

REPORT TO THE LEGISLATURE
BY THE CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
AS MANDATED BY CHAPTER 745, STATUTES OF 2001, SECTION 150 FOR REPORTING
PERIODS 2014 to 2016

THE IMMUNIZATION STATUS OF YOUNG CHILDREN IN CALIFORNIA
May 2018

Karen Smith, MD, MPH, Director
California Department of Public Health

CONTACT INFORMATION

Copies of this report may be obtained from the Immunization Branch, California Department of Public Health, 850 Marina Bay Parkway, Richmond, CA 94804, telephone 510-620-3737.
izbranch@cdph.ca.gov.

CONTENTS

Mandate for the Report.....	2
Executive Summary.....	3
Background: Vaccine-Preventable Diseases	6
I. The Immunization Status of Young Children	13
II. Strengthening Immunization Efforts in California	18
III. Improving Outreach and Education Efforts.....	24
IV. Recommendations for a Comprehensive Immunization Strategy and Analysis of Funding Requirements.....	26
Appendix A: Percent of Two Year Olds Up to Date on Immunizations, Medi-Cal Managed Care Health Plans by County, 2014	29
Appendix B: 2016 Childhood Immunization Schedule	30

[INTENTIONALLY LEFT BLANK]

IMMUNIZATION OF YOUNG CHILDREN IN CALIFORNIA

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

2014 to 2016

MANDATE FOR THE REPORT

This report complies with Health and Safety Code §120475, which was enacted by Senate Bill (SB) 1360 (Chapter 415, Statutes of 1995). Under the provisions of this statute, as amended by SB 1191 (Chapter 745, Statutes of 2001), the Department of Public Health (CDPH)* is required to submit a biennial report to the legislature covering the following topics:

- The immunization status of young children in the State, based on available data
- The steps taken to strengthen immunization efforts, particularly through the Child Health and Disability Prevention (CHDP) program
- The steps taken to improve immunization levels among currently underserved minority children, young children in family daycare and other childcare settings, and children with no health insurance coverage
- The improvements made in ongoing methods of immunization outreach and education in communities where immunization levels are disproportionately low

This report incorporates CDPH's recommendations for a comprehensive strategy for fully immunizing all California children and its analysis of the funding necessary to implement this strategy. This report covers the biennial reporting period of 2014 to 2016.

*§120475 directs the Department of Health Services (DHS) to submit this report, but in July 2007, DHS split into two new agencies, the Department of Public Health and the Department of Health Care Services. The Department of Public Health has taken responsibility for this report.

EXECUTIVE SUMMARY

Immunization Status of Young Children: California and the United States as a whole continue to strive to meet the federal Department of Health and Human Services' *Healthy People 2020* goal of on-time vaccination for 90% of two-year-olds and 95% of school-age children. In the most recent National Immunization Survey in 2015, 85% of Californians 19 to 35 months of age had received all doses of DTaP (diphtheria, tetanus, pertussis), MMR (measles, mumps, rubella), and polio vaccines – collectively known as the 4:3:1 series – that are recommended before the age of two. Fewer (77%) had received that series as well as the recommended doses of hepatitis B and Hib (*Haemophilus influenzae* type b) vaccines. California slightly exceeds the national average rates on both measures, which are 83% and 76%, respectively.

The vast majority of low-income children are enrolled in Medi-Cal managed care plans (MCPs). The percentage of MCP members who were fully immunized at age two has fallen for four consecutive years, from 78% in 2010 to 71% in 2015. Among individual MCPs, percentages of fully immunized two-year-olds range from less than 60% to over 85% (see Appendix A).

Partnerships that Strengthen Immunization Efforts: CDPH coordinates extensive efforts to facilitate and encourage immunization, involving the Department itself, other State agencies, and private enterprise. CDPH is working closely with the Department of Health Care Services (DHCS) and healthcare providers, so Californians can take full advantage of the Patient Protection and Affordable Care Act (ACA) as it applies to immunization coverage.

CDPH supports the immunization efforts of local health departments and provides technical assistance to public and nonprofit health clinics, including periodic evaluations of areas in which those clinics can improve their performance. CDPH participates in the California Immunization Coalition, which brings many public and private entities involved with immunization together. CDPH assists schools and child care centers in following state law on immunization requirements, creates professional education materials for healthcare providers, and informs parents about vaccine issues through a variety of traditional and new media projects.

CDPH receives invaluable support from several State programs in pursuing the immunization of children. The Women, Infants, and Children (WIC) Supplemental Nutrition Program, which serves more than 60% of infants born in California, includes immunization screening and education as a regular part of its interactions with clients. The Child Health and Disability Prevention (CHDP) Program provides preventive health services, including immunizations, to low-income children and adolescents; its local branches frequently collaborate with local immunization programs by sharing information, training healthcare providers in vaccine-related procedures, and conducting public outreach to promote immunization.

The Vaccines for Children Program (VFC) was established by Congress in 1993 to help families by providing free vaccines to medical providers who serve eligible children 18 years of age and younger. The Centers for Disease Control and Prevention (CDC) administers the VFC program at the national level. CDC contracts with vaccine manufacturers to purchase Federal Food and Drug Administration (FDA)-approved vaccines at reduced rates. In California, the VFC Program is administered by the

CDPH, Immunization Branch. Medi-Cal is federally mandated to cover all vaccines that are FDA approved and that are recommended by the federal Advisory Committee on Immunization Practices (ACIP).

Between 2014 and 2016, the State of California bought more than ten million doses of ACIP recommended vaccines per year with VFC funds. VFC-purchased vaccines are distributed through both public and private healthcare providers who enroll as VFC providers. These providers also receive a broad range of technical support and materials from CDPH. Medi-Cal requires providers to enroll as VFC providers.

Steps to Improve Immunization of Minority and Uninsured Children: CDPH continues to develop and support efforts to address disparities, including focus on increasing prenatal immunization with Tdap (tetanus, diphtheria and pertussis) vaccine, primarily among pregnant Latina women. Prenatal immunization allows maternal antibodies to be transferred across the placenta before birth, so infants can be born with protection against pertussis. Infants less than 4 months of age are most vulnerable to hospitalization and death due to pertussis. Data from the California Maternal and Infant Health Assessment Survey from 2014 show that Tdap vaccination during pregnancy is higher among women with private insurance (56.3%) than women with Medi-Cal coverage (35.6%), as well as higher among White (48.4%) and Asian (56.1%) women compared to Hispanic (40.0%) and African-American (43.0%) women. In 2015, CDPH undertook several initiatives, including the DHCS National Governor's Association Learning Collaborative, to increase prenatal immunization rates in the State. DHCS also exercises its contract authority with health plans that requires health plans that do not meet performance thresholds for childhood immunization rates to develop quality improvement initiatives to address their performance and improve their reporting, which has been identified as an issue that contributes to lower performance rates.

Several other programs facilitate the immunization of uninsured children in California. As undocumented children are enrolled in MCPs, ongoing CDPH work with DHCS should improve immunization coverage of these new enrollees, as well. Uninsured children are eligible to receive VFC vaccine from VFC-enrolled providers, which may be public clinics or private practitioners. The CHDP Program, which includes uninsured children, screens participants for immunization status at every health assessment visit. Many uninsured children are WIC enrollees and are screened through that program as well.

Improvements in Outreach and Education: CDPH produces a variety of educational materials in multiple languages for families, providers, and school staff. In crafting content and selecting from media options, CDPH takes an evidence-based approach, maximizing impact and cost-effectiveness. Various projects include *Shot By Shot*, an online repository of true stories about personal experiences with vaccine-preventable disease, and *EZ-IZ*, an interactive web-based training for medical assistants who work with vaccines. The *EZ-IZ* lessons are now required for health care providers to participate in the VFC Program.

Strategy Recommendation and Funding Analysis: For several years, state general funds supporting immunization activities in California have not been available, other than for purchase of vaccine used primarily to protect adults against influenza. As a result, the CDPH immunization program is almost completely dependent on federal funding. Full implementation of the statewide California Immunization Registry (CAIR) in 2017 will enable better assessment of current

immunization gaps, better targeting and assessment of interventions, and better estimates of funding needed to ensure all California children are fully protected.

BACKGROUND: VACCINE-PREVENTABLE DISEASES

Thanks in large part to the development and widespread use of vaccines, deadly diseases, such as polio and diphtheria, have entirely, or almost entirely, disappeared in the United States. Immunization not only saves lives and reduces pain, suffering, and disability, it also saves money. According to the CDC, among 78.6 million children born during 1994–2013, immunization will potentially avert \$402 billion in direct costs and \$1.5 trillion in societal costs because of prevented illnesses over their lifetimes.¹ In 2009, each dollar invested in vaccines and their administration in the U.S. resulted in an estimated \$3 in direct benefits and \$10 in benefits when societal costs are included.¹

