



COUNTY OF LOS ANGELES DEPARTMENT OF HEALTH SERVICES
IMMUNIZATION PROGRAM
NATIONAL IMMUNIZATION SURVEY, 2001
APRIL 2003

Background

The National Immunization Survey (NIS) provides estimates of vaccination coverage levels by vaccine and series among children 19-35 months of age in the United States at selected age milestones. Estimates are also provided for each state and 28 urban areas, including Los Angeles County (LAC). The NIS was initiated by the Centers for Disease Control and Prevention (CDC), sponsored by the National Immunization Program and the National Centers for Health Statistics, in April 1994 as a standardized means to monitor progress in meeting national goals to appropriately vaccinate 90% of preschool aged children by the year 2010. Results of the NIS are summarized and distributed annually on the CDC website.

Methods

NIS Eligibility

- Households with children 19-35 months of age are eligible for inclusion in the survey.

NIS Sample Design

- Quarterly telephone surveys.
- Randomly generated listed and unlisted telephone numbers.
- Telephone numbers are linked to geographic areas based on the area code and prefix.

Collected Data

- Participants are asked to provide the following:
 - The dates of their child's vaccinations from written records. If the record is not available they are asked to recall the number of doses of each vaccine their child has.
 - The names and addresses of their child's vaccination providers.
 - Verbal consent to contact their child's vaccination providers.
 - Demographic information.
- Vaccination providers are contacted by mail to obtain and/or verify vaccination dates of their patients participating in the NIS, provided parent/guardian gives consent.

Data Analysis

- Vaccination rates are estimated by adjusting the data for non-response of parents and providers and for households that do not have telephones.
- Confidence limits are presented for each estimate. The confidence limits reflect the range within which 95% of the estimates would fall if the survey were repeated over and over. When confidence intervals overlap, the point estimates do not represent statistically significant differences.

Results

The 2001 survey includes children who were born from February 1998 through May 2000, i.e., children who were 19-35 months of age during 2001. In this report, the results are grouped into four categories:

- I. Sampling and Response Rates.
- II. Estimated Vaccination Coverage with Individual Vaccines and Selected Vaccination Series
 - General Summary and Trends.

- III. Estimated Vaccination Coverage with Individual Vaccine and Selected Vaccination Series – Stratified Summary.
- IV. Estimated Vaccination Coverage with Individual Vaccines by Age Milestone.
- V. Healthy People 2010 Objectives and Los Angeles County Status.

I. Sampling and Response Rates

Table 1. Number of eligible households and children with completed interviews and adequate provider data for the United States and Los Angeles County, National Immunization Survey – 2001.

	United States	Los Angeles County
Households		
Number eligible	35,985	537
Number with completed interviews (%)	32,796 (91.1)	489 (91.1)
Children		
Number with completed interviews	33,437	509
Completed interviews and adequate provider data (%)	23,531 (70.4)	329 (64.6)

In 2001, LAC had 537 households that were eligible for inclusion in NIS. Ninety-one percent (489) of these households completed interviews, which is a considerably high response rate. These 489 household interviews resulted in 509 completed interviews on children in the eligible age-range. Of these 509 children, 329 (64.6%) also had adequate provider data. These proportions were similar to the proportions for the entire United States. The coverage level estimates contained in NIS come from the analysis on the data from children with completed interviews and adequate provider data (329 for LAC and 23,531 for the U.S.).

II. Estimated Vaccination Coverage with Individual Vaccines and Selected Vaccination Series – General Summary and Trends

Table 2. Estimated vaccination coverage levels among children 19-35 months of age for Los Angeles County, the United States, and other urban areas, National Immunization Survey – 2001.

