

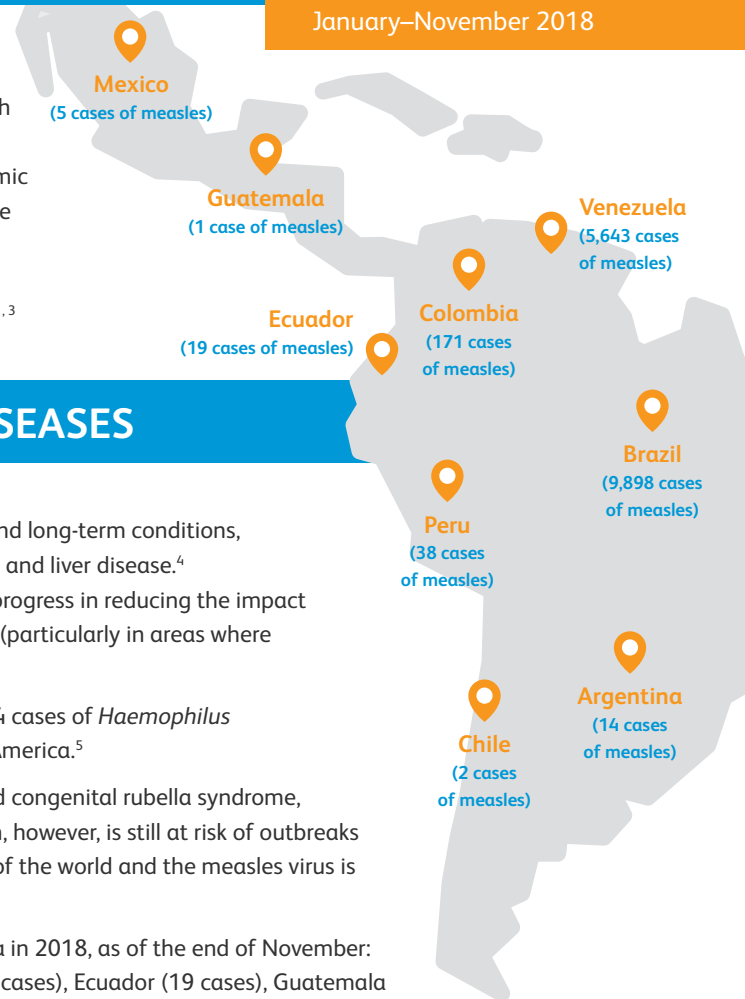
# The Value of Vaccines in Disease Prevention in Latin America



## INTRODUCTION

Vaccines are a safe and effective way to eradicate and control a number of life-threatening or debilitating infectious diseases.<sup>1</sup> Throughout the twentieth century, immunization programs reduced the spread of vaccine-preventable diseases in Latin America, preventing illness, death, and reducing the economic burden of these diseases.<sup>1,2</sup> Despite advances, numerous vaccine-preventable diseases remain prevalent in Latin America, and continued strengthening of national immunization programs and support for innovative vaccine development will help the region progress toward a healthier Latin America.<sup>1,3</sup>

## CONFIRMED MEASLES CASES: January–November 2018



## BURDEN OF VACCINE-PREVENTABLE DISEASES

Vaccine-preventable diseases can be deadly and cause a number of short- and long-term conditions, including diarrhea, paralysis, deafness, intellectual disabilities, heart defects, and liver disease.<sup>4</sup> National immunization programs in Latin America have made tremendous progress in reducing the impact of vaccine-preventable diseases, but these diseases still persist in the region (particularly in areas where vaccine coverage is lower).<sup>5</sup>