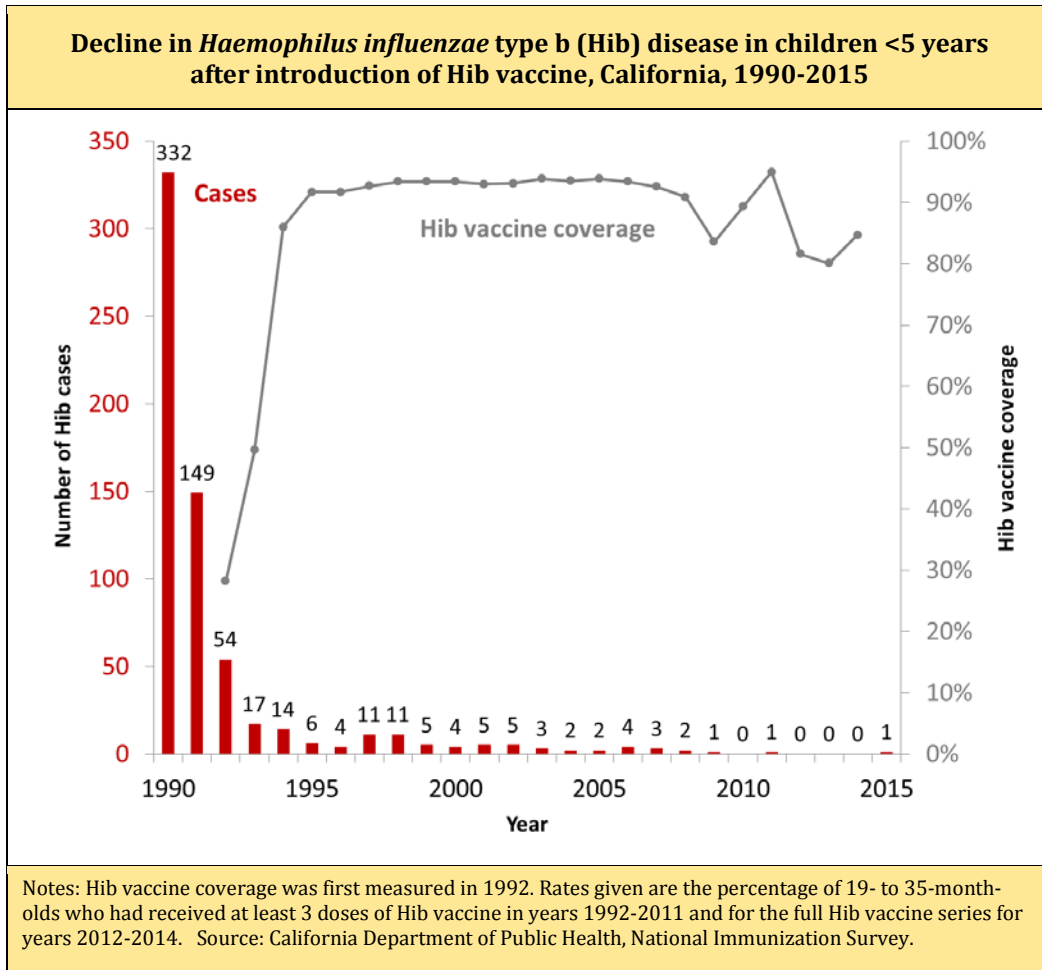
Cases of Selected Vaccine-Preventable Diseases in California, all ages: 2015, 2000, and Historic Highs				
Diseases	Routine Vaccine Abbreviations	2015	2000	Historic High (year)
Measles	MMR	125*	19	39,201 (1961)
Mumps		31	84	26,216 (1960)
Rubella		0	6	9,539 (1967)
Diphtheria	DTaP, Tdap	0	0	1,299 (1945)
Pertussis		4,706	672	21,344 (1941)
Tetanus		3	9	26 (1963)
Hepatitis A	HAV	179	2,785	8,270 (1986)
Hepatitis B (acute)	HBV	158	982	5,969 (1985)
Polio	IPV	0	0	2,574 (1952)
Hib†	Hib	1	4	697 (1990)
<small>*Includes cases from the 2014 California Disneyland-associated measles outbreak †<i>Haemophilus influenzae</i> type b disease in children <5 years of age Source: California Department of Public Health</small>				

For example, according to data from the Office of Statewide Health Planning and Development, approximately 30,000 Californians infected with hepatitis B virus were hospitalized for liver disease, liver cancer, or liver transplant from 2001-2011. These hospital stays cost more than \$6.5 billion, with more than 30% of this expense covered by Medi-Cal. These costs are almost entirely avoidable

¹ CDC. Benefits from Immunization during the Vaccines for Children Program Era — United States, 1994–2013. MMWR. April 25, 2014 / 63(16); 352-355. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6316a4.htm>

through vaccination. Immunization has reduced vaccine-preventable diseases compared to the pre-vaccination era, but opportunities for improvement still exist.

Achievements in the Control of Vaccine-Preventable Diseases



Haemophilus influenzae type b (Hib) disease: Hib used to be the leading cause of meningitis in children. Since Hib vaccine became available in the early 1990's, Hib disease has been nearly eliminated (Figure above).

Hepatitis A: Hepatitis A vaccine was first licensed in 1995 and was recommended for all California children in 1999. The incidence of hepatitis A has declined from 20 cases per 100,000 population in 1995, to less than 1 per 100,000 population in 2015. Hepatitis A has become less common among all age groups since the vaccine was recommended for children, suggesting that in addition to preventing hepatitis A in children, the vaccine has interrupted transmission of the disease from children to adults.

Hepatitis B: In 1990, one year before hepatitis B vaccine became part of the routine childhood vaccination schedule, California had 224 reported acute cases of hepatitis B infection in persons between 1 and 19 years of age. In 2015, there were no cases of acute hepatitis B infection reported in

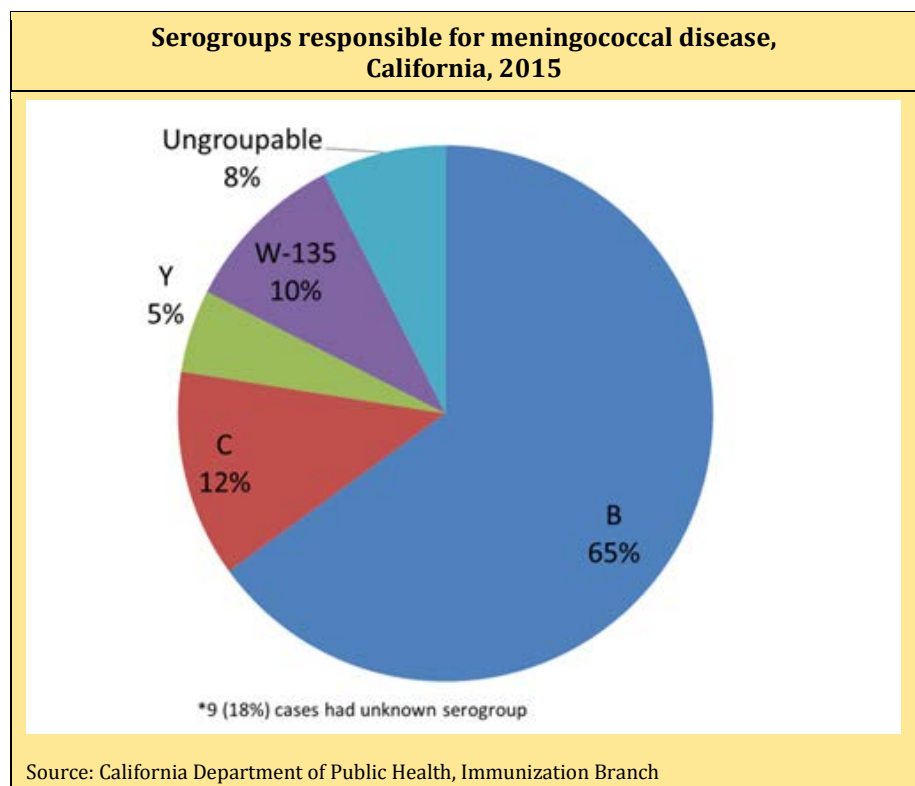
this age group. Risk factors for infection include injection drug use, household exposure, and sexual contact.

When acquired during infancy, hepatitis B infection is most likely to result in chronic infection, cirrhosis, or liver cancer many years later. Since 1999, California has had a program in place to identify pregnant women infected with hepatitis B and treat their infants at birth to prevent chronic infection. Approximately 2,500 hepatitis B infected pregnant women are identified each year. Because of available post-exposure prophylaxis for their infants, fewer than 20 infants become infected with hepatitis B each year.

Meningococcal disease: Rates of meningococcal disease have been declining in the United States since the late 1990s for reasons that are unclear. In 2015, 49 meningococcal disease cases were reported in California. Although invasive meningococcal infections are relatively rare, the case fatality rate is 10%, and 11-19% of survivors suffer long-term consequences, such as hearing loss, neurologic disability, digit or limb amputations, and skin scarring.

Since 2005 meningococcal conjugate vaccine, which prevents disease due to serogroups A, C, Y, and W, has been recommended for children beginning at age 11 years, as well as for other high-risk groups. In 2015, there were no cases of disease due to these serogroups reported in persons ages 11-16 years old.

Serogroup B meningococcal disease is the most common serogroup in California. Two serogroup B vaccines were recently licensed, but use of these vaccines has been limited to date. CDPH will continue to monitor meningococcal disease trends in California.



Mumps: The currently-used live attenuated mumps vaccine was licensed in 1967 and prevents tens of thousands of cases each year, with residual circulation of mumps virus currently at low levels.² Thirty-one cases of mumps were reported in California in 2015 and outbreaks continue throughout the US, especially among college students whose living environment may include attending classes or living in dormitories with a person who has mumps.

² CDC. Mumps Cases and Outbreaks. <https://www.cdc.gov/mumps/outbreaks.html>

Pneumococcal disease: Since the introduction of the 7-valent pneumococcal conjugate vaccine (PCV7) in 2000 and the 13-valent vaccine (PCV13) in 2010, the incidence of invasive pneumococcal disease (IPD) in the United States has dropped markedly among the infants and toddlers who were previously at greatest risk for these infections.³ During this time, the incidence of pneumococcal disease has also decreased in adults, particularly among the elderly—a phenomenon attributable to vaccinated children no longer exposing older people to vaccine-preventable strains of pneumococcal bacteria that cause the most serious disease. Pneumococcal disease is not reportable in California, so California-specific data are not available.

