

# A CENTURY OF VACCINES AND IMMUNIZATION IN THE AMERICAS

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This chapter discusses the immunization activities undertaken in the Region of the Americas over the last century, particularly those launched in the last quarter century, when the countries of the Americas accelerated their immunization-related activities. A century ago, in 1902, Walter Reed first identified that yellow fever was transmitted by a mosquito. The first yellow fever vaccine was developed in New York, by Max Tyler in 1937, and it was used in Brazil in the same year.

Subsequently, there were several disease eradication efforts initiated in the Region of the Americas (Table 1). General William Crawford Gorgas launched the first one in 1911, to eliminate yellow fever. It was followed four years later by the Rockefeller Commission's proposal for the global eradication of yellow fever. Fred Soper later proposed the eradication of smallpox in the Americas, and the Region became the first to eradicate the disease. The experience in the Americas led to an initiative for the global eradication of smallpox, which was successfully accomplished in 1977, after a ten year campaign spearheaded by Donald A. Henderson (1). More recently, the Region of the Americas successfully eradicated polio, and this major accomplishment

led to the launching of a global polio eradication initiative. Finally, in 1994, the Ministers of Health of the Americas launched the measles eradication initiative, as a result of which, that disease is on the verge of being eradicated in the Region. The failure to eradicate malaria from the Region stands out among these decades of success in the efforts to eradicate disease in the Americas.

Immunization programs throughout the world, and particularly in the Americas, have been extremely successful in increasing immunization coverage. In 1970, the year that PAHO convened the International Conference on Vaccines Against Viral, Rickettsial, and Bacterial Diseases of Man, immunization coverage rates were under 10% for the scant vaccines that were being used in the Region's programs—basically DPT, BCG, polio, and tetanus toxoid. Today coverage hovers between an average of 80% to 90% for the vaccines being used, which now include many additional vaccines, such as measles, rubella, mumps, *Haemophilus influenzae* type b, and hepatitis B.

Ten years have elapsed since the last case of indigenous poliomyelitis occurred in the Region of the Americas (Figure 1) (2). In 2001–2002, there was a re-emergence of poliomyelitis in the Dominican Republic and Haiti. The small outbreak was due to a vaccine-derived polio virus, not a wild polio virus re-introduction; it was very quickly controlled. The challenge now is to sustain the political commit-

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**TABLE 1. Disease eradication initiatives, Region of the Americas and worldwide, 1911–1994.**

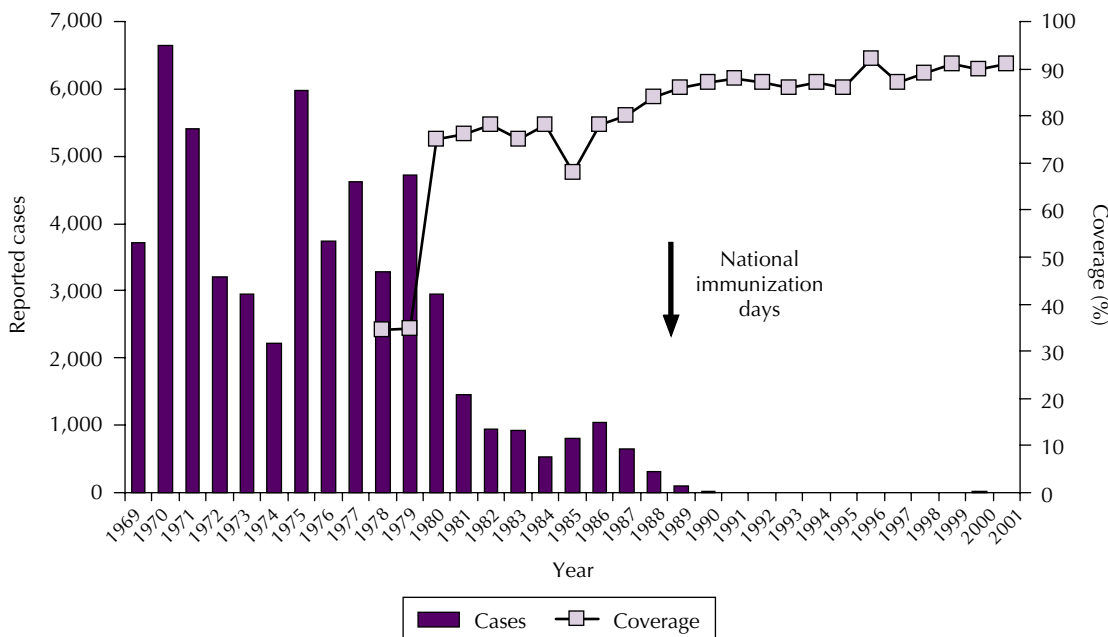
Year	Initiator	Disease	Scope
1911	William Crawford Gorgas	Yellow fever	Region of the Americas
1915	Rockefeller Commission	Yellow fever	Worldwide
1950	Soper	Smallpox	Region of the Americas
1958	Viktor M. Zhdanov	Smallpox	Worldwide
1955	WHO	Malaria	Worldwide
1985	PAHO	Polio	Region of the Americas
1988	WHO	Polio	Region of the Americas
1994	PAHO	Measles	Region of the Americas