- In 2017, there were 6,234 cases of pertussis, 868 cases of diphtheria, 194 cases of *Haemophilus influenzae* type b (HiB) meningitis, and 44,570 cases of mumps in Latin America.<sup>5</sup>
- The Americas were the first in the world to eliminate measles, rubella, and congenital rubella syndrome, culminating from a 22-year effort involving mass vaccination.<sup>6</sup> The region, however, is still at risk of outbreaks because the measles and rubella viruses continue to circulate in the rest of the world and the measles virus is highly contagious.<sup>6</sup>
- Confirmed measles cases were reported in nine countries in Latin America in 2018, as of the end of November: Argentina (14 cases), Brazil (9,898 cases), Chile (2 cases), Colombia (171 cases), Ecuador (19 cases), Guatemala (1 case), Mexico (5 cases), Peru (38 cases), and Venezuela (5,643 cases).<sup>6</sup>

Ongoing efforts to limit the spread and incidence of vaccine-preventable diseases include:<sup>7</sup>



Ensuring that immunization programs work with health systems



Maintaining and strengthening national commitments to immunization programs



Increasing surveillance of vaccine-preventable diseases



Enhancing communication and social mobilization to prevent further outbreaks

# VALUE OF VACCINES

National immunization programs protect Latin Americans from serious and potentially deadly vaccine-preventable diseases.<sup>5</sup> A healthier population, in turn, saves the economy millions of dollars of direct and indirect costs.<sup>2</sup> Continued widespread use of vaccines and the development of new vaccines present opportunities to economically benefit society.



Prevented **174,000 DEATHS**  
in children under age 5

National immunization programs in Latin America and the Caribbean **prevent approximately 174,000 deaths in children under age five every year.**<sup>1</sup>



Protected vaccinated individuals  
by **DIRECT IMMUNIZATION**






In 2017, the reported immunization coverage<sup>8</sup> in Latin America for the polio vaccine (3 doses), pneumococcal conjugate vaccine (3 doses) and measles, mumps, and rubella vaccine (1 dose) were 82 percent, 81 percent and 89 percent, respectively, **protecting the vaccinated individuals by direct immunization and unvaccinated individuals by herd immunity, or the vaccination of a significant portion of the population.**<sup>5,9</sup>



Up to **100% REDUCTION** in life-threatening infectious diseases

Vaccines have proven to be an effective way to prevent the spread of infectious diseases. The World Health Organization epidemiological surveillance demonstrates **up to 100 percent reductions in several life-threatening infectious diseases in Mexico since 1980.**<sup>10</sup>

## The Impact of Vaccines on Infectious Disease Morbidity in Mexico<sup>10</sup>

	Morbidity in 1980	Morbidity in 2017	% Reduction from 1980 in 2017
 Diphtheria	7	0	100%
 Measles	29,730	0	100%
 Pertussis	5,539	827	85%
 Polio	682	0	100%
 Tetanus	363	27	93%

# Highlights on the Impact of Vaccines



**SAVED \$217.2 MILLION**  
through polio eradication program

## Polio in Latin America and the Caribbean

A common disease only a few decades ago, polio has been eliminated in Latin America. In the 1970s, polio caused approximately 15,000 paralysis cases and 1,750 deaths each year.<sup>11</sup> In 1985, the Pan American Health Organization began a polio eradication campaign in Latin America and the Caribbean. **The last polio case in the region was in 1991 and the first five years of the polio campaign saved the region \$217.2 million USD.**<sup>11</sup>



Invasive HiB disease  
**DROPPED BY 95%**

## HiB in Chile

HiB vaccines protect individuals against the HiB bacterium, which causes deadly invasive bacterial disease.<sup>12</sup> Chile introduced a HiB vaccine to their routine immunization schedule in 1996 and **after two years, the incidence of invasive HiB disease dropped by 95 percent in children under five years.**<sup>12</sup>



**SAVED 1470 YEARS OF QUALITY LIFE** per year

## Rotavirus in Argentina

Rotavirus infection can cause severe diarrhea and vomiting, leading to severe dehydration which is particularly dangerous for infants and young children.<sup>13</sup> **In 2015, the rotavirus vaccine was introduced to the country's national immunization program and is projected to save \$9.5 million Argentinian pesos and 1470 years of quality life per year.**<sup>2</sup>



