EPI Newsletter

Expanded Program on Immunization in the Americas

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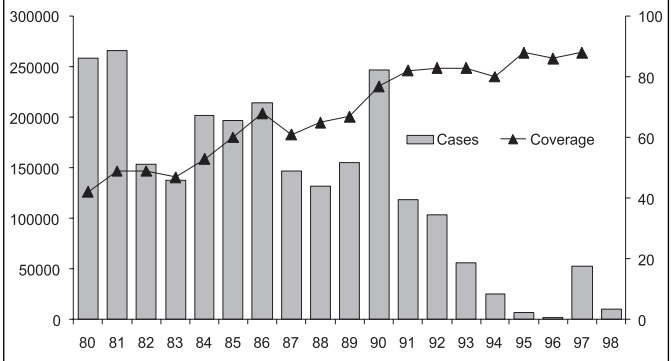
Measles in the Americas, 1998

Through December 21, 1998, a total of 26,103 suspected measles cases had been reported from the countries of the Americas. Of the total reported suspected measles cases, 9,628 (37%) were discarded after a complete epidemiologic and laboratory investigation, 9,598 (37%) were confirmed as measles and 6,877 (26%) suspected cases remained under investigation.

Although the 1998 data are not yet complete, there has been an 82% reduction in measles cases when compared to the 53,661 total confirmed measles cases reported during 1997 (Figure 1). Of the total confirmed cases, 9,005 (94%) had either laboratory confirmation of measles infection or epidemiologic linkage to a laboratory-confirmed measles case, and 590 cases (6%) were confirmed on clinical grounds alone.

Figure 1
Reported measles cases
Region of Americas, 1980-1998*



Source: PAHO
Data as of 21 December 1998

Together, Argentina (7,054 confirmed cases) and Brazil (2,006 confirmed cases) have accounted for 94% of the total confirmed measles cases in the Americas during 1998 (Figure 2). Other countries documenting significant measles virus circulation include Bolivia (351 confirmed cases), the United States (86 confirmed cases) and Paraguay (68 confirmed cases). Combined, the other countries of the Region have reported a total of 33 confirmed measles cases; several of these cases were international importations and the others were isolated in both time and place.

During 1998, the largest outbreak in the Region occurred in Argentina. Of the total reported cases in Argentina, 6,026 cases (85%) have been reported from the Greater Buenos Aires metropolitan area. Of the total Buenos Aires cases, 4,239 (60%) occurred in infants and children < 5 years of age, the overwhelming majority of whom were unvaccinated against measles. Other provinces in Argentina reporting large numbers of measles cases include: Tucumán (212 cases), Misiones (177 cases), Chaco (97 cases) and Jujuy (93 cases). Through December 21, there had been 56 measles related deaths reported, mostly among unvaccinated infants and preschool-aged children.

In Brazil, during 1998, most measles virus circulation has occurred in the South and South-East regions of the country, although cases have been reported from all regions. States reporting large numbers of confirmed measles cases include: Parana (804 cases), Sao Paulo (403 cases), Amazonas (258 cases), Pernambuco (166 cases) and the Federal District (144 cases). In contrast to Argentina where the majority of cases have occurred among unvaccinated preschool-aged infants and children, most cases in Brazil have occurred among unvaccinated young adults.

Editorial Note: It has been now been over 4 years since the goal of measles eradication from the Americas was established at the 1994 Pan American Sanitary Conference. While great progress has been made towards achieving the goal with a marked reduction in the annual number of reported cases, measles virus continues to circulate in several countries of the Region. Thus, it seems appropriate to pause and summarize several of the lessons-learned from the experience of the Americas in interrupting measles virus circulation, and to take appropriate actions.

In this issue:

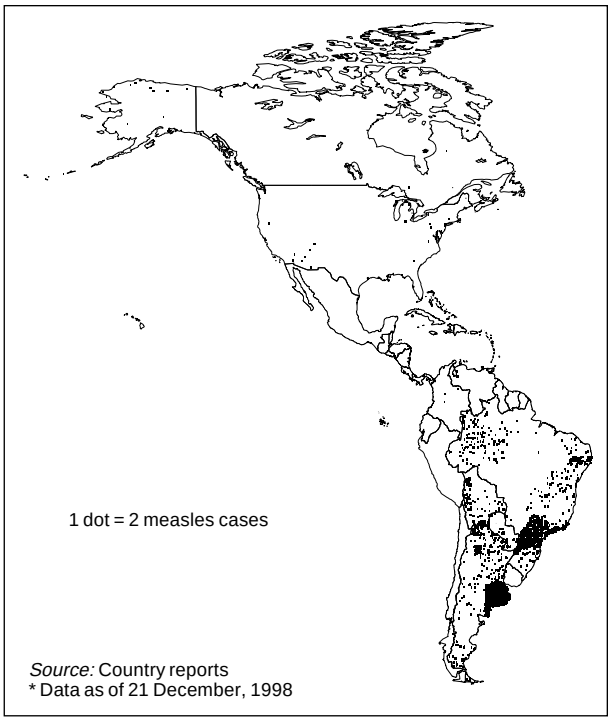
- **Measles vaccine is very effective in preventing measles, if used**

A single dose of measles vaccine has been repeatedly demonstrated to be ≥90% effective in protecting an individual from measles infection. However, the vaccine is only effective if it is administered to a susceptible infant as soon as possible after the first birthday. For measles eradication, annual routine measles vaccination coverage must be at least 95% in every area of every country of the Region and *follow-up* campaigns must be conducted among children 1-4 years of age at least every four years.

