Why vaccines are so important to safeguard health

Immunization coverage rate target goals

Influences on vaccine acceptance

Fans (Vaccine Recipients & Community)

Stephanie Massay

Centuries ago, scientists discovered the basic principles that make immunization possible. They learned they could help the body prepare to fight deadly infections by training the immune system to recognize and defeat germs.

Milkmaids and Coxpox, Wellcome Library, London.

Live attenuated	Killed whole organism	Protein or polysaccharide	Genetically engineered
18th Century			
Smallpox (1798)			
19th Century			
Rabies (1885)	Typhoid (1896)		
	Cholera (1896)		
	Plague (1897)		
20th Century			
Tuberculosis (BCG) (1927)	Pertussis (1926)	Diphtheria toxoid (1923)	Hepatitis B surface antigen recombinant (1986)
Yellow fever (1935)	Influenza (1936)	Tetanus toxoid (1926)	Cholera (recombinant toxin B) (1993)
Polio (oral) (1963)	Typhus (1938)	Anthrax secreted proteins (1970)	Lyme OspA (1998)
Measles (1963)	Polio (injected) (1955)	Meningococcus polysaccharide (1974)	
Mumps (1967)	Rabies (cell culture) (1980)	Pneumococcus polysaccharide (1977)	
Rubella (1969)	Tick-borne encephalitis (1981)	Hepatitis B (plasma derived) (1981)	
Adenovirus (1980)	Cholera (WC-rBS) (1991)	*Haemophilus influenzae* type b polysaccharide (1985)	
Typhoid (*Salmonella* Ty21a) (1989)	Japanese encephalitis (mouse brain) (1992)	*H. influenzae* type b conjugate (1987)	
Varicella (1995)	Hepatitis A (1996)	Typhoid (Vi) polysaccharide (1994)	
Rotavirus reassortants (1999)		Acellular pertussis (1996)	
Cholera (attenuated) (1994)		Meningococcal conjugate (group C) (1999)	
21st Century			
Cold-adapted influenza (2003)	Japanese encephalitis (Vero cell) (2009)	Pneumococcal conjugates (heptavalent) (2000)	Human papillomavirus recombinant (quadrivalent) (2006)
Rotavirus (attenuated and new reassortants) (2006)	Cholera (WC only) (2009)	Pneumococcal conjugates (13-valent) (2010)	Human papillomavirus recombinant (bivalent) (2009)
Zoster (2006)		Meningococcal conjugates	Human papillomavirus recombinant (9vHPV) (2014)
			Meningococcal B recombinant

Adapted from Outline of the Development of Human Vaccines. Vaccines, 6th Ed.

Comparison of 20th Century Annual Morbidity and Current Morbidity: Vaccine-Preventable Diseases

Disease	20th Century Annual Morbidity†	2014 Reported Cases ††	Percent Decrease
Diphtheria	21,053	1	> 99%
Measles	530,217	644	> 99%
Mumps	162,344	1,151	99%
Pertussis	200,752	28,660	86%
Polio (paralytic)	16,316	0	100%
Rubella	47,745	8	> 99%
Congenital Rubella Syndrome	152	0	100%
Tetanus	580	21	96%
Haemophilus influenzae	20,000	27*	> 99%
Total	999,159	30,512	97%

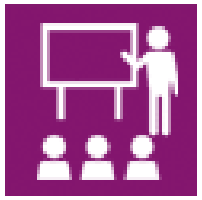
† JAMA. 2007;298(18):2155-2163

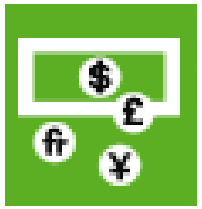
†† CDC. MMWR January 9, 2015 / 63(53);ND-733-ND-746. (MMWR 2014 provisional week 53 data)

* *Haemophilus influenzae* type b (Hib) < 5 years of age. An additional 12 cases of Hib are estimated to have occurred among the 226 reports of Hi (< 5 years of age) with unknown serotype.