Over a **50% REDUCTION**  
in the MD incidence rate

## Meningococcal Diseases in Brazil

Meningococcus is a bacterium which can cause life-threatening meningococcal diseases (MD) such as meningitis and sepsis infections and there is significant value in vaccinating against it with meningococcal conjugate vaccines.<sup>14</sup> Brazil introduced a meningococcal C conjugate vaccine to their immunization program in 2010 and saw **over a 50 percent reduction in the MD incidence rate in one to two year old infants by 2012.**<sup>14</sup>



**86% DECREASE** in the  
number of varicella cases

## Varicella in Uruguay

Varicella, also known as chickenpox, is a highly contagious disease that typically presents with a mild itchy rash, but occasionally with serious and costly complications such as skin and bloodstream infections.<sup>15</sup> In Argentina, the total economic cost of varicella in children under age 14 was \$40 million USD in 2015 and each inpatient and outpatient case can cost approximately \$2948 and \$323 USD, respectively.<sup>16</sup> **Uruguay introduced the varicella vaccine to their national immunization plan in 1999 and the number of varicella cases in the country dropped by 86 percent by 2009.**<sup>17</sup> The varicella vaccine was introduced into Argentina's national immunization schedule in 2015 and promises to reduce the number of costly varicella-associated hospitalizations in the future.<sup>16</sup>



**70% FEWER CASES OF PNEUMONIA**  
in children 12-23 months

### Pneumococcal Disease in Argentina

In 2012, Argentina introduced a pneumococcal conjugate vaccine into its routine immunization program for children under 2 years of age.<sup>18</sup> Following the introduction, **cases of pneumonia dropped by 53 percent in children 0-11 months and by 70 percent in children 12-23 months.**<sup>19</sup> Early studies show that rates of hospitalization from invasive pneumococcal disease and community-acquired pneumonia are also decreasing.<sup>18</sup>



Mass immunization campaign to  
**VACCINATE 23.8 MILLION PEOPLE**

### Yellow Fever in Brazil

Routine administration of the yellow fever vaccine confers immunity and life-long protection against the disease, but low immunization coverage has led to outbreaks in Latin America.<sup>20</sup> Between July 2017 and February 2018, there were 723 confirmed cases of yellow fever and 237 yellow fever-related deaths in Brazil.<sup>20</sup> In January 2018, **Brazil launched a mass immunization campaign to vaccinate 23.8 million people with a lower dose of the yellow fever vaccine**, which still confers immunity for at least one year.<sup>21</sup> This short-term strategy extended vaccine supplies to protect more people and reduce the possibility of disease spread.<sup>21</sup>



Routine immunization would  
**PREVENT 1,937 CASES** of cervical cancer

### Human Papillomavirus in Brazil

Human papillomavirus (HPV) is a sexually transmitted virus that causes the majority of all cervical cancer.<sup>22</sup> The HPV vaccine was introduced in 2014 to Brazil's national immunization program and has been a cost-effective strategy to prevent cancer and death.<sup>23</sup> A modeling study found that **routine immunization in one year would prevent 1,937 total cervical cancers cases and 229 deaths** and reduce the direct medical costs associated with cervical cancer treatment by 43 percent.<sup>23</sup>

## Summary



A push towards comprehensive immunization of Latin Americans has significantly relieved the burdens associated with vaccine-preventable diseases. **The Pan American Health Organization, national governments, and pharmaceutical companies seek to maintain and further progress by sustaining efforts to achieve uniformly high vaccination coverage** and developing of vaccine technologies that are more effective and protect against new diseases.<sup>3, 5</sup>