	4:3:1 series ¹	4:3:1:3 series ²	4:3:1:3:3 series ³
	% ± 95% CI ⁴	% ± 95% CI	% ± 95% CI
Los Angeles County, CA (n=329)	76.7 ± 5.2	73.3 ± 5.4	71.6 ± 5.5
United States (n=23,531)	78.6 ± 0.9	77.2 ± 0.9	73.7 ± 0.9
California State	76.5 ± 3.6	74.9 ± 3.6	72.6 ± 3.7
Jefferson County, AL	86.9 ± 4.0	86.6 ± 4.0	79.5 ± 5.0
Maricopa County, AZ	73.1 ± 5.6	71.7 ± 5.7	66.5 ± 5.9
San Diego County, CA	80.8 ± 4.4	79.9 ± 4.5	75.7 ± 4.8
Santa Clara, CA	80.0 ± 5.0	77.0 ± 5.3	70.7 ± 5.7
Dade County, FL	79.1 ± 5.7	77.8 ± 5.8	74.5 ± 6.2
Duval County, FL	77.5 ± 5.4	76.0 ± 5.5	73.7 ± 5.7
Fulton/DeKalb Counties, GA	78.3 ± 5.4	75.1 ± 5.7	73.0 ± 5.8
Chicago City, IL	71.9 ± 5.9	69.0 ± 6.0	65.1 ± 6.2
Marion County, IN	74.6 ± 6.4	72.0 ± 6.6	68.6 ± 6.7
Orleans Parish, LA	69.3 ± 5.9	67.8 ± 6.0	62.4 ± 6.1
Baltimore, MD	72.4 ± 6.2	71.6 ± 6.2	65.3 ± 6.4
Boston, MA	85.1 ± 4.6	84.5 ± 4.7	78.5 ± 5.4
Detroit, MI	65.3 ± 6.3	62.5 ± 6.4	57.7 ± 6.5
Newark, NJ	67.0 ± 5.7	64.0 ± 5.9	58.8 ± 6.1
New York, NY	77.6 ± 5.7	75.9 ± 5.9	74.3 ± 6.1
Cuyahoga County, OH	74.0 ± 5.7	72.8 ± 5.8	67.4 ± 6.0
Franklin County, OH	79.3 ± 4.9	78.3 ± 5.0	74.4 ± 5.3
Philadelphia County, PA	76.0 ± 5.4	73.8 ± 5.6	64.9 ± 6.1
Davidson County, TN	83.1 ± 4.6	81.9 ± 4.7	77.6 ± 5.0
Shelby County, TN	75.8 ± 5.4	73.9 ± 5.6	72.1 ± 5.7
Bexar County, TX	75.1 ± 5.1	73.2 ± 5.3	71.4 ± 5.4
Houston, TX	70.5 ± 6.6	69.2 ± 6.7	63.0 ± 7.3
Dallas, TX	68.9 ± 5.7	66.5 ± 5.9	63.1 ± 5.9
El Paso, TX	69.2 ± 5.3	68.5 ± 5.3	64.4 ± 5.4
King County, WA	73.8 ± 5.9	72.3 ± 6.0	64.7 ± 6.2
Milwaukee County, WI	71.7 ± 6.4	70.3 ± 6.4	65.6 ± 6.4

¹ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV.

² Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, and three or more doses of Hib.

³ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, three or more doses of Hib, and three or more doses of hepatitis B vaccine.

⁴ Confidence interval.

Among the 28 urban areas for which coverage levels were estimated, the 4:3:1 series, the 4:3:1:3 series, and the 4:3:1:3:3 estimates were lowest for the city of Detroit (65.3%, 62.5%, and 57.7%, respectively) and highest for Jefferson County (Birmingham), Alabama (86.9%, 86.6%, and 79.5%, respectively). Coverage estimates for LAC were consistent with those for other California counties, the state of California, and most other urban areas throughout the United States.

Table 3. Estimated vaccination coverage levels among children 19-35 months of age, Los Angeles County and the United States, National Immunization Survey – 2001.

Vaccine(s)	Los Angeles County (n=329)	United States (n=23,531)
	% ± 95% CI ¹	% ± 95% CI
≥ 4 DTaP/DT	80.2 ± 4.8	82.1 ± 0.8
≥ 3 DTaP/DT	95.3 ± 2.9	94.3 ± 0.5
≥ 3 Poliovirus	89.1 ± 3.9	89.4 ± 0.7
≥ 1 MCV ²	91.9 ± 3.6	91.4 ± 0.6
≥ 3 Hib	90.1 ± 3.9	93.0 ± 0.6
≥ 3 Hepatitis B	91.6 ± 3.3	88.9 ± 0.7
≥ 1 Varicella	84.5 ± 4.5	76.3 ± 0.8
4:3:1 ³	76.7 ± 5.2	78.6 ± 0.9
4:3:1:3 ⁴	73.3 ± 5.4	77.2 ± 0.9
4:3:1:3:3 ⁵	71.6 ± 5.5	73.7 ± 0.9

¹ Confidence interval.

