

# Varicella Vaccination Coverage among Adolescents Ages 13-17 Years, United States, National Immunization Survey, 2007-2014

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## BACKGROUND

- Varicella (chickenpox) is typically a self-limiting disease but it can be more severe in adolescents and adults.
- In 1996, a 1-dose childhood varicella vaccination program was implemented in the U.S.
- In 2007, 2-doses of varicella vaccine were routinely recommended for children, with a catch-up second dose for persons who received 1 prior dose.
- The Healthy People 2020 target for varicella is 90% 2-dose varicella vaccination coverage among 13-15 year-olds.
- In 2006, the National Immunization Survey-Teen (NIS-Teen) was implemented to assess US vaccination coverage among 13-17 year-olds.



## STUDY OBJECTIVES

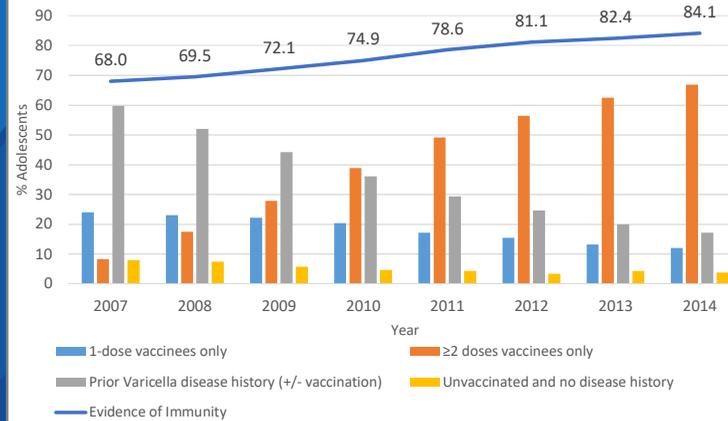
- To examine trends in coverage with ≥2 varicella vaccine doses in adolescents and trends in the proportion of adolescents with evidence of immunity to varicella during 2007-2014
- To assess the timing of second-dose receipt, factors associated with ≥2 dose coverage, and missed opportunities for second-dose vaccination among adolescents in 2014

## METHODS

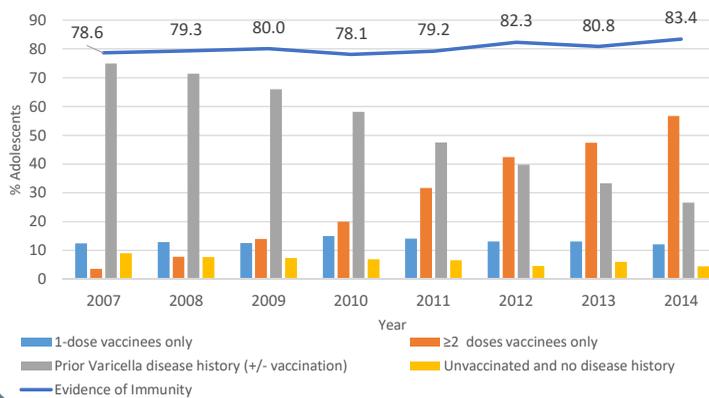
- Data Source:**
  - 2007-2014 NIS-Teen data
- Study Population:**
  - Adolescents aged 13-17 years from 50 US states and the District of Columbia with adequate provider data (APD)
- Study Definitions:**
  - Varicella vaccination:** receipt of either single-antigen (Varivax<sup>®</sup>) or combination measles, mumps, rubella, varicella (ProQuad<sup>®</sup>) vaccine
  - Varicella vaccination coverage:** Varicella vaccination among adolescents without a history of varicella (from provider or parental/guardian report)
    - 1-dose: received 1 dose of varicella vaccine at ≥12 months of age
    - ≥2-dose: received a first dose of varicella vaccine at ≥12 months of age and a second dose a minimum of 28 days after the first dose; included any adolescent who received more than 2 varicella vaccine doses
  - Evidence of immunity to varicella:** receipt of ≥2 doses of varicella vaccine or varicella history
  - Receipt of a (non-varicella) adolescent vaccine:** receipt of ≥1 dose of tetanus-diphtheria and acellular pertussis (Tdap) vaccine at or after age 10 years, meningococcal vaccine, or any human papillomavirus (HPV) vaccine
  - Missed opportunity for a second dose of varicella vaccine:** provider visit where any vaccine dose was given, other than the second varicella dose among 1-dose varicella vaccinated adolescents
  - Achievable ≥2-dose coverage:** ≥2-dose varicella vaccination coverage (among adolescents without disease history) that could have been attained if all 1-dose vaccinated adolescents received their second dose of varicella vaccine at a visit when they received other vaccinations
- Analyses**
  - Varicella vaccination and disease history, 2007-2014:** Calculated the weighted proportions of adolescents who (1) received 1 dose only, (2) received ≥2 doses of varicella vaccine; (3) had disease history (regardless of varicella vaccine receipt), (4) were unvaccinated with no disease history; calculated the weighted proportions of adolescents with evidence of immunity by age group
  - Timing of second dose, 2014:** Examined timing of receipt of the second dose by age at the time of survey
  - Factors related to receipt of ≥2 varicella vaccine doses, 2014:** Multivariate logistic regression to examine factors (Table) related to receipt of ≥2 varicella vaccine doses