Vaccines do far more than protect health; they also protect people's incomes and savings, and promote economic growth

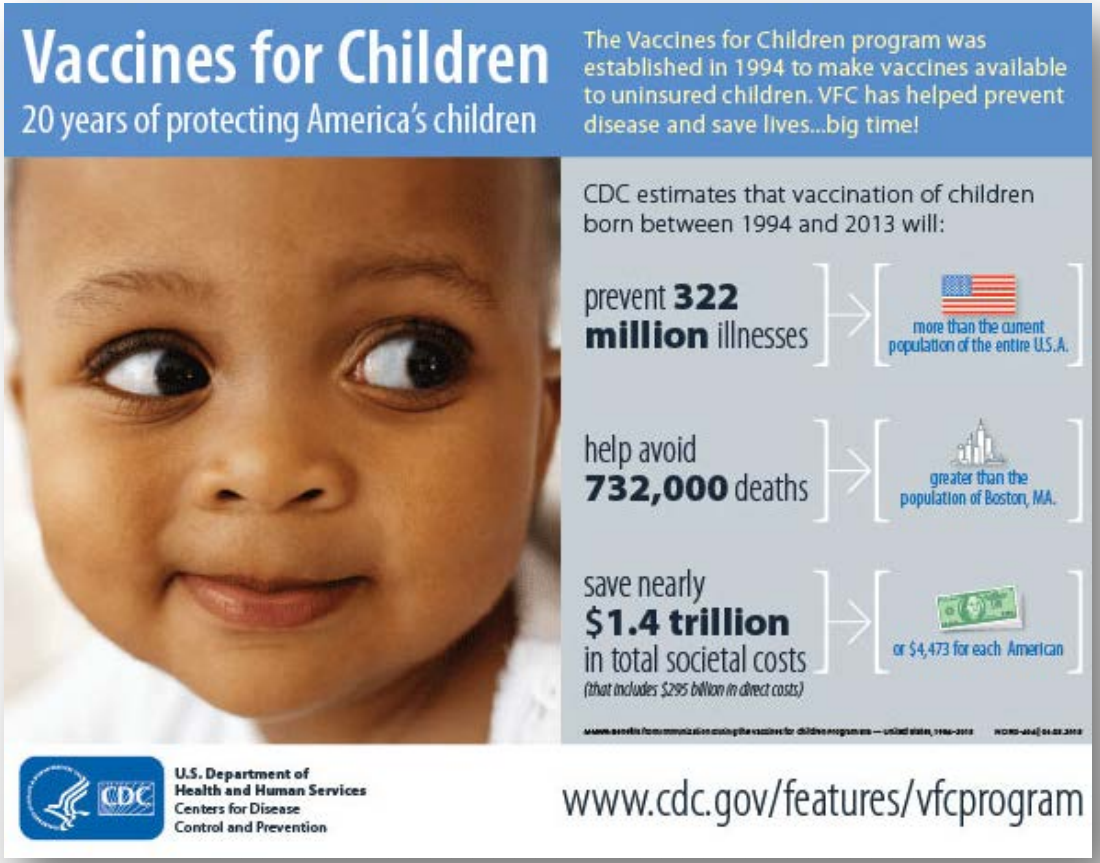
- Better health, more education
- Healthier, more productive workforce
- More money to spend and save
- Better off families and communities





Vaccine Pharmacoeconomics

Most vaccines recommended are cost-saving even if only direct medical costs – not lost lives and suffering are considered.



CDC. MMWR April 25, 2014 / 63(16); 352-55.