ment for continuing vaccinating against a disease that has already disappeared and strengthening surveillance so that events such as the one in the Dominican Republic and Haiti can be promptly detected and controlled (3).

Measles is on the verge of being eradicated in the Americas. The strategy being utilized to eradicate measles in the Region was first tried by Cuba with a “catch up” vaccination cam-

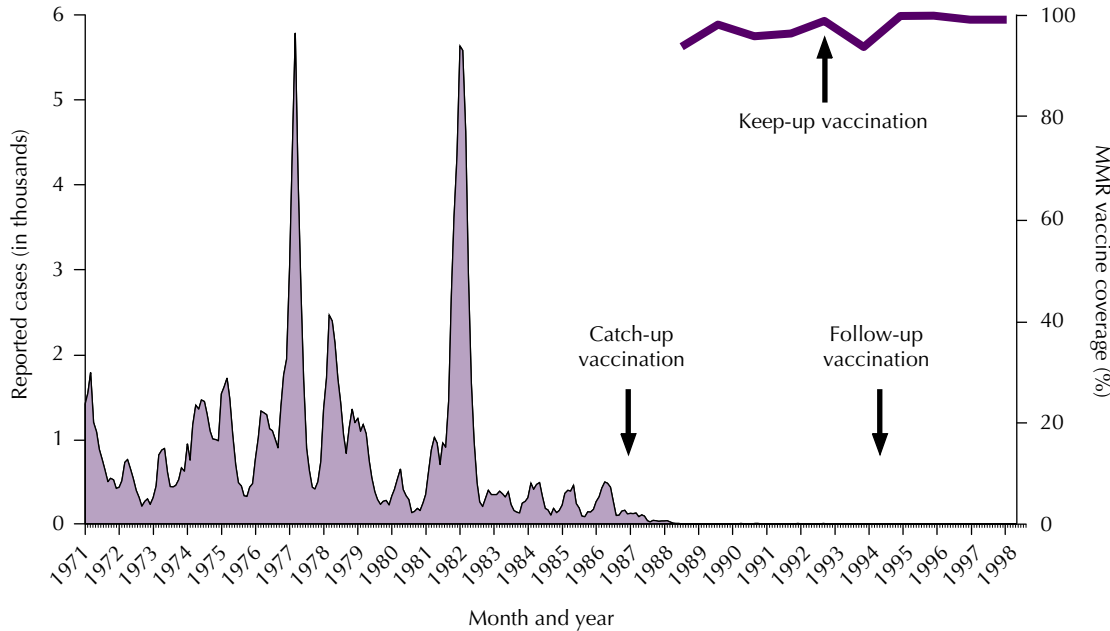
paign targeting all children 1 to 14 years old, “keeping up” with a very high level of coverage in new cohorts of children, and periodic “follow up” campaigns every four years targeting children 1–4 years old. The strategy is designed to prevent the accumulation of susceptibles as the vaccine is not 100% efficacious (Figure 2) (4). There were more than one-quarter of a million cases of measles in the Region