Polio: While the global eradication of polio has not yet been achieved, polio remains fully eliminated in California and throughout the Western Hemisphere.

Rubella: Rubella vaccines were first licensed in 1969. Cases declined rapidly, although a moderate resurgence occurred in California in 1990. Domestic transmission of rubella was declared eliminated from the United States in 2004; in 2015, there were no rubella cases in California, compared to a high of 9,539 rubella cases in 1967. Pregnant women who are infected with rubella can have infants with congenital rubella syndrome (CRS), which is characterized by birth defects ranging from physical malformations to mental retardation. The last reported case of CRS in California was in 2008. The infant's mother was infected with rubella during international travel while in her first-trimester of pregnancy.

Varicella (chickenpox): Formerly a nearly universal disease of childhood, varicella has been vaccine-preventable in the United States since 1995. With immunization, the incidence of reported varicella has decreased in the United States by over 97%.⁴ In 2015, only 58 probable and confirmed varicella-associated hospitalizations, including one death, were reported statewide, and only 14 (24%) of these were in children aged 18 years and younger.

Challenges in the Control of Vaccine Preventable Diseases

Seasonal influenza: Influenza viruses cause widespread disease among persons of all ages. Rates of infection are highest among children, but the risks of complications, hospitalization, and death from seasonal influenza are higher among adults ages 65 years and older, young children, and persons of any age with medical conditions such as chronic cardiac or respiratory disease.

Because most influenza cases are not reportable, exact numbers are not available. However, CDC estimates that more than 200,000 people in the United States are hospitalized each year because of seasonal influenza virus infections⁵ and that annual influenza-associated deaths in the United States have varied from 3,000 to 49,000 people⁶.

In California, fatal laboratory-confirmed influenza cases in persons under 65 years of age are reportable. During the 2015–2016 influenza season, at least 144 laboratory-confirmed influenza

³ <https://www.cdc.gov/pneumococcal/surveillance.html>

⁴ www.cdc.gov/mmwr/volumes/65/wr/mm6534a4.htm

⁵ <http://www.cdc.gov/flu/about/qa/hospital.htm>

⁶ http://www.cdc.gov/flu/about/disease/us_flu-related_deaths.htm

deaths among persons younger than 65 years of age were reported to CDPH, including nine among children younger than 18 years of age.

Controlling influenza is challenging. Influenza viruses change from season to season, necessitating corresponding changes to the composition of seasonal influenza vaccine. Immunization reduces the risk of flu illness by about 50% to 60% among the overall population during seasons when most circulating flu viruses are like the vaccine viruses, but vaccine effectiveness is lower when new strains emerge more quickly. Approximately 44% of Californians are estimated to have been immunized against influenza during the 2015–2016 influenza season⁷; many more could have benefited from influenza vaccine, even with its limited effectiveness.

To help reduce the burden of influenza in California, CDPH distributed over 500,000 doses influenza vaccine per year from 2014-2016 to local health departments and their non-profit partners. The California VFC program supplied approximately half of the pediatric influenza vaccine in the state. CDPH collaboratively educates the public and health care providers on the importance of influenza immunization.

Pertussis (whooping cough): Pertussis is a difficult disease to control because it is highly infectious and immunity wanes after either vaccination or natural infection. Immunity from acellular pertussis vaccines, which have been used in the United States since the 1990s, wanes more quickly than the immunity from the whole cell vaccines that preceded them.

Pertussis is a particular danger to young infants because they cannot be vaccinated against it until they are at least six weeks of age. This is a vaccine-preventable disease with a significant health inequity. Compared to non-Hispanic infants, Hispanic infants have an incidence of pertussis two times higher and are three times more likely to die when they get pertussis.⁸

In 2014, California experienced a pertussis epidemic, the second in this decade, which caused the deaths of three young infants in the State.

Over 11,000 pertussis cases were reported in California over the course of the year – more than in any year since 1947.

Disease incidence is also cyclical, with peaks occurring every 2-5 years. In 2010 and in 2014, California experienced pertussis epidemics with a total of 13 reported deaths, all in young infants. CDPH's efforts around pertussis control are currently focused on preventing severe pertussis in infants by recommending that pregnant women receive a pertussis booster (Tdap) vaccine between 27 and 36 weeks gestation during every pregnancy and that infants be immunized promptly. Vaccinated women create pertussis antibodies that are transferred across the placenta to the fetus and can protect newborn infants until they are old enough to be vaccinated themselves. In addition, CDPH assists in educating providers to promptly recognize and treat pertussis in young infants.

Measles: Measles-containing vaccine, introduced in 1963, dramatically reduced the number of measles cases annually. As recently as 1989 – 1991, the United States experienced a measles

⁷ www.cdc.gov/flu/fluview/reportshtml/trends/index.html

⁸ <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6348a2.htm>

epidemic with over 17,000 cases and 70 deaths reported in California alone. This resurgence was due to low vaccine coverage due to lack of access to vaccine. This led to the creation of the VFC program, which ensures that all Medi-Cal, as well as all un- and under-insured children less than 19 years of age, have access to FDA-approved, ACIP recommended vaccines. Additionally, a second dose of measles containing vaccine was recommended in 1989 for children; the two-dose MMR schedule is estimated to be greater than 97% effective at preventing measles. Measles was declared eliminated in the United States in 2000.

California typically identifies more measles cases than any other U.S. state. California remains vulnerable due to pockets of unimmunized children and adults, who are susceptible to infected travelers returning from endemic countries or visitors to California from those countries. From 2000 – 2014, the number of measles cases reported in California each year ranged from 4 to 75 cases with the majority of cases having international travel or contact with travelers. In December 2014, an outbreak of measles, associated with Disneyland in Orange County was detected, which ultimately led to 131 cases in California, 16 cases in other states and 160 cases in Canada and Mexico. Among those California cases with documented vaccination status, the majority were unvaccinated.

To prevent and contain measles outbreaks, CDPH provides MMR vaccine to children in California to public and private providers through the VFC program. CDPH vigorously promotes timely routine immunization for young children and catch-up doses at older ages. When cases and outbreaks occur, CDPH and California's local health departments work rapidly to identify and protect persons in the community who are at risk of contagion.

Because measles is so contagious and cases often are in contact with many individuals, investigations to prevent additional spread are very labor-intensive. A 2008 San Diego outbreak was estimated to have cost public health authorities \$124,512 to contain, in addition to \$37,200 in costs to affected families.

New Vaccines and

Recommendations:Over the past decade, new vaccine recommendations for children or adolescents have included human papillomavirus, rotavirus, meningococcal and pneumococcal vaccines, annual influenza vaccination, a pertussis booster shot; and a second dose of varicella (chickenpox) vaccine (See Appendix B). Accordingly, the cost of vaccinating each child against these diseases has increased. Even so vaccines remain cost-saving.

Through the VFC program, children with Medicaid coverage and other low income children have access to needed vaccines. However, some providers serving privately insured children have declined to purchase the more-expensive vaccines, instead referring their patients to other, less accessible sources of care, such as local public health departments, community clinics, pharmacies and other private providers. To address this issue, the federal Affordable Care Act (ACA) has required most health plans to cover vaccines. CDPH continues to monitor and help with remaining barriers to access to immunization as the ACA undergoes Congressional review.

Notes:

All costs reflect June 2014 CDC vaccine contract prices and assume the use of single rather than combination vaccines.

There are two brands of rotavirus vaccine, one given in a two-dose series and one requiring three doses. The total costs of the two series are comparable. The influenza vaccine is recommended every influenza season for all persons over 6 months of age. Total cost represents cost of annual vaccination through childhood.

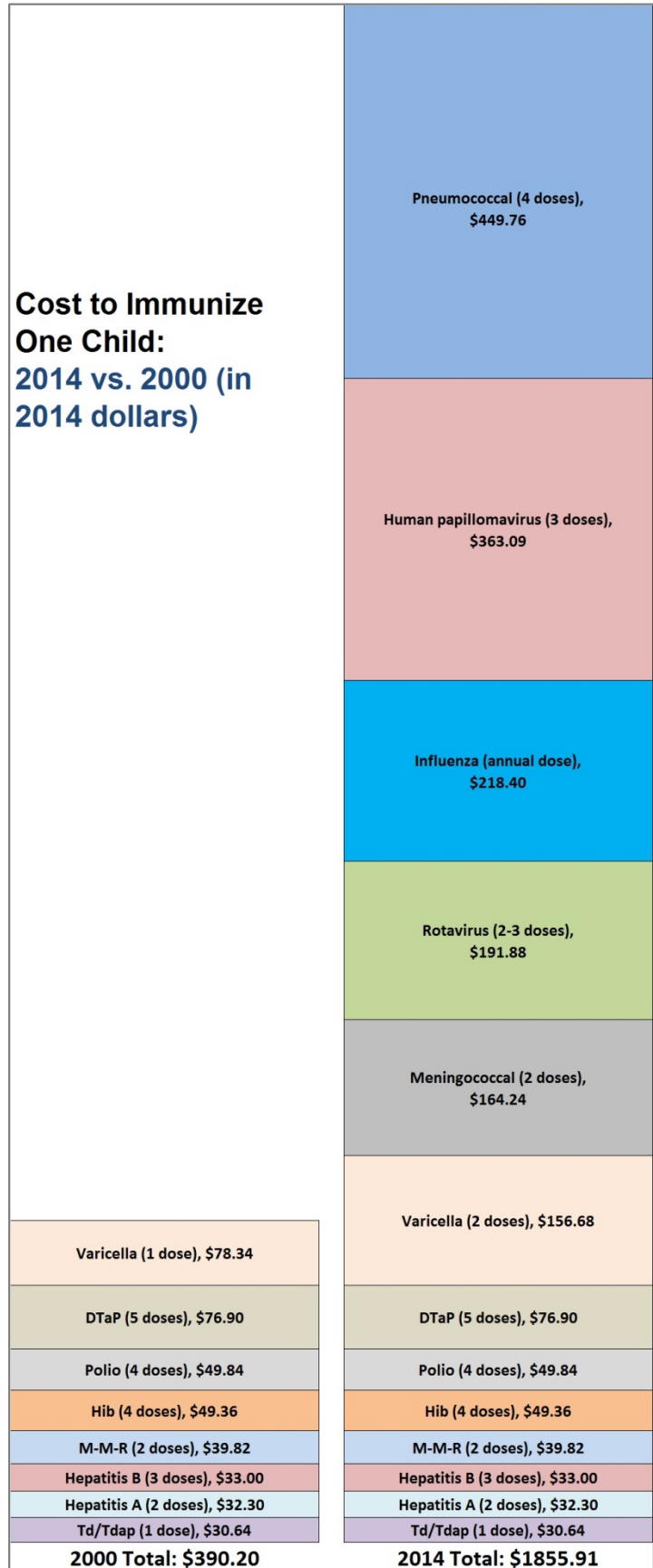
In 2000, hepatitis A vaccine was recommended only for children living in certain states, including California. By 2010, the recommendation had been extended nationwide.