Value of Vaccines Beyond Childhood

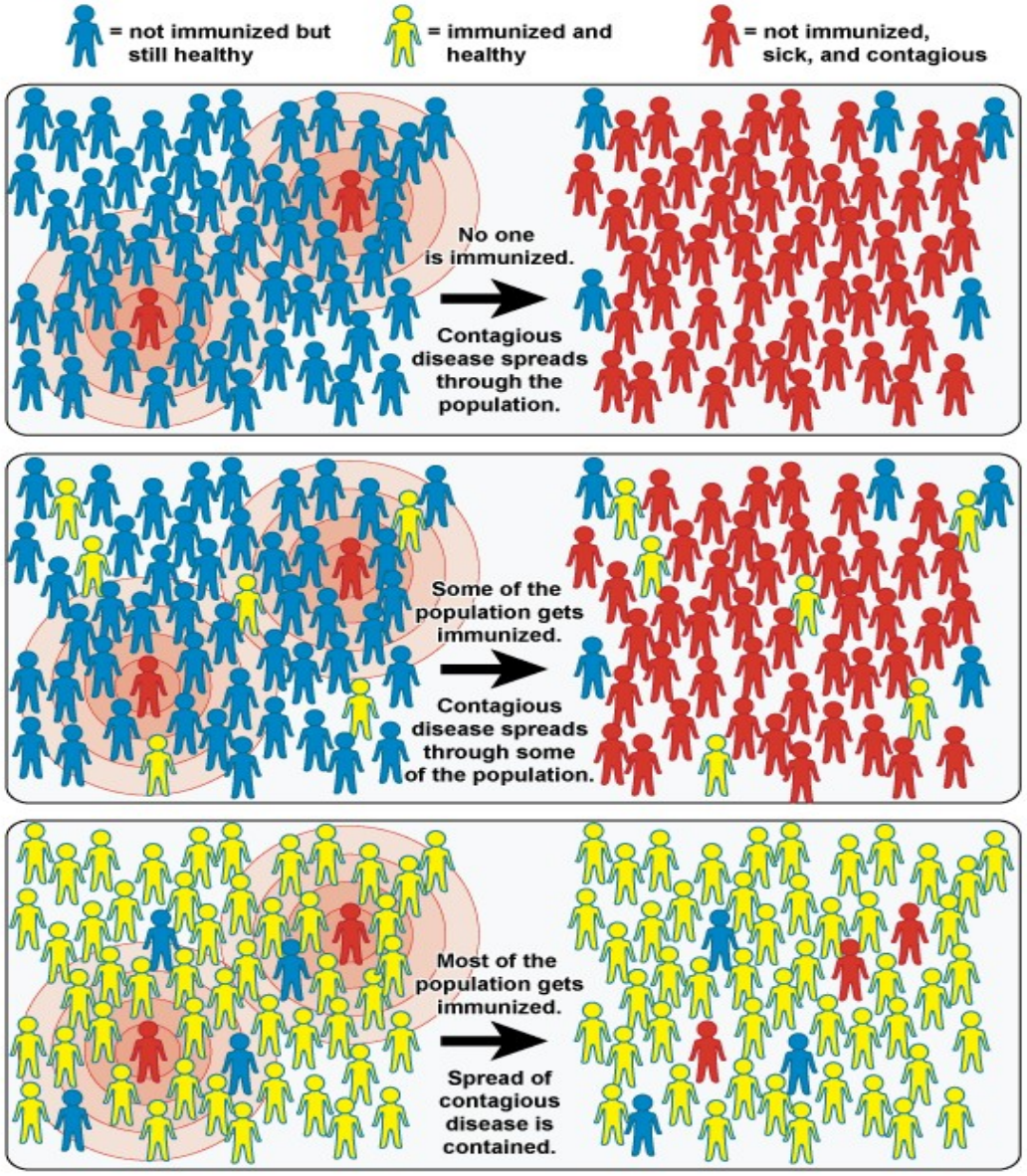
Among vaccines-preventable disease in adults, influenza has the greatest impact on the United States population.

- An average of 36,000 deaths and over 200,000 hospitalizations associated with influenza occur each year in the US
- Combination of influenza and pneumonia is the eighth leading cause of death among all persons in the US in 2005
- Estimates of the cost of flu annually:
  - Direct medical costs: $8.7 billion
  - Indirect (lost earning and productivity): $6.2 billion
- From a societal perspective, the total economic burden of influenza-attributable in the US is $83.3 billion

CDC. Workplace Health Promotion, Adult Immunization. 10/23/13.