**FIGURE 1. OPV3 vaccination coverage and incidence of paralytic poliomyelitis, Region of the Americas, 1969–2001.**



**Note:** Coverage data are for children <1 year of age. Type 1 vaccine derived virus in 2000 and 2001.  
**Source:** Pan American Health Organization, Immunizations Unit.

FIGURE 2. Reported measles cases, by month, Cuba, 1971–1998.



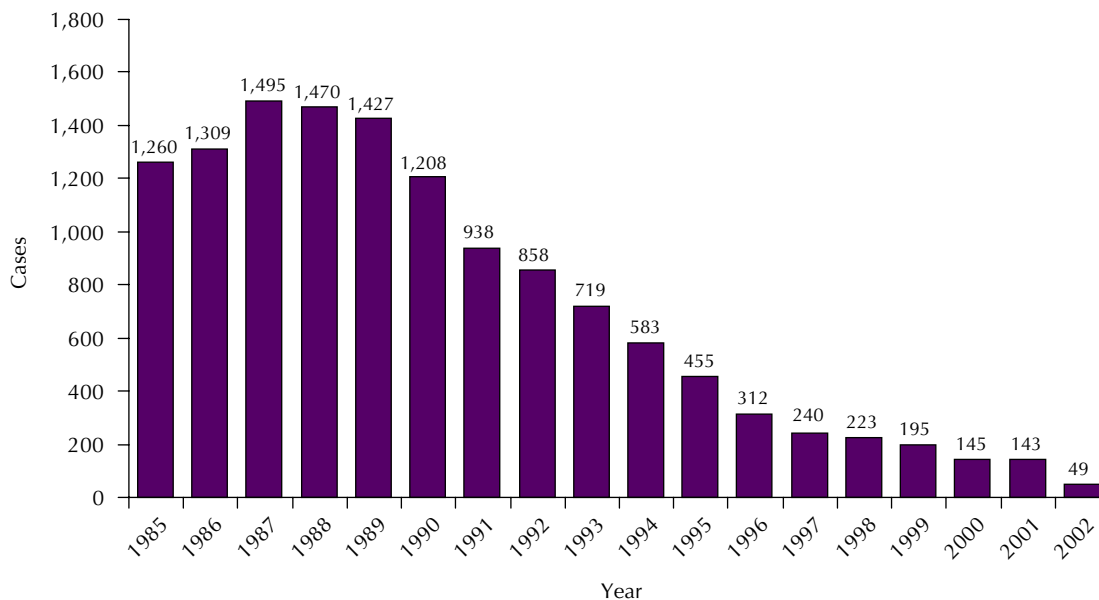
Source: Ministry of Health, Cuba.

of the Americas in 1990. Given inadequate surveillance, this number could well increase five- or tenfold. In 2001, there were only 545 cases in the Region, half of them in the Dominican Republic and Haiti, and another 25% in Venezuela. Venezuela, which had been free of indigenous measles transmission for more than two years, suffered an importation from Europe. This generated a sizeable outbreak because Venezuela's immunization program was not adequate at that time. In 2002, as of November 16, there were 2,548 cases reported, 94% of them in Venezuela and 5% in Colombia along the border with Venezuela, due to importation from the latter country. The few cases in other countries were all related to importations from Europe, Asia, or other regions. Thanks to the extraordinary efforts of the governments of Colombia, Venezuela, and of all the Region's countries in 2002, for the first time in history 10 weeks have elapsed without measles transmission detected anywhere in

the Region. Colombia's last case occurred in week 36, and Venezuela's, in week 38. The Region of the Americas is on the verge of interrupting indigenous measles transmission.