1. See: [www.paho.org/hq/dmdocuments/2015/CD54-7-e.pdf](http://www.paho.org/hq/dmdocuments/2015/CD54-7-e.pdf).
2. Martí, S. G., et al. (2015). Cost effectiveness evaluation of a rotavirus vaccination program in Argentina. *Vaccine*. 33(42): 5684–90.
3. See: [www.who.int/immunization/research/development/dengue\\_q\\_and\\_a/en](http://www.who.int/immunization/research/development/dengue_q_and_a/en).
4. See: <https://www.cdc.gov/vaccines/parents/diseases/index.html>
5. See: [www.paho.org/hq/index.php?option=com\\_docman&task=doc\\_download&gid=42190&lang=en](http://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=42190&lang=en).
6. See: [www.paho.org/hq/index.php?option=com\\_content&view=article&id=14515:measles-in-the-americas-new-epidemiological-update&Itemid=135&lang=en](http://www.paho.org/hq/index.php?option=com_content&view=article&id=14515:measles-in-the-americas-new-epidemiological-update&Itemid=135&lang=en).
7. See: [www.paho.org/hq/index.php?option=com\\_docman&task=doc\\_download&gid=42191&lang=en](http://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=42191&lang=en).
8. Immunization coverage is defined as the percent of the target population that has received the last recommended dose for each vaccine, recommended in the vaccine national schedule. See: [www.measureevaluation.org/rbf/indicator-collections/service-use-and-coverage-indicators/dpt3-immunization-coverage](http://www.measureevaluation.org/rbf/indicator-collections/service-use-and-coverage-indicators/dpt3-immunization-coverage).
9. See: [www.who.int/bulletin/volumes/86/2/07-040089/en](http://www.who.int/bulletin/volumes/86/2/07-040089/en).
10. See Mexico: [apps.who.int/immunization\\_monitoring/globalsummary/countries?countrycriteria%5Bcountry%5D%5B%5D=MEX](http://apps.who.int/immunization_monitoring/globalsummary/countries?countrycriteria%5Bcountry%5D%5B%5D=MEX).
11. See: [www.cgdev.org/sites/default/files/archive/doc/millions/MS\\_case\\_5.pdf](http://www.cgdev.org/sites/default/files/archive/doc/millions/MS_case_5.pdf).
12. Morris, S.K., et al. (2008). Haemophilus influenzae type b conjugate vaccine use and effectiveness. *Lancet Infect Dis*. 8(7):435–43.
13. See: [www.cdc.gov/rotavirus/about/symptoms.html](http://www.cdc.gov/rotavirus/about/symptoms.html).
14. Safadi, M.A.P., et al. (2014). Meningococcal Disease: Epidemiology and early effects of immunization programs. *Journal of the Pediatric Infectious Diseases Society*. 3(2):91–3.
15. See: [www.cdc.gov/vaccines/hcp/vis/vis-statements/varicella.html](http://www.cdc.gov/vaccines/hcp/vis/vis-statements/varicella.html).
16. Giglio, N., et al. (2018). Economic burden of varicella in children 1–12 years of age in Argentina, 2009–2014. *J Med Econ*. 21(4):416–24.
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18. Lopez, E.L., et al. (2018). Rapid decrease in rates of hospitalization resulting from invasive pneumococcal disease and community-acquired pneumonia in children aged <60 months after 13-valent pneumococcal conjugate vaccines introduction in Argentina. *J Pediatric Infect Dis Soc*. 7(1):30-5.
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20. See: [www.who.int/csr/don/09-march-2018-yellow-fever-brazil/en](http://www.who.int/csr/don/09-march-2018-yellow-fever-brazil/en).
21. See: [www.paho.org/hq/index.php?option=com\\_content&view=article&id=14065:brazil-launches-worlds-largest-campaign-with-fractional-dose-yellow-fever-vaccine&Itemid=135&lang=en](http://www.paho.org/hq/index.php?option=com_content&view=article&id=14065:brazil-launches-worlds-largest-campaign-with-fractional-dose-yellow-fever-vaccine&Itemid=135&lang=en).
22. See: [www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet](http://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet).
23. Novaes, H.M.D., et al. (2015). Cost-effectiveness analysis of introducing universal human papillomavirus vaccination of girls aged 11 years into the National Immunization Program in Brazil. *Vaccine*. 33:A135–42.

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