**Figure. Estimated varicella vaccination coverage and disease history among adolescents aged 13-17 years, by age group and year—National Immunization Survey-Teen, United States, 2007-2014**

### A. Age Group: 13-15 year-olds



### B. Age Group: 16-17 year-olds



**Table. Factors associated with ≥2 dose varicella vaccination coverage among adolescents aged 13-17 years—National Immunization Survey-Teen, United States, 2014<sup>a</sup>**

Variable	≥2 dose coverage, unadjusted N=16,461		Adjusted Prevalence Ratio for ≥2 dose coverage (i.e., risk ratio) (95% CI)	p-value (adjusted)
	N	Weighted % (95% CI)		
<b>Age at interview</b>				
13-15 years	10,555	80.8 (79.4-82.2)	1.02 (0.99-1.05)	0.1092
16-17 years	5,906	77.3 (75.2-79.3)	REF	
<b>Gender</b>				
Male	8,513	78.9 (77.1-80.5)	REF	
Female	7,948	80.2 (78.6-81.8)	1.01 (0.99-1.04)	0.3151
<b>Race/Ethnicity</b>				
Non-Hispanic White	10,602	78.0 (76.5-79.3)	REF	
Non-Hispanic Black	1,649	83.8 (81.0-86.2)	1.08 (1.04-1.12)	0.0002
Hispanic	2,545	81.9 (78.5-84.8)	1.06 (1.01-1.10)	0.014
Other	1,665	76.7 (71.8-80.9)	1.02 (0.97-1.07)	0.4258
<b>Metropolitan Statistical Area (MSA)</b>				
Urban	6,672	81.1 (79.0-83.0)	REF	
Suburban	6,431	80.3 (78.6-81.8)	0.99 (0.96-1.02)	0.5461
Rural	3,358	72.4 (69.4-75.3)	0.94 (0.90-0.98)	0.0023
<b>Income to poverty ratio<sup>b</sup></b>				
<133%	4,030	81.0 (78.9-83.0)	REF	
133-322%	4,753	76.7 (74.2-79.0)	0.94 (0.91-0.98)	0.0032
322->503%	3,512	80.4 (78.0-82.6)	0.95 (0.91-1.00)	0.0343
≥503%	4,166	80.4 (77.6-83.0)	0.95 (0.90-0.99)	0.0275
<b>Health Insurance Status</b>				
Private only	8,443	80.9 (79.2-82.4)	REF	
Medicaid or I.H.S.	6,236	78.3 (76.4-80.2)	0.97 (0.94-1.00)	0.0505
Uninsured	641	74.9 (67.8-80.8)	0.97 (0.91-1.04)	0.3824
CHIP (Public)	458	86.1 (81.1-89.9)	1.04 (0.98-1.10)	0.2079
Military	547	74.6 (67.4-80.7)	0.96 (0.87-1.06)	0.392
Other	136	87.2 (76.6-93.4)	1.06 (0.95-1.18)	0.3952
<b>Well-child visit at 11-12 years<sup>c</sup></b>				
Yes	7,752	87.5 (86.0-88.8)	REF	
No	8,709	73.0 (71.2-74.7)	0.90 (0.88-0.93)	<0.0001
<b>Whether child received ≥1 dose of adolescent vaccine<sup>d</sup></b>				
Yes	15,164	84.1 (83.0-85.1)	REF	
No	1,297	22.1 (18.0-26.9)	0.33 (0.27-0.41)	<0.0001
<b>Lives in state with 2-dose varicella school entry requirement (Based on 2013 SY data)</b>				
Yes	7,356	85.4 (83.9-86.9)	REF	
No	9,105	76.0 (74.3-77.6)	0.89 (0.86-0.91)	<0.0001