Vaccines Protect Individuals & Provide Community immunity

- Most vaccine-preventable diseases are spread from person to person
- If one person in the community gets an infectious disease, they can spread it to others who are not immune
- A person who is immune to a disease due to vaccination can't spread it to others
- The more people who are vaccinated, the fewer opportunities a disease has to spread



- Herd Immunity: When a significant portion of the population is immune, it provides protection for individuals who are not immune

Implied Crude Herd Immunity Threshold for Common Vaccine-Preventable Diseases

Disease	Community Immunity Threshold
Diphtheria	85%
Influenza	75%
Measles	94%
Mumps	86%
Pertussis	94%
Polio	95%

Vaccines, 6th Edition. Pg. 1399

Immunization Coverage Goals – Healthy Alaskans 2020

Indicator #17: Increase the proportion of children aged 19-35 months who receive the ACIP recommended vaccination series

4:3:1:3:3:1:4 Series Target Goal: 75%

Series Composition: ≥4 doses of DTaP, ≥3 doses of poliovirus vaccine, >1 MMR, full series of Hib (3 or 4 depending upon product), ≥3 doses of Hep B, ≥1 doses of varicella, and 4 doses of PCV.

Immunization Coverage Goals – Healthy people 2020

Healthy People 2020

IID-7 Achieve and maintain effective vaccination coverage levels for universally recommended vaccines for young children (19-35 months)

IID-10 Maintain vaccination coverage levels for children in kindergarten

IID-11 Increase routine vaccination coverage levels for adolescents

IID-12 Increase the percentage of children and adults who are vaccinated against seasonal influenza

IID-13 Increase the percentage of adults who are vaccinated against pneumococcal disease

IID-14 Increase the percentage of adults who are vaccinated against zoster (shingles)

Immunization Coverage Rates Goals – Healthy People 2020

Objective	Target
Children 19-35 months who have receive the recommended 4:3:1:3:3:1:4 vaccine series	80%
Children enrolled in kindergarten who have received 4 DTaP, 2 MMR, 3 IPV, 3 HepB, 2 varicella	95%
Adolescents who have received 1 Tdap, 1 MCV, 3doses of HPV	80%
Children and adults vaccinated annually against seasonal influenza	70%
Adults aged 65 years and older who are vaccinated against pneumococcal disease	90%
Adults aged 60 years and older who have received zoster vaccine	30%

What Influences Vaccine Acceptance?

Vaccine decision making by a caregiver or patient is a complex process with many factors influencing this both directly and indirectly. Some factors may be more important in certain contexts that in others. Experience and circumstances may change the weight of a factor(s) in different settings.