In 2000, only a tetanus-diphtheria (Td) booster dose was given to adolescents; by 2006 a pertussis-containing booster (Tdap) had become available and was recommended for all children 11-12 years of age.

MMR contains measles, mumps, and rubella vaccines.

DTaP contains diphtheria and tetanus toxoids and acellular pertussis vaccine.

**Cost to Immunize One Child:
2014 vs. 2000 (in 2014 dollars)**



I. THE IMMUNIZATION STATUS OF YOUNG CHILDREN

In *Healthy People 2020: National Health Promotion and Disease Prevention Objectives*, the federal government set a goal of adequately immunizing at least 90% of two-year-olds and 95% of school-age children. Several annual surveys measure California’s progress toward these benchmarks: the National Immunization Survey, Medi-Cal managed care plan Healthcare Effectiveness Data and Information Set (HEDIS) reporting, and the fall kindergarten assessment. Each is discussed below.

Overall Child Immunization Rates

The National Immunization Survey (NIS) is an annual telephone survey of families for approximately 400 children in the state conducted by CDC.⁹ For 2015, the most recent year for which results are available, 85% (±6%) of California children aged 19 to 35 months had completed the 4:3:1 series and 77% (±7%) had completed the 4:3:1:3:3 series, comparable to the national rates (83% and 76.0%, respectively).

National Immunization Surveys, 19-35 months of age			
		California	United States
Completed 4:3:1 series*	2000	77% (±3%)	78% (±1%)
	2015	85% (±6%)	83% (±1%)
Completed 4:3:1:3:3 series†	2000	72% (±4%)	73% (±1%)
	2015	77% (±7%)	76% (±1%)
<p>* The 4:3:1 series is comprised of at least 4 doses of DTaP, 3 doses of polio vaccine, and 1 dose of MMR. † The 4:3:1:3:3 series is comprised of the 4:3:1 series plus at least 3 doses of Hib vaccine and 3 doses of hepatitis B vaccine. While neither series represents a complete list of the vaccines a child should receive, they are metrics that enable historical comparisons. Source: National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention</p>			

Immunization of Minority and Low-Income Children

At the national level, the 2015 NIS shows that children living below the poverty level have coverage levels 7 to 10 percentage points lower than other children for the following routinely recommended childhood vaccines: rotavirus, four or more doses of pneumococcal conjugate vaccine (PCV13), full series Hib, and four or more doses of DTaP.¹⁰

California’s results from the 2015 NIS show no statistically significant difference in series completion rates for children living in households above or below the federal poverty line, but the small NIS sample size results in large confidence intervals, (a large margin of error) and difficulty in discerning differences. The 2015 NIS data also show that vaccination rates in White and Hispanic children for the 4:3:1 and 4:3:1:3:3 vaccine series are comparable within California and are similar to national rates, while rates for Asian children were higher than for other racial or ethnic groups. The sample size of this survey was too small to accurately estimate rates for African-American children.

⁹ Methods include follow up calls with the pediatric provider to validate the parental interview.

¹⁰ Source: CDC. Morbidity and Mortality Weekly Report, Vol. 65, no. 39, October 7, 2016.

2015 National Immunization Survey Results: 19- to 35-month-old Children				
	4:3:1*		4:3:1:3:3†	
	California	US	California	US
Overall by age group (19-35 months)				
All	85% (±6%)	83% (±1%)	77% (±7%)	76% (±1%)
By poverty level (at 19-35 months)				
Above poverty level	85 (±7%)	86% (±1%)	72% (±10%)	78% (±2%)
Below poverty level	84 (±10%)	79% (±2%)	83% (±10%)	72% (±3%)
By race/ethnicity (at 19-35 months)				
African-American	NA‡	81% (±3%)	NA‡	73% (±4%)
Asian	96% (±7%)	90% (±3%)	96% (±7%)	84% (±4%)
Hispanic	84% (±9%)	83% (±3%)	75% (±10%)	75% (±3%)
White	80% (±11%)	83% (±1%)	71% (±13%)	77% (±2%)
* The 4:3:1 series is comprised of at least 4 doses of DTaP, 3 doses of polio vaccine, and 1 dose of MMR. † The 4:3:1:3:3 series adds to the 4:3:1 series at least 3 doses of hepatitis B vaccine, and 3 doses of Hib vaccine. ‡ Insufficient sampling to provide point estimates. Source: National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention				

Low income children in Medi-Cal managed care health plans. DHCS provides an important source of coverage estimates for low income two year olds. Medi-Cal covers 52% of California’s children under age 5 years, and 41% of those under age 18 years.¹¹ The vast majority of children in the Medi-Cal program are enrolled in managed care health plans.

The percentage of two year olds in Medi-Cal managed care health plans (MCPs) who are fully immunized on time has fallen for the last four years¹². For the most recent year with available results, the statewide weighted average for percentage of MCP members turning two who are fully vaccinated in 2015 (Reporting Year, 2016) was 71%.¹³ Coverage by MCP and reporting unit (county or counties) was most recently published for children who turned two in 2014. Appendix A shows the wide range of individual MCP performance. Several county organized health systems, local initiative plans, and Kaiser succeeded in immunizing over 80% of their two-year-old MCP members. At the other end of the performance spectrum, three commercial MCPs reported less than 60% of their two-year-old members were fully immunized (See Appendix A).

These publicly reported Medi-Cal managed care coverage estimates are a useful supplement to the NIS because they are reported at the reporting unit (reporting unit is a county or several county region) level, are audited by an external organization, and have a much larger sample size. It should

¹¹ Source: California Health Interview Survey, 2014.

¹² Fully immunized on time as defined by the HEDIS indicator Childhood Immunization Status, Combination 3 (CIS3) includes: 4 DTaP, 3 polio, 1 MMR, 3 Hib, 3 HepB, 1 Varicella and 4 PCV.

¹³ Source: DHCS. Medi-Cal managed care quality strategy; comprehensive review, October 2016.

be noted that DHCS has identified that not all health plans and providers are reporting delivery of childhood immunizations either through HEDIS or to the CAIR. DHCS issued a Medi-Cal All Plan Letter in January 2018 to remind health plans of their responsibility provide childhood immunizations and to report the delivery of those immunizations to the CAIR.

Furthermore, the Medi-Cal managed care coverage estimates are actionable; DHCS contracts hold MCPs to a minimum performance level for this measure (and a set of other indicators). If an MCP in a county performs in the bottom 25% of Medicaid plans in the US, then DHCS requires quality improvement efforts. These efforts require an intensive exploration of the reasons for subpar performance, based on detailed barrier analysis and rapid cycle interventions, which last up to 18 months and are continually monitored by the Department. Currently, there are 14 MCPs undergoing quality improvement efforts related to childhood immunizations. DHCS incentivizes MCPs to improve on this measure by rewarding higher performing MCPs (“auto-assignment”) and by implementing Quality Corrective Action Plans. To help leverage these incentives, CDPH is partnering with MCPs and DHCS on two pilot projects, discussed in Section IV below. In addition, CDPH has proposed adding this HEDIS indicator to the *Let’s Get Healthy California* [measure set](#).

Immunization of School-Aged Children

Herd Immunity and Exemptions from Vaccination Requirements: Non-immune persons are still protected against vaccine-preventable disease if enough of their contacts are immune and therefore unable to transmit diseases to them. This phenomenon is called “herd immunity.” Herd immunity is important to control outbreaks of disease because even with a comprehensive immunization program, not every child will be immunized. In addition, infants are not fully vaccinated until 24 months of age; some have medical conditions that preclude vaccination or render vaccines ineffective, and others remain unvaccinated because of their parents’ preferences. As long as a high proportion of the population has been vaccinated, herd immunity will protect those who are still vulnerable.