Neonatal tetanus is under control in the Region, with an annual case average between 50 and 100 (Figure 3). These cases occur in fewer than 1% of the more than 13,000 districts in the Region. The Americas has been the first one to achieve the goal of less than one case per 1,000 live births in every district of each country that was set at the Children's Summit. Countries now are focusing on those few districts which still show cases and on the elimination of missed opportunities to vaccinate women of childbearing age. The latter is particularly important since most of the cases of neonatal tetanus are in multiparous women, indicating that they have visited health centers in previous pregnancies and were never vaccinated.

Cases of pertussis and diphtheria have declined steadily over the last few years. Rubella

**FIGURE 3. Neonatal tetanus cases per year, selected countries in the Americas, 1985–2002.<sup>a</sup>**

<sup>a</sup> Data as of week 26.

**Note:** Countries with cases in the last three years: Argentina, Bolivia, Brazil, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, and Venezuela.

**Source:** Country reports.

and congenital rubella syndrome (CRS) are now under attack. Almost every Latin American country now includes vaccination against rubella in their national immunization programs, and the two or three countries that still do not include this vaccine have plans to introduce it next year.

Rubella and measles surveillance have been combined. A few countries already have succeeded in interrupting rubella transmission. Cuba was the first, when they used MMR vaccine in children 1 to 14 years old and rubella vaccine in the population 15 to 29 years old as part of their measles catch up campaign in the late 1980s. Then, in the early 1990s, countries in the English-speaking Caribbean vaccinated all males and females up to 39 years of age with MMR vaccine, and recently Costa Rica held a similar, very successful campaign (5). Other countries, like Chile and Brazil, have started vaccinating all women of childbearing age. During a recent meeting, the PAHO Technical

Advisory Group on Immunization recommended that countries implementing mass campaigns against rubella should target both female and male populations as a way to interrupt rubella transmission. I believe that rubella will be the first disease to be eradicated in the Americas during PAHO's second centennial.

Hepatitis B is now under attack, with practically every country having included hepatitis B vaccine in their national programs, many of them using it in a combination vaccine with DTP and/or DPT/Hib.

When the Pan American Health Organization was created, one of the major issues was yellow fever, and the yellow fever vaccine was the first vaccine used in the Region. And now, 100 years later, yellow fever continues to be a threat in the Region. Cases have been declining over the past 15 to 20 years, however, due to major vaccination activities that have been conducted in countries like Bolivia, Brazil, Colombia, Peru, and Venezuela. In Brazil, for

example, nearly 80 million people have been vaccinated throughout the country in the past five years. The PAHO Technical Advisory Group recommends that vaccination coverage be maintained at a very high level in the enzootic zones, as well as in those contiguous areas that are infested with *Aedes aegypti*, which now can be found throughout the hemisphere. All travelers to those areas also should be vaccinated, particularly now, with the emergence of ecotourism. About one third of cases in Brazil have been tourists going to those areas. Surveillance must also be strengthened.

In the last five years, the *Haemophilus influenzae* type b vaccine also has been introduced (6). In 1996, the vaccine was used only in Canada, Chile, the United States, and Uruguay. Uruguay was the first Latin American country to introduce this vaccine, followed by Chile. The success of this vaccine in Uruguay and Chile showed that it was very efficacious, and this encouraged other countries to introduce it. At present, 90% of newborns in Latin America live in countries where this vaccine is used in the national vaccination schedule (Figure 4).

The model used to introduce *Haemophilus influenzae* type b vaccine in the Americas is important for the future introduction of new vaccines now in the pipeline. Components of this model included strong national and regional immunization programs, the population's high degree of awareness of the importance of immunization, a very safe and efficacious vaccine, and an awareness about the disease among health professionals and parents. The Pan American Health Organization's Directing Council approved a resolution urging governments to utilize the vaccine. The Directing Council also promoted the use of the vaccine through its Technical Advisory Group meetings and through publications on the impact of the vaccine. Last but not least, the use of the PAHO Revolving Fund for purchasing the vaccine led to economies of scale that made the vaccine available at an affordable price.