² Measles-containing vaccine.

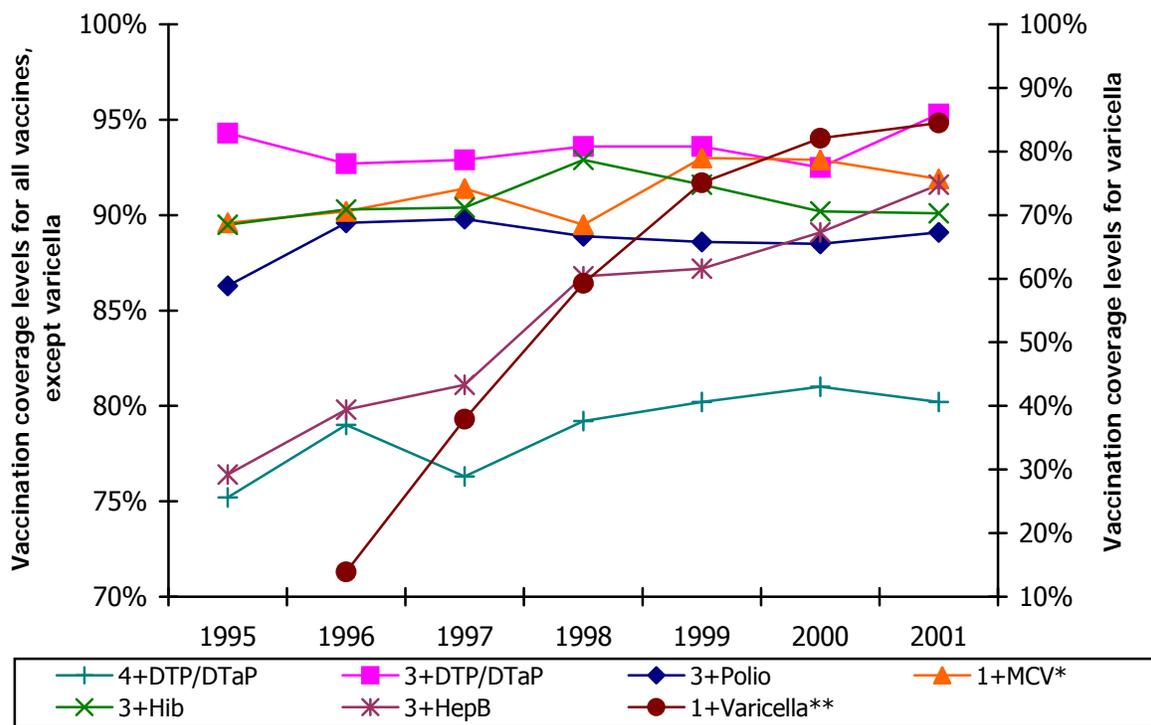
³ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV.

⁴ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, and three or more doses of Hib.

⁵ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, three or more doses of Hib, and three or more doses of hepatitis B vaccine.

In LAC, individual vaccine coverage estimates were highest for three or more doses of diphtheria, tetanus toxoids, and pertussis (DTaP/DT) vaccine and lowest for four or more doses of DTaP/DT. When comparing varicella vaccine coverage estimates for LAC and the entire U.S., LAC estimates are significantly higher. For all other vaccines there are no differences in coverage level estimates between LAC and the U.S.

Figure 1. Estimated vaccination coverage with individual vaccines among children 19-35 months of age, Los Angeles County, National Immunization Survey, 1995-2001.



*Measles-containing vaccine.

**Varicella vaccine was licensed by the Food and Drug Administration in 1995 and was added to the recommended childhood immunization schedule and the VFC Program in 1996.

In this graph, all vaccines except varicella are graphed using the vertical axis on the left. Since NIS began, vaccine coverage levels in LAC have remained fairly steady. However, there was an increase of more than 5% in hepatitis B vaccination coverage from 1997 to 1998, which was due to the California law requiring hepatitis B vaccination upon entry into kindergarten. Since NIS began, vaccination coverage levels for 3+DTaP/DT have been 3-8% higher than vaccination coverage levels for 3+Polio. The difference between 3+DTaP/DT coverage levels and 4+DTaP/DT coverage levels range from 12% to 19%, indicating that a need to improve efforts towards getting children immunized with the fourth dose of DTaP/DT remains. The varicella vaccine is graphed using the vertical axis on the right. Coverage estimates for varicella vaccine have significantly increased each year since its addition to the recommended childhood immunization schedule in 1996.