Elective exemptions to immunizations threaten herd immunity, making it more likely that children who cannot be immunized will encounter others who are contagious. The proportion of kindergarteners with personal belief exemptions (PBEs) to one or more required immunizations increased from 0.5% in 1980 to 3.15% in 2013, including many local pockets of unimmunized children at much higher rates. Geographic clusters of exemptors are demonstrably associated with the locations of pertussis outbreaks, confirming that exemptors create community risks.¹⁴

To address the increasing number of PBEs being taken, the Legislature passed Assembly Bill (AB) 2109 (Chapter 821, Statutes of 2012) which took effect January 1, 2014. AB 2109 required parents seeking a PBE to either be counseled first by a health care practitioner or be allowed to claim a ‘religious’ exemption. PBE rates modestly decreased after implementation of AB 2109 (2.54% in 2014 and 2.37% in 2015). In 2015 the Legislature passed Senate Bill (SB) 277 (Chapter 35, Statutes of 2015). Effective January 1, 2016, SB 277 no longer allows for new personal belief exemptions, and existing personal belief exemptions expire when a child enrolls in the span between transitional

¹⁴ Omer SB, Enger KS, Moulton LH, Halsey NA, Stokley S, Salmon DA. Geographic clustering of nonmedical exemptions to school immunization requirements and associations with geographic clustering of pertussis. *Am J Epidemiology*. 2008; 168: 1389-1396.

kindergarten and 6th grade or the span between 7th and 12th grade. This new law is expected to further increase herd immunity and reduce clusters of under-immunized children.

California Fall Assessment Survey: Each autumn all schools in California are required to report student compliance with California school immunization laws (California Health and Safety Code Sections 120325-120375). Schools reported data to CDPH in the autumn of 2015 during the second year of implementation of AB 2109, prior to the 2016 effective date for SB 277. The proportion of students entering kindergarten after receiving all required immunizations increased by 2.5 percentage points to 92.9% between the 2014-2015 and 2015-2016 school years, an increase matched by a 2.5 percentage point reduction in students reported to be catching up with their required immunizations in accordance with state law (classified as “conditional” entrants). In 2015 CDPH and local health departments trained school staff on the proper evaluation and management of conditional entrants. In addition, schools were alerted that the required annual compliance audits of local education agencies for the 2015-2016 school year examined reimbursement for attendance at schools with higher rates of conditional entrance.

For the 2015-2016 school year, 90.5% of childcare participants were fully vaccinated with all required immunizations at the time of reporting. The percent of 7th graders that received the pertussis booster immunization (Tdap) was 97.8.

California Fall Assessment Surveys, 2013-16												
Δ indicates the proportion in 2015-16 minus the proportion in 2014-15												
Grade	Childcare and Head Start				Kindergarten				7 th Grade			
	2013-14 (%)	2014-15 (%)	2015-16 (%)	Δ (%)	2013-14 (%)	2014-15 (%)	2015-16 (%)	Δ (%)	2013-14 (%)	2014-15 (%)	2015-16 (%)	Δ (%)
All Required Immunizations	89.3	89.4	90.5	+1.1	90.2	90.4	92.9	+2.5	96.6	97.8	97.8	0
'Conditional' entrant	7.5	7.4	6.7	-0.7	6.5	6.9	4.4	-2.5				
Permanent Medical Exemption	0.29	0.56	0.48	-0.08	0.19	0.19	0.17	-0.02	0.19	0.14	0.14	0
PBE	2.94	2.67	2.31	-0.36	3.15	2.54	2.37	-0.16	3.26	2.09	1.66	-0.43
Overdue	-	-	-	-	-	-	0.18	-	-	-	0.40	-
4+ doses DTaP	93.8	94.1	94.7	+0.6	92.2	92.4	94.2	+1.8				
3+ doses Polio	95.7	95.7	96.4	+0.7	92.6	93.0	94.7	+1.7				
1+ dose MMR *	95.7	96.1	97.0	+0.9								
2+ doses MMR *					92.3	92.6	94.5	+1.9				
3+ doses Hepatitis B	93.9	94.3	94.9	+0.6	94.8	94.9	95.8	+0.9				
1+ doses Varicella †	95.1	95.6	96.3	+0.7	95.3	95.4	96.3	+0.9				
1 Tdap (booster)									96.6	97.8	97.8	0

* MMR vaccine is scheduled to be given at 12-15 months and at 4-6 years.
† Physician-documented disease can substitute for proof of immunization.
Note: "Overdue" is a new category in 2015-2016.
Source: California Department of Public Health

Since the additional measures of AB 2109 (2012) that required parents seeking a PBE for their child to receive health care practitioner counseling or take religious objection to such counseling, the rate of kindergarten PBEs decreased from 3.15% in 2013-2014 to 2.37% in 2015-2016.

Rates of permanent medical exemptions and personal belief exemptions were no higher in 2015-2016 than the prior year. Data from the 2016-2017 school year, reflecting the implementation of SB 277 (2015), are expected to become available from CDPH in 2017.

The school and child care data show that rates of young children who had received all required immunizations increased modestly between 2013 and 2015. By contrast, the coverage of 2 year old Medi-Cal managed care members has steadily decreased for the last four years. Much work remains to reach the *Healthy People 2020* goals of immunizing 90% of two year olds and 95% of school aged children.

II. STRENGTHENING IMMUNIZATION EFFORTS IN CALIFORNIA

California’s immunization workplan seeks to maximize childhood immunization and minimize disparities, in accordance with the legislative intent in California Health and Safety Code §120325. Key strategies from this workplan are described below.

VFC Program

The federal VFC program, administered in California by CDPH, makes funding available for the purchase of vaccines to be administered to uninsured children, as well as children eligible for Medi-Cal.¹⁵ Nationally, almost half of all vaccine doses given to children and adolescents are purchased through the VFC program. In 2015, approximately 4,000 public and private health care providers in California participated in the program by taking receipt of more than ten million doses of VFC-purchased vaccine valued at over \$500 million. Medi-Cal providers, whether in fee-for service or managed care, must enroll in the VFC program. These providers rely on the VFC program to purchase vaccines at no out-of-pocket expense.

In order to participate in the VFC program, providers must agree to comply with certain requirements for storage and handling of VFC-purchased vaccine, vaccine administration procedures, and documentation. To ensure that providers meet these requirements, CDPH sends trained VFC consultants to medical practices around the state who provide assistance with VFC compliance and strategies to enhance immunization delivery. Representatives visit over 2,000 provider sites each year. In customer satisfaction surveys, providers report that they are highly satisfied with this service and that it increases the number of children they are able to vaccinate.

Previous NIS results indicated that children receiving VFC vaccine had been immunized at rates lower than more affluent children ineligible for VFC vaccine. In contrast, 2015 data estimate the 4:3:1 rate in California children served by providers participating in the VFC program is at least as high as the rate in children served by providers not participating in the VFC program, although this estimate has large confidence intervals. This suggests that over time the provision of VFC vaccine may have reduced barriers to immunization faced by poorer children.

2015 National Immunization Survey: 19- to 35-month-old Children			
		California	United States
Completed 4:3:1* series	Provider is VFC participant	88% (±6%)	85% (±1%)
	Provider is Not VFC Participant	77% (±15%)	80% (±5%)
<small>* The 4:3:1 series is comprised of at least 4 doses of DTaP, 3 doses of polio vaccine, and 1 dose of MMR vaccine. Source: National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention</small>			

¹⁵ Children are entitled to VFC vaccine if they are eligible for Medi-Cal or CHDP program, have no health insurance, or are American Indian or Alaska Natives. Children whose insurance does not provide full coverage for immunization may receive VFC vaccine at Federally Qualified Health Centers or Rural Health Clinics. For more information about these locations, please see <https://findahealthcenter.hrsa.gov/>.

California Immunization Registry (CAIR)

The immunization registry is a key component of the Immunization Workplan. CAIR is a confidential database of immunization records which protects public health and increases immunization rates by:

- Providing a comprehensive immunization record that can adapt to changes in the medical home, health insurance, legal custody, or area of residency;
- Calculating promptly which shots children need, minimizing under- or over-immunization;
- Issuing reminders of upcoming visits; and
- Identifying individuals and populations with low immunization rates.

The Task Force on Community Preventive Services, an independent body of public health and prevention experts, completed a comprehensive review of immunization registries in the United States in 2010. The Task Force recommended using immunization registries based on the strength of the evidence that they increase vaccination rates.

CAIR users include health care providers, public health departments, schools, child care facilities, family child care homes, WIC service providers, foster care agencies, welfare departments, juvenile justice facilities, and other programs that provide, track, or promote immunization. CAIR was originally developed as county, and then, regional registries. To provide full benefit to users and children, these regional registries need to be merged into one statewide immunization registry.

California physicians' offices, clinics, families, and schools are estimated to have saved several million dollars per year in expenditures through the availability of CAIR, far exceeding the costs of the system.¹⁶ These savings have resulted from reducing or avoiding:

- Vaccine-preventable diseases and their associated costs, including those to Medi-Cal and other public programs;
- Hundreds of thousands of duplicative shots that are given annually because complete records cannot be located;
- Manual record reviews by providers, schools, and child care centers; and
- Efforts by educational institutions to obtain, review, and transcribe pupil immunization records.

Currently, CAIR has over 9,000 'read/write' (provider) sites and almost 2,000 'read-only' (mostly schools) participating. In addition to these traditional participant sites who log into CAIR to look up patient records or to add patients or vaccine doses manually, CAIR currently enrolls clinical sites that intend to submit vaccination information electronically through the CDPH Health Information Exchange Gateway, CDPH's "one-stop shop" for public health data reporting.

As of September 20, 2016, CAIR has enrolled more than 6,500 sites at the CDPH Gateway/CAIR Immunization Portal and more than 4,000 sites are actively submitting data to one of the CAIR registries. Currently, about 70% of data being submitted to CAIR each quarter is via electronic data

¹⁶ CDC. Development of Community- and State-Based Immunization Registries. CDC Response to a Report from the National Vaccine Advisory Committee. *MMWR*, Oct. 5, 2001, 50(RR-17).
<http://www.cdc.gov/mmwr/PDF/rr/rr5017.pdf>

exchange from provider Electronic Health Records (EHRs), and this percentage is increasing each quarter.