Abbreviations, CI=Confidence Interval; I.H.S.=Indian Health Service; CHIP=Children's Health Insurance Program  
<sup>a</sup>Responses may not have been available for all teens. Percentages are rounded. A p-value <0.05 was considered statistically significant (significant values are in bold text).  
<sup>b</sup>Income-to-poverty ratios were calculated using 2013 Census Bureau poverty thresholds. This was based on the exact income if given or midpoint of income bounds if entire income cascade was completed.  
<sup>c</sup>Data on well-child visits at 11-12 years were obtained from the provider survey.  
<sup>d</sup>Adolescent vaccines included ≥1 dose Tdap or ≥1 dose Meningococcal or ≥1 dose HPV.

## RESULTS

- Median annual number of adolescents aged 13-17 years included in the NIS-teen survey was 19,228. A total of 20,827 adolescents with ADP were included in the 2014 survey.
- During 2007-2014, the proportion of adolescents with ≥2 doses of varicella vaccine increased from 8.3% to 66.9% among those aged 13-15 years and from 3.6% to 56.7% among those aged 16-17 years. (Figure)
- During 2007-2014, the proportion of adolescents with evidence of immunity also increased, from 68.0% to 84.1% among those aged 13-15 years and from 78.6% to 83.4% among those aged 16-17 years. (Figure)
- Among adolescents who received ≥2 doses of varicella vaccine by 2014, a higher proportion of 13-15 year-olds received their 2nd dose at 4-6 years compared to 16-17 year-olds (13.4% versus 3.2%).
- Factors significantly associated with lower ≥2 dose coverage included non-Hispanic White race/ethnicity; rural residence; living at >133% of the income-to-poverty ratio; no 11-12 year well-child visit; not receiving an adolescent vaccine; and residence in a state with no 2-dose immunization school entry requirement. (Table)
- Among the 2,478 adolescents who received only 1-dose of varicella vaccine, 77.1% (1,922) had at least 1 missed opportunity to receive their 2nd dose; potentially 2-dose coverage could have increased from 79.5% to 94.8%.

## CONCLUSIONS

- The ≥2-dose varicella vaccination coverage and the proportion of adolescents with evidence of immunity to varicella increased during 2007 to 2014.
- Despite significant progress in ≥2-dose varicella vaccination coverage in adolescents, there were still 16% who lacked evidence of immunity in 2014.
- Our identification of differences in ≥2-dose varicella vaccination coverage in certain subgroups in the population will help target messages and interventions to increase coverage in these subgroups.
- Though catch-up campaigns have succeeded, missed opportunities for varicella vaccination persist.
- It is important for providers to ensure that adolescents are up-to-date on all routine vaccinations and are protected from varicella.

