

The Value of Vaccines in Disease Prevention: A Global Perspective



Vaccinations are an essential tool in our fight against infectious disease. According to the World Health Organization (WHO), vaccination has greatly reduced the burden of infectious disease globally.¹ Vaccines protect the vaccinated individual by direct immunization and can protect unvaccinated individuals through community protection or herd immunity, vaccination of a significant portion of the population to protect against the spread of contagious disease.² Vaccination has also been highlighted as one of the main reasons for reducing health disparities both within and across countries in the last century, though racial and ethnic differences in vaccination rates still persist.^{3,4}



**2-3 MILLION LIVES
Saved Each Year**

According to the World Health Organization (WHO), **immunizations save an estimated 2-3 million lives each year from vaccine-preventable infections.**⁵

It is well-documented that some vaccines decrease antibiotic use, thus lowering the likelihood of antibiotic resistance.⁶ This suggests that vaccines can play a role in decreasing antibiotic resistant infections.² The Centers for Disease Control and Prevention (CDC) now advocates for the development of and improved access to vaccines as a tool for addressing antimicrobial resistance (AMR).⁷

KEY TAKEAWAYS

According to the World Health Organization (WHO), **immunizations save an estimated 2-3 million lives every year.**⁵

The ability to prevent 20 million deaths by vaccination against ten vaccine-preventable diseases has a total **estimated economic and social value of \$820 billion in low- and middle-income countries.**¹⁴

In the U.S., immunization of infants born in 2009 would **save an estimated \$13.5 billion in direct costs over their collective lifetimes.**¹¹

SOCIETAL HEALTH IMPACT

Vaccines have dramatically reduced the threat of diseases that were once widespread and oftentimes fatal.⁸ Today, more people benefit from safe and effective vaccines than ever before — and the list of diseases that vaccines can help to prevent continues to grow. **Vaccines help reduce health care costs to both patients and the broader health care system by reducing the incidence of vaccine-preventable illness including associated hospitalizations and death.**⁸ Continued investment in new vaccine technologies is critical for the development of new and more effective ways to address unmet medical needs.



**26 MILLION CASES
of Disease Prevented**

It is estimated that **vaccinations prevented 26 million cases of childhood disease in the U.S. in the past decade**, representing approximately 99 percent of diseases that would have occurred.⁹



**Prevented an Estimated
120 MILLION INFECTIONS**

Routine vaccination with Hepatitis B vaccine in China has **prevented an estimated 120 million infections, including 28 million chronic infections, between 1992 and 2014.** By preventing these infections, many individuals averted hepatitis B-associated liver cirrhosis and/or cancer.¹⁰



**Vaccines can PREVENT
AND COMBAT AMR**


AMR is a significant public health problem, negatively impacting millions of people worldwide and costing billions of dollars. Vaccines can help by (1) preventing an individual from ever developing an infection which requires antibiotic treatment, and (2) reducing the transmission and circulation of certain types of bacteria strains that are antibiotic resistant.¹¹

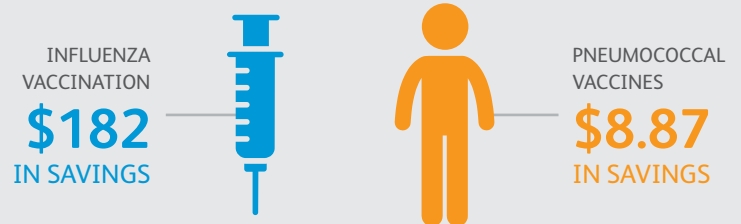
ECONOMIC IMPACT


Timely use of vaccinations and adherence to the WHO's recommended vaccination schedules for infants, children, and adults prevent morbidity and mortality, and save millions of dollars in direct medical costs to the health care system and prevent indirect costs associated with the illnesses.¹² The further development and appropriate implementation of new, innovative vaccines may continue to cut costs.


 For every **\$1.00** low- and middle-income countries spend on childhood vaccinations, **\$44** is saved in total societal costs.¹⁴





 For adults aged 65 years and older, in the U.S., **influenza vaccination saves \$182** in medical costs per vaccination and **pneumococcal vaccines save \$8.87** in societal medical costs per person.¹³



 In a recent study, it was estimated that routine childhood vaccination in U.S. children born in 2009 would be valued over their collective lifetimes at **\$8.9 billion** for measles vaccination, **\$2.7 billion** for pneumococcal disease, and **\$595 million** for rotavirus.¹⁵

 The ability to prevent 20 million deaths by vaccinating children and adults against ten vaccine-preventable diseases has a total estimated economic and social value of **\$820 billion** in low- and middle-income countries.¹⁴