The result was the striking difference between the Americas and other regions of the world in the utilization of this vaccine. If we

look back a few years, immunization schedules were very similar in the developed and developing worlds. However, as new, higher-cost vaccines became available, a gap started to open between these two groups of countries, with developing countries lagging behind in the use of these new vaccines. In the Region of the Americas, however, this gap has been rapidly closing due to the high commitment of the governments (Figure 5). This commitment is attested to by the fact that between 1987 and 1991 there was investment of more than US\$ .5 billion in immunization programs in the Region, with about US\$ 430 million coming from national budgets and about US\$ 114 million coming from international partners and collaborators (7). In the next five-year period, between 1992 and 1996, the countries greatly increased their national budget contributions, thus diminishing the need for external support. This pattern was repeated in the next five-year period (1997–2001), and it is estimated that the trend will hold in 2002–2006, a period that will require even more resources, given the introduction of *Haemophilus influenzae* type b and hepatitis B, as well as influenza, pneumonia, and varicella vaccines that have been introduced in a few countries.

As we look into the future to PAHO's second century of work, there will be many more choices, because so many vaccines will become available. There will be new target populations for vaccination, from children through adults to grandparents. This will require better communication about the need for vaccination, its benefits, and risks, particularly now with the emergence of anti-vaccine lobbies that are questioning the use of the vaccines, especially as diseases are brought under control.

Among the challenges ahead is the need to have a legal basis for the financial and political sustainability of public health priorities at all levels. Vaccines should be seen as a public good with adequate and sustainable financing over time, with a specific line in the national budgets. In the Americas, over the last few years, many countries have enacted such laws to protect the budget for the national immu-

**FIGURE 4. Introduction of *Haemophilus influenzae* vaccine in the Americas, 2001.<sup>a</sup>**



<sup>a</sup> 15,889,000 vaccinations in 2001, representing

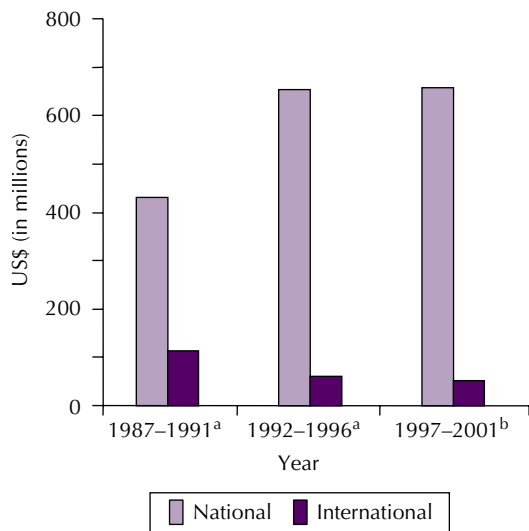
- 92% of all newborns in the Region and
- 89% of all newborns in Latin America

nization programs. Other challenges include the strengthening of the managerial capacity at the local level, particularly in an environment of decentralized health systems, and the use of indicators that can measure the impact of the program at the lowest level of the coun-

tries, in order that inequities can be promptly identified and acted upon.

For PAHO, the major challenge is to maintain the achievements attained by the countries so far, to make every effort to introduce the new vaccines as they become available, to

**FIGURE 5. National and international expenditures in immunization programs in the Americas, 1987–2001.**



<sup>a</sup> Includes polio eradication.

<sup>b</sup> Includes measles eradication (estimate).

move into adult immunization, and to look at the safety of vaccination.

Finally, the success of the immunization programs in the countries of this Region would have been impossible without a major partnership that included all the countries and territories of the Americas, countless institutions and organizations—nongovernmental,

bilateral, and multilateral—and PAHO's regional coordination over the last 100 years, particularly over the last 25 years.

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