Factors That May Influence Vaccine Acceptance

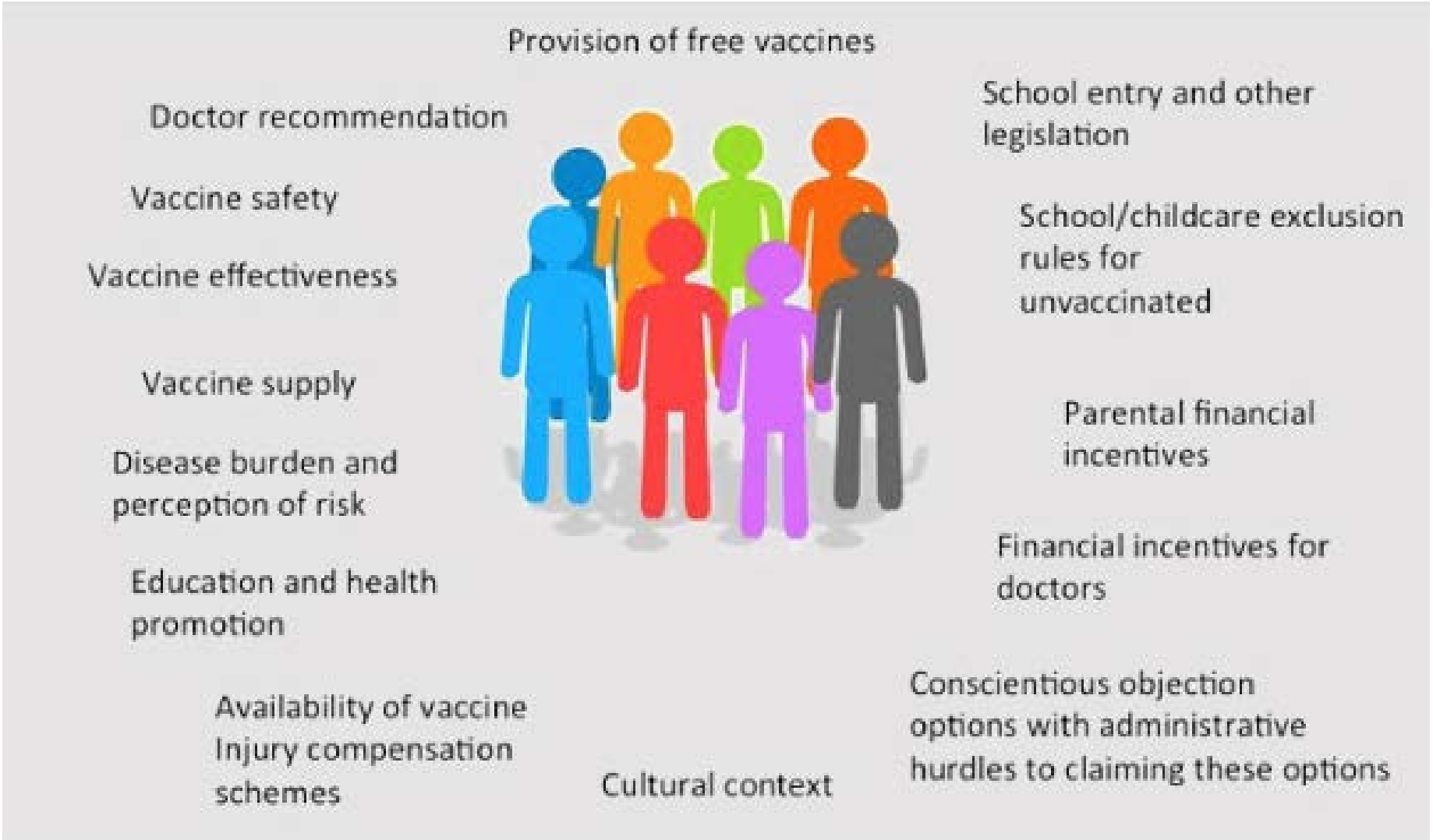


Photo credit: IFL Science, Want to Boost Vaccination. 15 April 2015.

Contextual Influences

Influences arising due to historical, socio-cultural, environmental, healthy system/institutional, economic or political factors

a. Communication and media environment
b. Influential leaders, immunization program gatekeepers, and anti- or pro-vaccination lobbies
c. Historical influences
d. Religion/culture/gender/socio-economic
e. Politics/policies

WHO. SAGE Working Group Report on Vaccine Hesitancy. October 2014.

Individual or Group Influences

Influences arising from personal perception of the vaccine or influences of the social/peer environment

a. Personal, family and/or community member's experience with vaccination
b. Beliefs, attitudes about health and prevention
c. Knowledge/awareness
d. Health system and providers trust or personal experience
e. Risk/benefit (perceived, heuristic)
f. Immunization as a social norm vs. not needed/harmful

WHO. SAGE Working Group Report on Vaccine Hesitancy. October 2014.

Vaccine/Vaccination Issues

Directly related to vaccine or vaccination	a. Risk/benefit (epidemiological and scientific evidence) b. Vaccine schedule c. Reliability and/or source of supply of vaccine and/or vaccination equipment d. Costs e. Strength of recommendation and/or knowledge base, or attitude of health care professionals

WHO. SAGE Working Group Report on Vaccine Hesitancy. October 2014.