 In 2015, **infections from vaccine-preventable diseases in unvaccinated individuals cost approximately \$7.1 billion in the U.S.**¹² This included 4,450 cases of pertussis, with an average cost of \$600 per case.¹⁴ Given that the pertussis vaccine costs between \$25-44, significant cost savings could have been realized through vaccination.¹⁶

 A recent modeling study estimated that **routine childhood immunization among children born in the U.S. between 1994 and 2013 will prevent an estimated 322 million illnesses, 21 million hospitalizations, and 732,000 deaths** over the course of their lifetimes, with a net savings of **\$295 billion** in direct costs and **\$1.38 trillion** in total societal costs.¹⁷

Cost of Outbreaks Around the World

Globally, vaccinations help save billions of dollars by reducing the need for additional healthcare related costs. Between 2001 and 2020 in 73 low- and middle-income countries, avoiding costs of treatment for vaccine-preventable diseases saves \$4.6 billion; avoiding lost wages of caretakers saves \$886 million; avoiding long-term costs of lost productivity due to disability and death may add savings of around \$341 billion.¹⁸ Evidence also indicates that increases in vaccination rates lead to economically significant and sustained increases in the gross domestic product (GDP) growth rate.¹⁹



\$11.2 Billion
in costs

Seasonal Influenza in the United States

Less than half of the U.S. population is vaccinated for influenza each year, leading to direct health care costs and indirect productivity costs related to absenteeism from paid employment. Based on 2015 population numbers, **there were 26.2 million cases of seasonal influenza in the U.S. with a total annual economic burden of \$11.2 billion. Of those costs, \$3.2 billion were for direct healthcare costs and \$8.0 billion for indirect costs.** Persons aged 65 and older had the largest share of total direct costs, primarily due to hospitalizations.²⁰



€3.9 Million
in costs

Measles Outbreak in the Netherlands

A measles outbreak in 2013-2014 in the Netherlands resulted in 2,700 measles cases (mostly in children) with a total economic burden of approximately €3.9 million. Even with a national plan to manage the outbreak, restricting the spread of measles was difficult and there were reported cases linked to this outbreak in Canada, the United States, and Belgium.²¹



\$384,594
in costs

Measles Outbreak in Beijing

A 2015 measles outbreak in Beijing lasted 19 days and resulted in 22 reported cases of measles (all in unvaccinated adults). Controlling the outbreak cost \$384,594 and required 21,471 personnel hours.²²



€48,682
in costs

Pertussis Outbreak in Amsterdam

Health care workers (HCWs) exposed to infectious diseases are positioned to transfer the disease to susceptible patients. Vaccinating HCWs can help prevent costly outbreaks. **A recent study found that a pertussis outbreak on the neonatal ward in Amsterdam cost €48,682, but preventively vaccinating HCWs would only have cost €12,208,** suggesting that €4 could be saved for every €1 spent on vaccinating HCWs.²³

VACCINE INNOVATION

The development and use of newer innovative vaccines helps us fight infectious diseases that had been previously difficult to vaccinate against. Since new strains are constantly emerging, the ability to develop innovative vaccines is important to meet emerging infectious disease challenges. **Vaccines have proven to be an extremely effective way to prevent morbidity and mortality associated with infectious disease.** CDC epidemiological surveillance demonstrates up to 99 to 100 percent reduction in several life-threatening infectious diseases in the U.S., as shown in the adapted table below.

The Role of Vaccines on U.S. Infectious Disease Cases in Adults and Children

| | Pre-Vaccine Era Cases in the U.S. ²⁴ | 2017 Reported Cases in the U.S. ²⁵ | % Decrease |
|----------------------|---|---|------------|
| DIPHTHERIA | 21,053 | 0 | 100.0% |
| H. INFLUENZAE | 20,000 | 5,548 | 72.3% |
| HEPATITIS A | 117,333 | 3,365 | 97.1% |
| HEPATITIS B | 66,232 | 3,440 | 94.8% |
| MEASLES | 530,217 | 120 | 100.0% |
| MUMPS | 162,344 | 6,109 | 96.2% |
| PERTUSSIS | 200,752 | 18,975 | 90.5% |
| PNEUMOCOCCAL DISEASE | 63,067 | 19,780 | 68.6% |
| POLIO | 16,316 | 0 | 100.0% |
| RUBELLA | 47,745 | 7 | 100.0% |
| CONGENITAL RUBELLA | 152 | 5 | 96.7% |
| SMALLPOX | 29,005 | 0 | 100.0% |
| TETANUS | 580 | 33 | 94.3% |
| VARICELLA | 4,085,120 | 8,777 | 99.8% |

ENDNOTES

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