Table 4. Estimated vaccination coverage levels for children 19-35 months of age, Los Angeles County, National Immunization Survey – 1995-2001.

Year	4:3:1 series ¹	4:3:1:3 series ²	4:3:1:3:3 series ³
	% ± 95% CI ⁴	% ± 95% CI	% ± 95% CI
1995 ⁵	71.5 ± 8.5	67.7 ± 8.8	60.9 ± 9.0
1996 ⁵	75.6 ± 6.3	74.6 ± 6.4	67.3 ± 6.8
1997 ⁵	74.1 ± 6.6	71.6 ± 6.8	64.6 ± 7.2
1998	76.5 ± 5.9	76.0 ± 6.0	70.5 ± 6.3
1999	78.1 ± 5.6	76.0 ± 5.7	71.0 ± 6.0
2000	78.2 ± 5.1	76.5 ± 5.2	72.6 ± 5.4
2001	76.7 ± 5.2	73.3 ± 5.4	71.6 ± 5.5

¹ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV.

² Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, and three or more doses of Hib.

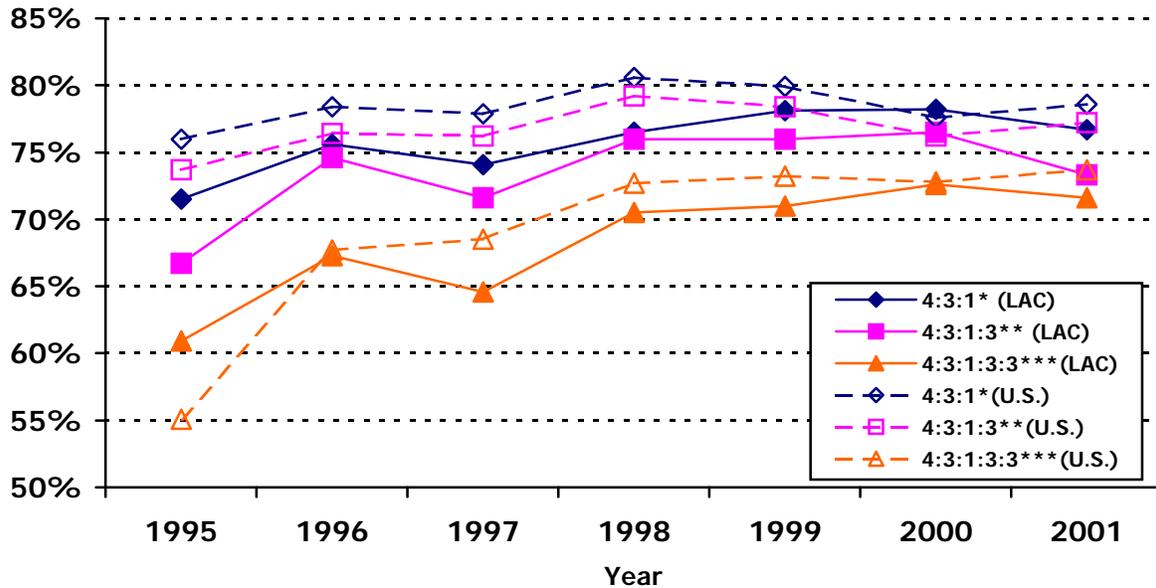
³ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, three or more doses of Hib, and three or more doses of hepatitis B vaccine.

⁴ Confidence interval.

⁵ Estimates from previous reports differ because they were obtained from different reporting sources. Currently, all estimates are obtained from NIS tables.

All three vaccine series experienced an increase in coverage levels between 1995 and 1996. There were small decreases between 1996 and 1997 and small increases between 1998 and 2000 for all three vaccine series. Between 2000 and 2001 there were slight decreases for all three vaccine series. These changes were not statistically significant. These results are also displayed graphically in Figure 2.

Figure 2. Estimated vaccination coverage levels with selected vaccination series among children 19-35 months of age, Los Angeles County (LAC) and the United States (U.S.), National Immunization Survey, 1995-2001.



*Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of Measles-containing vaccine (MCV).