California Immunization Registry Participation as of 6/30/2016				
	0-5 years	6-18 years	19+ years	All ages
Estimated CA population	3,024,392	6,620,697	30,141,371	39,786,460
Patients in CAIR	3,221,551	6,696,345	14,343,968	24,261,864
% of pop. in CAIR*	106.5%	101.1%	47.6%	61.0%
CAIR patients w/ 2+ doses	2,293,975	5,760,274	7,866,734	15,920,983
% of pop. w/ 2+ doses	75.8%	87.0%	26.1%	40.0%
Total doses in CAIR	35,547,972	118,139,375	67,855,679	221,542,926
*Can be higher than 100% due to limitations in population estimations, duplicate entries. In addition, immunization registries may be incompletely updated when people move out of state or die. Source: California Department of Public Health				

Ongoing improvements in CAIR are described in Section IV below.

Partnerships with Immunization Providers

The California Coalition for Childhood Immunizations (C3I) was founded in 1995. In 2008, C3I broadened its mission by merging with the California Adult Immunization Coalition to form the California Immunization Coalition (CIC). CIC’s mission is to promote immunizations, not just among infants and children, but also across the lifespan, including adolescents, adults, and seniors. The CIC’s membership includes representatives from CDPH, health care agencies, health care provider associations, and other health-related organizations that serve a variety of age groups, races and ethnicities. CIC is the only statewide collaboration of partnerships and stakeholders with the mission of raising immunization rates, developing sound immunization policy, planning actions, and implementing those plans locally.

Smaller-scale public-private coalitions exist throughout the State between local health departments and community organizations, often including volunteer groups, such as the Kiwanis and Rotary Clubs. These coalitions undertake media and advertising campaigns, house-to-house efforts, and incentive programs sponsored by local merchants. CIC provides technical support and coordination between local coalitions.

Implementation of School and Childcare Immunization Laws

CDPH and local health departments help schools and childcare centers implement immunization laws by providing handbooks and other written guidelines and materials including explanatory letters to parents and standardized pupil immunization forms. In 2015, CDPH and local health departments helped train staff on the proper evaluation and management of children catching up on their vaccine who meet state legal criteria for conditional entry. Partly as a result of these efforts, from 2014–2015 to 2015–2016, the number of kindergartners classified as conditional entrants decreased from

36,731 (6.9%) to 24,424 (4.4%); MMR vaccine coverage increased from 92.6% to 94.5%; and DTaP vaccine coverage increased from 92.4% to 94.2%.

Expert consultation from CDPH is also readily available to schools and childcare centers, and on-site visits are conducted to review reporting requirements and train school staff. The fall assessments of kindergartens and childcare centers by CDPH and local health departments measure how well the law is being implemented and provide positive reinforcement to schools and childcare centers that ensure their students are appropriately immunized.

Professional Education

CDPH provides regular email notifications to almost 40,000 recipients, online training courses, job aids, webinars, an e-newsletter (*IZ Update*), and ongoing technical support to keep health and medical personnel abreast of health alerts, new immunization schedules, and best practices. In addition, CDPH meets regularly with professional associations of health care providers and offers presentations and exhibits at their meetings and conferences.

Parental Education

Public Information Campaigns: CDPH's media campaigns are based on research indicating that an understanding of the importance of vaccinations, a sense of parental responsibility, and knowledge of the immunization schedule are key factors motivating parents to get their children immunized on time. CDPH uses professionally designed and tested, culturally-appropriate, print/online materials, websites, and press releases in its regular media campaigns. During the past several years, educational efforts have been targeted to Latino communities, addressing HPV vaccination and pertussis.

Information and Reminder Materials: CDPH produces a variety of information pamphlets, reminder postcards, posters, and online resources that are used to teach parents the immunization schedule and remind them of the importance of timely immunization. CDPH also developed an immunization text message reminder system for pregnant and new mothers, using the national Text4Baby service. This service is offered in English and Spanish.

National Infant Immunization Week/Toddler Immunization Month: This major public outreach effort, which takes place every year during the last week of April and the month of May, involves the joint efforts of CDPH, local and federal health agencies. Public service advertising, special events and outreach campaigns, recognition of the contributions of immunization partners, and press campaigns have all been successful in increasing awareness of the importance of immunizations.

Preteen Vaccine Week. This observance takes place every February and aims to highlight the importance of recommended immunizations for 11- and 12-year-olds. CDPH hosts monthly planning calls with local health departments and coalitions to facilitate statewide collaboration. Many local health departments report planning immunization clinics and workshops in schools, as well as distributing health education materials at clinics and provider offices.

Partnerships with DHCS to Strengthen Immunization Services in the Medi-Cal Program

CDPH is participating in the DHCS-led National Governors' Association (NGA) learning collaborative on Maternal Child Health, which developed an Action Plan with several goals. One goal is to raise immunization coverage of two-year-old members of three MCPs in Sacramento County. This effort

has also engaged the medical groups contracted by these MCPs, the local health department, and the American Academy of Pediatrics. The three MCPs have identified pediatric practices that care for a large number of MCP enrollees and face challenges in meeting the DHCS minimum performance level for immunization of two year olds. The MCPs have surveyed the practices and are currently engaging in Plan-Do-Study-Act cycles with interventions including data exchanges with CAIR.

Another goal of the NGA Action Plan is to reduce infant pertussis by expanding immunization of pregnant women against pertussis. For this aim, collaborators also include the CDPH Maternal, Child, and Adolescent Health Branch, the American College of Obstetricians and Gynecologists, local health departments, and MCPs. To accelerate some of the interventions, CDPH has worked with the California Health and Human Services Agency on an innovative Use Case Team to prevent infant pertussis. One of the recent successes related to this effort is the expansion of the Medi-Cal managed care pharmacy benefit, so pertussis vaccine is more accessible to women whose prenatal care providers do not stock this vaccine in their clinics.

As providers and local health departments learn to work with the Medi-Cal managed care program, many questions have come up about the DHCS contract requirements for immunizations. To address these questions, CDPH worked with DHCS to develop a set of Frequently Asked Questions on immunizations in the Medi-Cal program. Finally, CDPH continues to collaborate with DHCS on policy initiatives to improve beneficiary access to all vaccines recommended by ACIP.

Partnership with Women, Infants, and Children (WIC) Supplemental Nutrition Program

As the main point of access to health services for low-income preschool children, WIC is an important partner in the effort to improve immunization rates. In California, WIC serves more than 1.4 million participants, including 1.1 million children younger than five years old, and more than 60% of infants born in California.

- Since 2000, all WIC agencies have performed immunization screening for children under two at periodic WIC certification and re-certification visits. However, most WIC agencies did not participate in CAIR to assist with screening in 2014 to 2016.
- All California WIC agencies provide immunization education to participants and refer them to medical providers. Various agencies have adopted immunization promotion strategies, such as co-locating WIC sites with immunization clinics and escorting participants to immunization clinics. Some require parents of under-immunized children to pick up their WIC vouchers monthly rather than at longer intervals in order to more closely monitor the children's progress toward becoming up-to-date on vaccines. Further investigation is needed to understand whether more frequent checks by WIC staff increase immunization rates and should be utilized more broadly.
- CDPH provides immunization education materials and technical assistance to WIC agencies.

Child Health and Disability Prevention (CHDP) Program

CHDP is administered by DHCS and is operated at the local level by county health departments for each county and in three cities, Berkeley, Long Beach and Pasadena. Through the Fee-for-Service delivery system, CHDP offers a wide variety of preventive services, including vaccines, as well as periodic health assessments and services, to low income children and youth in California consistent with the federally mandated Early and Periodic Screening, Diagnostic and Treatment (EPSDT)

benefit. Specifically, CHDP provides periodic health assessments to Head Start and State preschool children, as well as Medi-Cal beneficiaries from birth to age 21 years, with certain services available to a broader group. At every health assessment, beneficiaries receive immunization screening and any vaccines that are due. LHDs design their own strategies for maximizing immunization coverage among their beneficiaries. Please note that health assessments are provided based upon the American Academy of Pediatrics/Bright Futures periodicity schedule and recommendations for preventive pediatric health care.

Most CHDP offices collaborate and exchange information with corresponding local immunization programs. Commonly, CHDP staff receive technical assistance information from local health department immunization program staff to pass along to CHDP providers, and both CHDP and immunization programs share reports from their reviews of provider practices. Some CHDP offices hold immunization training workshops for CHDP providers. In addition, CDPH supports CHDP immunization activities. The VFC Program regularly reports on VFC activities to the CHDP Executive Committee.

In the Managed Care delivery system, MCPs are required to provide the same services required by CHDP.

The Patient Protection and Affordable Care Act (ACA) and Childhood Immunizations

Since 2010, immunizations routinely recommended by ACIP are required by the ACA to be covered by non-grandfathered health plans without cost-sharing. MCPs are included in the non-grandfathered health plans. In partnership with DHCS, CDPH supports the Medi-Cal program in ensuring its pediatric members are fully immunized on time. By compiling immunization requirements of MCPs and helping local health departments and clinics assist with patient navigation, CDPH is working with health plans to improve access to immunization services. CDPH is also informing local health departments and other providers on how Medi-Cal managed care plans perform in terms of childhood immunizations (see Appendix A) to prompt local collaboration to improve immunization coverage.

A number of challenges remain. Grandfathered health plans are not required to follow the provisions of the ACA. Citing inadequate reimbursement, some providers do not provide certain immunizations, and instead, refer patients to the local health department or other locations for immunization. CDPH is supporting local health department clinics to bill Medicaid and other insurance.