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

***Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, three or more doses of Hib, and 3 or more doses of hepatitis B vaccine.

Comparing LAC and U.S. vaccination coverage estimates, coverage levels for the 4:3:1 series and the 4:3:1:3 series have followed similar trends since 1995. For the 4:3:1:3:3 series, estimated coverage levels for the U.S. and LAC have followed similar trends since 1997. Coverage levels for all three series have remained about the same for both LAC and U.S. since 1998. Although U.S. estimates are generally higher than LAC estimates, the differences are not statistically significant.

Estimated coverage levels for the different series are usually lower than the estimated coverage levels for the individual vaccines. Delaying the fourth dose of DTaP is the primary reason why vaccine coverage levels for the 4:3:1, 4:3:1:3, and 4:3:1:3:3 series are not higher.

III. Estimated Vaccination Coverage with Individual Vaccine and Selected Vaccination Series – Stratified Summary

IIIa. Race/Ethnicity

There were no significant differences in any of the vaccine coverage estimates for non-Hispanic whites compared with Hispanics (data not shown). Race-specific estimates for other racial/ethnic groups were not calculated because of insufficient sample size.

IIIb. Poverty Level

Table 5. Estimated vaccination coverage levels among children 19-35 months of age, overall and by poverty level, Los Angeles County, National Immunization Survey – 2001.

Vaccine(s)	Children 19-35 months of age	Above poverty level	Below poverty level
	% ± 95% CI ¹	% ± 95% CI	% ± 95% CI
≥ 4 DTaP/DT	80.2 ± 4.8	80.8 ± 6.5	74.9 ± 8.9
≥ 3 Poliovirus	89.1 ± 3.9	89.1 ± 5.1	90.1 ± 6.4
≥ 1 MCV ²	91.9 ± 3.6	89.3 ± 6.1	93.4 ± 5.1
≥ 3 Hib	90.1 ± 3.9	91.2 ± 4.8	90.4 ± 6.4
≥ 3 Hepatitis B	91.6 ± 3.3	91.0 ± 4.8	92.4 ± 5.6
≥ 1 Varicella	84.5 ± 4.5	84.3 ± 6.1	83.5 ± 8.1
4:3:1 ³	76.7 ± 5.2	75.2 ± 7.4	74.9 ± 8.9
4:3:1:3 ⁴	73.3 ± 5.4	73.1 ± 7.6	71.4 ± 9.3
4:3:1:3:3 ⁵	71.6 ± 5.5	70.5 ± 7.8	70.1 ± 9.4

¹ Confidence interval.

² Measles-containing vaccine.

³ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV.

⁴ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, and three or more doses of Hib.

⁵ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, three or more doses of Hib, and three or more doses of hepatitis B vaccine.

Although not statistically significant, the coverage level for four or more doses of DTaP/DT in children living below poverty level is six percent lower than that for children living above poverty level. Overall, estimates for the 29% of children living below the poverty level were not significantly different from the estimates for children living at or above the poverty level or from the overall estimates.

IIIc. VFC Provider Status

Table 6. Estimated vaccination coverage levels among children 19-35 months of age by provider participation in the Vaccines for Children (VFC) Program, Los Angeles County, National Immunization Survey – 2001.

Vaccine(s)	Children whose providers participated in the VFC program	Children whose providers did not participate in the VFC program
	% ± 95% CI ¹	% ± 95% CI
≥ 4 DTaP/DT	78.5 ± 6.2	83.8 ± 9.1
≥ 3 Poliovirus	89.9 ± 4.9	87.1 ± 8.6
≥ 1 MCV ²	91.0 ± 4.9	89.8 ± 7.4
≥ 3 Hib	89.2 ± 5.2	94.4 ± 5.4
≥ 3 Hepatitis B	91.4 ± 4.3	91.0 ± 6.5
≥ 1 Varicella	83.7 ± 5.9	85.8 ± 8.3
4:3:1 ³	76.5 ± 6.7	N/A ⁴
4:3:1:3 ⁵	71.9 ± 7.0	N/A ⁴
4:3:1:3:3 ⁶	70.7 ± 7.1	N/A ⁴

¹ Confidence interval.

² Measles-containing vaccine.

³ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV.

⁴ Estimate not available (N/A) if the unweighted sample size for the numerator was less than 30.

⁵ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, and three or more doses of Hib.

⁶ Four or more doses of DTaP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, three or more doses of Hib, and three or more doses of hepatitis B vaccine.

The Vaccines for Children (VFC) Program is federally funded and, through state and local health departments, provides free vaccines to participating health care providers. These providers administer vaccines to children who are eligible for Medi-Cal and the Child Health and Disability Prevention (CHDP) Program, are American Indian or Alaskan Native, or do not have health insurance. Additionally, children whose health insurance does not cover vaccinations may go to federally qualified health centers and rural health clinics to receive vaccine provided by the VFC Program. For both DTaP/DT and Hib estimates, the coverage level was 5% higher in children whose provider did not participate in the VFC program. However, the differences are not statistically significant. In general, coverage estimates for children whose providers participated in the VFC Program were not significantly different than estimates for children whose providers did not participate in the VFC Program.

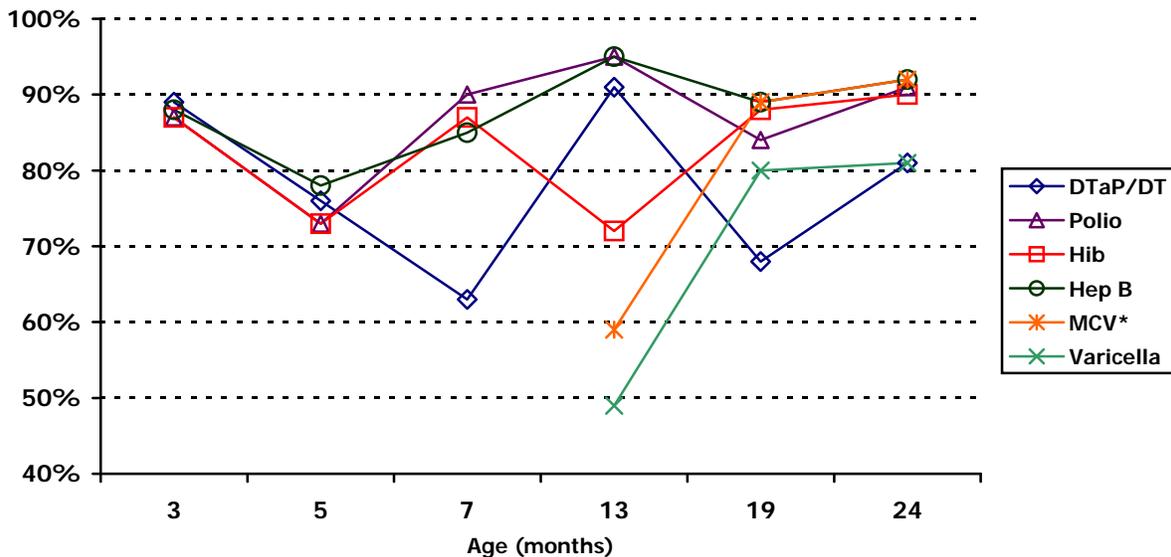
IV. Estimated Vaccination Coverage with Individual Vaccines by Age Milestone

Table 7. Required number of doses of individual vaccines for which coverage was estimated at 3, 5, 7, 13, 19 and 24 months of age, National Immunization Survey – 2001.

Age (months)	DTaP/DT	Polio	MCV	Hib	Hep B	Varicella
3	1	1	0	1	1	0
5	2	2	0	2	2	0
7	3	2	0	2	2	0
13	3	2	1	3	2	1
19	4	3	1	3	3	1
24	4	3	1	3	3	1

Coverage was also estimated at 3, 5, 7, 13, 19, and 24 months of age. The required number of doses of individual vaccines at each age milestone for which coverage was estimated is shown in Table 7. Four Hib conjugate vaccines are licensed for use in infants 6 weeks of age and older. One of these requires only two primary doses, as opposed to three primary doses, for children immunized before 7 months of age. This particular vaccine is also the Hib component in the combination Hib and hepatitis B vaccine, which is widely used in Los Angeles County. For this reason, the assessment of Hib coverage levels at 7, 13, 19, and 24 is based upon the schedule for the vaccine requiring two primary doses.

Figure 3. Estimated vaccination coverage with individual vaccines by age, Los Angeles County, National Immunization Survey, 2001.



*Measles-containing vaccine.