Health Plan quality improvement measures, including National Committee for Quality Assurance (NCQA) HEDIS measures, need to be updated to reflect current ACIP recommendations. CDPH is currently represented on a national workgroup to create a new measure of influenza vaccine and Tdap vaccine during pregnancy.

Undocumented persons are not covered under the ACA. However, a state law passed in 2015 (SB 75, Chapter 18, Statutes of 2015) grants full-scope Medi-Cal to children under the age of 19 who do not have satisfactory immigration status, as long as they meet the income standards. CDPH will continue to help inform local health departments and other providers on eligibility and access to immunization services.

III. IMPROVING OUTREACH AND EDUCATION EFFORTS

California's diversity is reflected in virtually all the educational and promotional materials that CDPH produces. Most patient education materials are provided in Spanish, as well as English, and many are translated into other languages including Chinese, Vietnamese, Laotian, Hmong, Russian, Arabic, Armenian, Cambodian, Tagalog, and Korean. CDPH also conducts specific culturally-appropriate outreach to at-risk communities:

- During the past several years, CDPH has partnered with various Latino community-based organizations, such as Vision y Compromiso to reach Latino parents and evaluate the utility of the Spanish-language immunization website (www.vacunasyosalud). Furthermore, CDPH worked closely with the Health Initiative of the Americas to produce an influenza prevention curriculum that *promotoras* (Spanish-speaking community health leaders) could use in their communities. Whenever possible, CDPH also partners with other Community Based Organizations, including La Clínica de la Raza and Tiburcio Vasquez Health Center, to develop educational materials aimed at Latinos.

CDPH is committed to testing and improving the methods it uses to promote immunization, especially among target audiences in low-income communities. Information from the existing literature and new qualitative and quantitative research are used to assess outreach methods and materials before they are put into general use. Below are some examples:

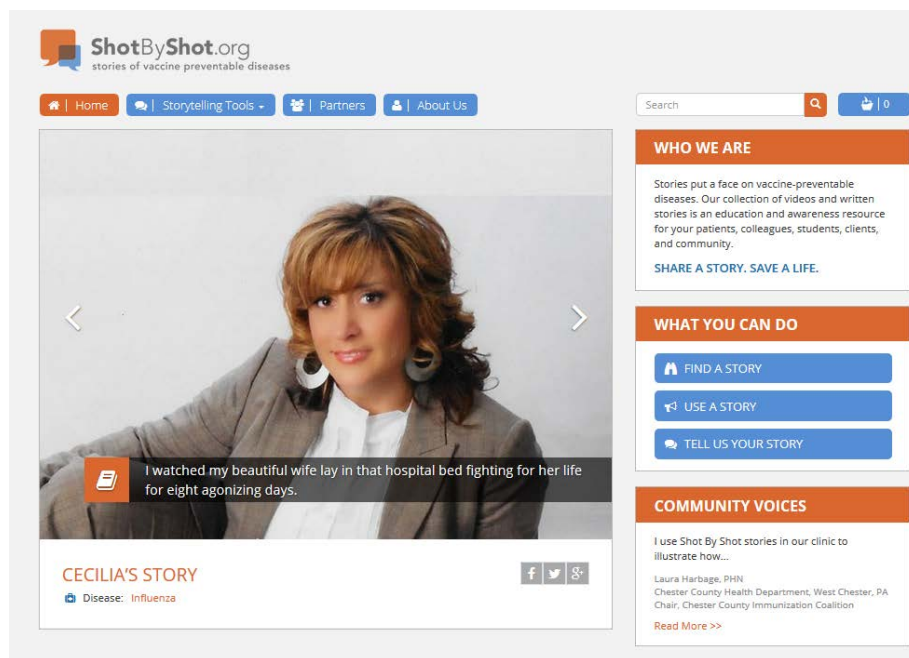
- CDPH's interactive e-learning curriculum, *EZ-IZ*, trains providers on immunization skills, practices, and VFC program requirements. In the beginning stages of designing this curriculum, CDPH analyzed characteristics of the target audience, determined appropriate learning strategies and training delivery methods, identified and validated job skills and learning objectives, and identified critical content for the interactive lessons. With that information, CDPH developed instructional strategies for each skill area and metrics for each learning objective. Subject matter experts reviewed these plans and helped revise them. CDPH pilot-tested each lesson with the target audience, allowing for validation of the pre- and post-tests that are part of the curriculum. The *EZ-IZ* system stores information on each learner, so that CDPH can analyze over time who is using the system and how well they are performing on the pre- and post-tests. Many of the



lessons are now required for designated staff in provider offices receiving vaccines from the VFC Program in California.

In its ongoing effort to provide timely and accurate information to the public, healthcare providers, and other immunization stakeholders, CDPH focuses on the use of online and new media tools. Resources for the production of print materials are diminishing, and the general public is moving toward seeking information on the Internet. CDPH has adapted by developing websites, web banners, online training modules, text messaging programs, and webinars. CDPH partnered with the California Immunization Coalition (CIC) to develop a media campaign, *Shot by Shot*, to make use of personal stories to educate others about the importance of vaccinations and the diseases they prevent.

Shot by Shot: Stories of Vaccine-Preventable Diseases is a collection of stories from people who have been touched by vaccine-preventable diseases. The project website, www.shotbyshot.org, is the most visited CDPH website, with nearly nine million visits during the past 3 years.



The ShotbyShot Facebook page has over 6,000 “likes.” With the amount of exposure the website and Facebook page receive, it appears to be an important vehicle for sharing information with large amounts of people with access to the internet.

Evaluating the effectiveness of CDPH’s outreach efforts has become an area of special emphasis. To the extent feasible, all immunization outreach and education projects now incorporate plans for

measuring their outcomes. Careful assessment of these projects’ results offers the opportunity to make refinements in future planning. This emphasis on program evaluation and performance measures is also being promoted at the local level.

IV. RECOMMENDATIONS FOR A COMPREHENSIVE IMMUNIZATION STRATEGY AND ANALYSIS OF FUNDING REQUIREMENTS

Immunizations remain an unparalleled investment in public health. Nationally, CDC estimates that vaccination of children born between 1995 and 2013 is saving nearly \$1.4 trillion in total societal costs by preventing illnesses and deaths. In its landmark report, *Calling the Shots: Immunization Finance Policies and Practices*, the national Institute of Medicine (IOM) urged in 2000 for states to devote more resources to the support of efficient and comprehensive immunization:

...State immunization infrastructure programs require increased financial and administrative support to strengthen immunization capacity and reduce disparities in child and adult coverage rates. The committee recommends that states increase their immunization budgets by adding \$100 million over current spending levels, supplemented by an annual federal budget of \$200 million to support state infrastructure efforts...(A)dditions to the vaccine schedule are likely to increase the burden of effort within each state.”

The IOM’s caution was accurate: since 2000, the cost to fully immunize one child through age 18 has more than quadrupled under an expanded schedule, with the results of saving additional lives and preventing debilitating illnesses.

Recommendations and Funding Requirements

California’s Immunization Workplan provides a comprehensive immunization strategy for both public and private sectors aimed at achieving on-time vaccination for 90% of two-year-olds and 95% of kindergarteners. Upon review of evidence-based practices to improve immunization coverage as well as California data, the following are the most important and feasible strategies for CDPH to pursue with its partners, given existing resources:

- 1) *Sustaining Immunization Infrastructure*: CDPH provides free or low-cost vaccinations to income-eligible children via the VFC program in both private and public providers’ offices; supports providers with technical assistance on vaccine handling, recordkeeping, and similar subjects; and systematically evaluates clinic immunization rates to pinpoint patterns of missed vaccination opportunities that indicate how a clinic can improve its approach.
- 2) *Enhancing the California Immunization Registry (CAIR)*: The immunization system must be capable of successfully implementing an increasingly complex vaccination schedule, maintaining high coverage of prior immunizations against diseases which have not been eradicated, and incorporating new vaccinations into the schedule.

Immunization registries are an evidence-based tool for improving immunization coverage across the population’s lifespan. The upgrade to CAIR, CAIR2, was launched October 3, 2016 with new, state-of-the-art software. It is being implemented in several phases through summer 2017 to:

- Consolidate the 7 regional registries (48 of 58 counties, about 87% of population) managed by CDPH staff into a single registry
- Allow statewide patient look up via connections to the remaining 10 counties using separate registries based in San Diego, San Joaquin, and Imperial counties
- Enable bidirectional messaging between the registry and EHRs

*According to the CDC,
immunizations are among
the 10 great
public health achievements
of the past century.*

- 3) *Expanding Quality Improvement Efforts:* AFIX is an acronym for Assessment, Feedback, Incentives, and eXchange, the CDC-recommended tool for improving the quality of immunization services. CDPH is re-designing its AFIX program, with the goal of engaging half of the State’s 4000 VFC providers each year in assessing and improving immunization coverage. Pilot projects in 2015-2016 involve partnering with Medi-Cal managed care plans and DHCS to improve performance on the HEDIS indicator for two year old immunization coverage.
- 4) *Cementing Public-Private Partnerships that Advance Immunization:* CDPH works with professional associations to provide physicians and other health professionals with ongoing education and technical assistance on vaccine and vaccine-preventable disease issues. CDPH participates in the California Immunization Coalition, which promotes lifespan immunization through the cooperative efforts of state agencies, healthcare providers, and other stakeholders.
- 5) *Implementing School and Childcare Immunization Requirements:* CDPH assists schools and child care centers in implementing California statutes mandating that children receive certain vaccines before enrollment. CDPH provides compliance handbooks for these institutions and offers individual consultations. The annual 7th grade, Kindergarten, and Childcare Fall Assessments quantify the results of these activities. CDPH has recently deployed an online child care/school lookup system to assist parents and others interested in determining the immunization rates of licensed child care facilities and K-12 schools.
- 6) *Educating Immunizers and the Public:* CDPH creates healthcare provider educational materials, both in print and online, and offers periodic training courses for medical and nursing staff who administer vaccines. CDPH engages in active outreach to parents, educating them about the risks of vaccine-preventable disease, the value and safety of vaccines, and the logistics of obtaining access to vaccines.