For DTaP/DT, poliovirus, and hepatitis B vaccines, coverage estimates peaked at 13 months of age. Coverage estimates for Hib, varicella, and MCV increased at each successive age milestone after 13 months.

The increase in DTaP/DT vaccine coverage levels from 63% at 7 months to 91% at 13 months implies a delay in children getting the third dose of the vaccine. Similarly, the change from a 68% coverage level at 19 months to an 81% coverage level at 24 months implies that children are late in receiving their fourth dose of DTaP/DT vaccine.

V. Healthy People 2010 Objectives and Los Angeles County Status

Table 8. Immunization objectives for Healthy People 2010, target coverage levels, and Los Angeles County estimates for 2001.

Healthy People 2010 Objective	Healthy People 2010 Target	Los Angeles County Estimate, 2001
Increase in and Maintenance of Vaccination Coverage Levels Among Children Aged 19 to 35 Months		
4 doses diphtheria-tetanus-acellular pertussis (DTaP) vaccine	90%	80%
3 doses Haemophilus influenzae type b (Hib) vaccine	90%	90%
3 doses hepatitis B (hep B) vaccine	90%	92%
1 dose measles-mumps-rubella (MMR) vaccine	90%	92%
3 doses polio vaccine	90%	89%
1 dose varicella vaccine	90%	85%
Increase in Coverage Levels of Universally Recommended Vaccines		
Children aged 19 to 35 months who receive the recommended vaccines (4 DTaP, 3 polio, 1 MMR, 3 Hib, 3 hep B)	80%	72%

The national 90% vaccination goal for children 19 to 35 months of age was achieved for three doses of Hib vaccine, three or more doses of hepatitis B vaccine, and one or more doses of MCV, which was also the case in the 2000 NIS. LAC has not reached the Healthy People 2010 target levels for four or more doses of DTaP, three doses of poliovirus vaccine, 1 dose of varicella, and the 4:3:1:3:3 series. The low coverage level for four or more DTaP is the primary reason that LAC has not reached the 80% goal for the 4:3:1:3:3 series. However, coverage levels for polio vaccine must also improve if LAC is to achieve this national goal.

Discussion

Summary

Through annual surveys like the NIS and the kindergarten retrospective survey, LAC Immunization Program will continue to monitor our progress in achieving our vaccination goals. Despite the vaccine shortages experienced nationally, there was not a significant drop in the proportion of children vaccinated with the varicella, DTaP, MCV, and Hib vaccines in Los Angeles County. Los Angeles County was only able to achieve a completion level of 80% for the DTaP/DT vaccine, which was slightly lower than the 85% coverage achieved in 2000. Although there have been improvements in vaccination coverage among preschool-aged children in Los Angeles County, optimal vaccination levels have not been achieved.

Comparison to Other Data Sources

The vaccination coverage estimates from the NIS are slightly higher than the estimates from the annual kindergarten retrospective survey conducted in Los Angeles County. The kindergarten retrospective survey is an annual survey of a sample of children entering public or private kindergartens in Los Angeles County. School-based vaccination records required for kindergarten entry are reviewed to estimate vaccination coverage levels in prior years. Of children who entered kindergarten in fall 2001, an estimated 70.0% had received the 4:3:1 series when they were 24 months of age in 1998. There are several reasons for the differences between the NIS and kindergarten retrospective survey estimates. First, the target age for the NIS is 19-35 months compared with 24 months for the kindergarten retrospective survey. Second, the two surveys use different sampling methods and are subject to different biases. The kindergarten retrospective survey is a records-based assessment and is not subject to response bias. NIS estimates are subject to sampling bias, but are adjusted to account for some of that bias. Third, the two surveys provide estimates for different cohorts of children. The 2001 kindergarten retrospective survey provides an estimate for children who were two years of age in 1998 compared with those 19-35 months of age in 2001 for the NIS. Also, the NIS is a population-based estimation; the kindergarten retrospective survey is not.

Limitations

The NIS provides overall vaccination coverage estimates for Los Angeles County. Because of the sample size and survey technique, the data cannot be analyzed for smaller geographic regions or specific communities. The NIS is useful for monitoring overall trends in the county but is limited in its ability to assist communities in assessing their immunization needs.

Further Information

Complete results of the 2001 NIS are available at <http://www.cdc.gov/vaccines/stats-surv/default.htm>.