To educate various audiences about immunization requirements, CDPH develops resources, including webinars, frequently asked questions, guides to requirements, and template letters. These efforts were crucial in recent years given the major legislative changes to personal belief exemption requirements (AB 2109 and SB 277). The resources are available at www.shotsforschool.org.

- 7) *Collaborating with Other State Programs to Promote Immunization:* CDPH collaborates with the WIC Supplemental Nutrition Program screens the immunization status of its participants, educates them about needed vaccines, and facilitates their access to vaccination services. City

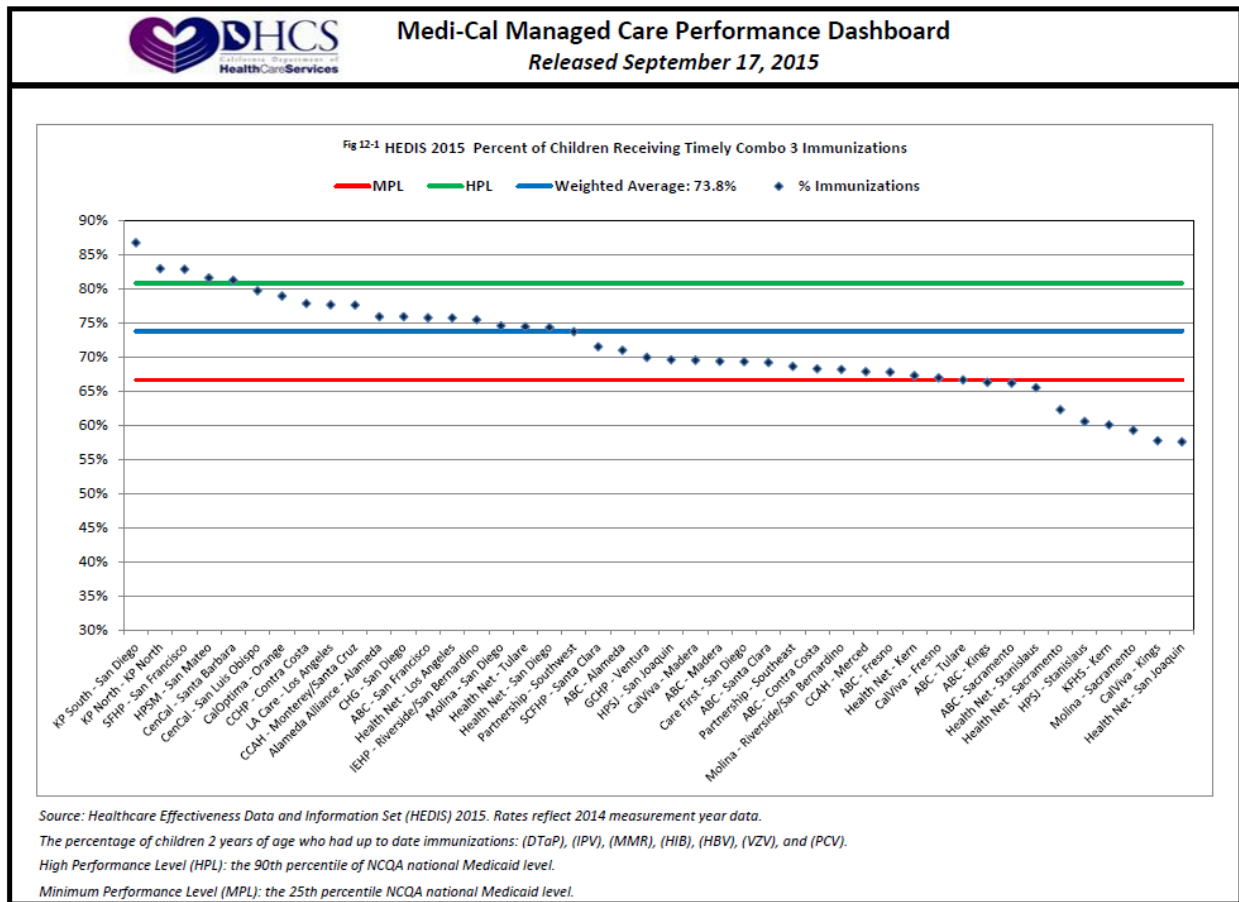
and county CHDP offices emphasize immunization among the preventive services they provide.

CDPH collaborates with the California Department of Education (CDE) and California Department of Social Services (CDSS) to support the implementation of child care and school immunization requirements and promote other immunization initiatives, such as seasonal flu vaccination among school-aged children and their families. CDE and CDSS were key partners in informing child care providers, school administrators, staff, and parents about the laws regarding the restriction of personal belief exemptions (AB 2109 and SB 277).

CDPH collaborates with DHCS to strengthen immunization services in the Fee for Service and Managed Care programs so that Medi-Cal members are fully vaccinated on time.

The CDPH immunization program is almost completely dependent on federal funding. Full implementation of CAIR2 will enable better assessment of current immunization gaps, better targeting and assessment of interventions, and better estimates of funding needed to ensure all California children are fully protected.

APPENDIX A: PERCENT OF TWO YEAR OLDS UP TO DATE ON IMMUNIZATIONS, MEDI-CAL MANAGED CARE HEALTH PLANS BY COUNTY, 2014



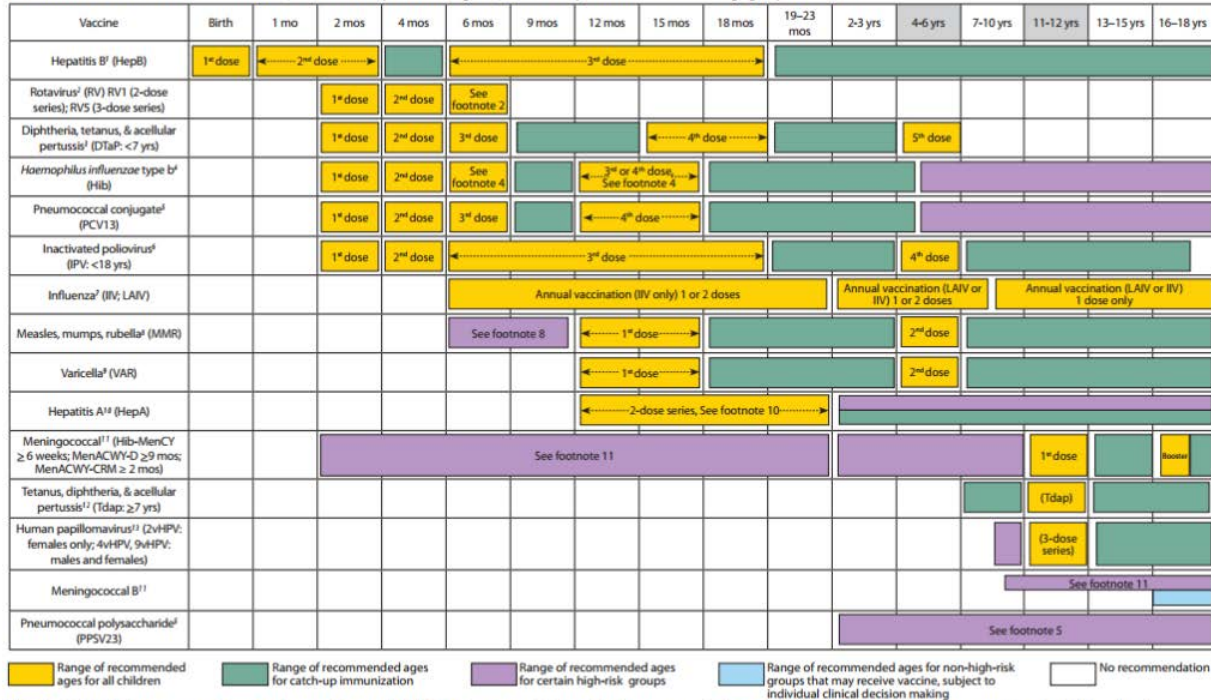
APPENDIX B: 2016 CHILDHOOD IMMUNIZATION SCHEDULE

For footnotes, see source of these schedules: <http://www.cdc.gov/vaccines/schedules/index.html>

Figure 1. Recommended immunization schedule for persons aged 0 through 18 years – United States, 2016.

(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded.



This schedule includes recommendations in effect as of January 1, 2016. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. Vaccination providers should consult the relevant Advisory Committee on Immunization Practices (ACIP) statement for detailed recommendations, available online at <http://www.cdc.gov/vaccines/hcp/acip-recs/index.html>. Clinically significant adverse events that follow vaccination should be reported to the Vaccine Adverse Event Reporting System (VAERS) online (<http://www.vaers.hhs.gov>) or by telephone (800-822-7967). Suspected cases of vaccine-preventable diseases should be reported to the state or local health department. Additional information, including precautions and contraindications for vaccination, is available from CDC online (<http://www.cdc.gov/vaccines/recs/vac-admin/contraindications.htm>) or by telephone (800-CDC-INFO [800-232-4636]).

This schedule is approved by the Advisory Committee on Immunization Practices (<http://www.cdc.gov/vaccines/acip>), the American Academy of Pediatrics (<http://www.aap.org>), the American Academy of Family Physicians (<http://www.aafp.org>), and the American College of Obstetricians and Gynecologists (<http://www.acog.org>).

NOTE: The above recommendations must be read along with the footnotes of this schedule.