- **PAHO's measles eradication strategy (*catch-up, keep-up, follow-up*) is very effective in preventing measles outbreaks, when fully implemented**

Countries that have properly implemented PAHO's recommended vaccination strategy for measles eradication have been successful in rapidly interrupting virus circulation and maintaining its interruption over time. A major contributing factor to the relative resurgence of measles observed in Brazil and Argentina during the years of 1997-1998, has been the failure to fully implement the measles eradication strategy. Complacency is clearly a major obstacle to achieving the goal of measles eradication.

Figure 2
Confirmed measles cases by state or province
Region of the Americas, 1998.



Source: Country reports
* Data as of 21 December, 1998

- **Outbreak prevention is far better than outbreak control**

Once measles virus has been re-introduced into an area and measles circulation has commenced, it is virtually impossible to stop an outbreak by rapidly implementing emergency measles vaccination. The virus can circulate much faster than any public health response, and it will result in a large outbreak, thus a "natural" immunization campaign with high coverage.

- **Measles circulates best in urban areas**

The high population density of cities greatly facilitates measles virus circulation between infected and susceptible individuals, especially when the number of susceptible infants and children is high due to low routine measles vaccination coverage. Increased efforts are needed to assure high measles population immunity among infants and children living in urban areas. This can be achieved by obtaining high measles vaccination coverage through routine measles vaccination services, and by the full and timely implementation of *follow-up* measles vaccination campaigns.

- **Measles kills susceptible infants and children**

Although there were no reported measles deaths in the Americas during 1995 and 1996, the recent measles outbreaks in Brazil and Argentina again demonstrate the lethality of measles virus. Over 100 measles-related deaths were reported during 1997-1998 in these two countries; most of them occurred among unvaccinated infants and preschool-aged children.

- **The epidemiology of measles is changing; certain groups of young adults are at relatively high-risk for measles**

Over half of the cases in the large 1997 measles outbreak in Sao Paulo, Brazil occurred in unvaccinated adults 20-34 years of age. These persons were born too early to have received measles vaccine through routine health services, yet too late to have been exposed to circulating measles virus. Many of the young adults who acquired measles in Sao Paulo belonged to clearly defined risk-groups which included: health care workers, military recruits, university students, persons working in the tourist industry, international travelers, institutionalized populations and migrant workers from rural areas living in work camps. Increased efforts are needed to target and vaccinate young adults who are members of high-risk groups, especially those living in densely populated urban areas.

- **Measles does not respect national or state borders**

While measles virus circulation has been greatly reduced in the Americas, the virus continues to circulate freely in the other regions of the world. With the recent major increases in the availability and accessibility of international air travel and an estimate of over 1,000,000 persons crossing international borders globally on a daily basis, there is a constant risk of the introduction of measles virus from measles endemic areas to countries which have been successful in interrupting measles virus circulation. For the Americas to achieve its measles eradication goal, increased efforts are needed to improve measles control and to progress towards measles eradication in other regions of the world.

- **Global measles eradication is feasible using currently available vaccines**

The experience from the Americas also clearly demonstrates that using currently available attenuated, live measles virus vaccines and utilizing an appropriate vaccination strategy, that regional measles eradication can be achieved. The full implementation of an appropriate vaccination strategy in every region will result in the interruption of measles virus circulation from every region, and finally the global eradication of measles virus.

Vaccines of Quality

*This article is the third in a series on vaccine quality (see the February and April 1998 issues of the **EPI Newsletter**). In this issue, the focus is on tests for potency. These tests are also performed in case of a failure in the cold chain. Given that they are lengthy and costly, potency tests should be performed only in highly justified occasions (Table 1).*

A requisite for an effective vaccine is that it induces protective immunity after its administration. The potency of a biological preparation is proven in principle during the licensing procedure through clinical trials. The vaccine manufacturer and the regulatory agency are faced then with the problem on how to evaluate each lot of vaccines that must be tested and released for use to meet this requirement. Although there is a better understanding today of the fundamental aspects of immunity development (cellular and humoral immunity) for specific vaccines, it is still difficult to design a precise test that can provide information on the potency of a vaccine. It must also be considered that various factors can affect the potency of a vaccine such as the presence and quality of adjuvants, site and route of administration, as well as combination with other antigens.

The design of a test depends in principle on the kind of vaccine, given that there are large differences between live and inactivated vaccines, as well as between bacterial and viral vaccines. In the case of live vaccines, the potency of each lot is related to the number of live particles present in the vaccines. For a bacterial vaccine (BCG, and live attenuated Salmonella typhi Ty21a), potency is measured by the number of colony forming units per dose of vaccine. For a viral vaccine (such as yellow fever, polio and measles) potency is measured by the number of plaque forming units per dose of vaccine. Dilutions of a vaccine are made and inoculated onto appropriate agar plates for bacteria and monolayer cell culture for virus. After a certain period of time the number of bacterial colonies or virus plaques are counted, it is assumed that each colony or plaque has derived from one bacteria or virus in the dilution inoculated. For live viral vaccines a more common procedure for determining potency is establishing the CCID50 (Cell Culture Infective Dose 50), which is the quantity of a virus suspension that is estimated to infect 50% of cell cultures and has a correlation with the number of virus particles present.

For inactivated vaccines, a distinction must be made between the determination of the amount of antigen present per dose of vaccine (antigenicity test) and the capacity for inducing protective immunity (immunogenicity test). Although there is a correlation between both, this is not necessarily constant. By analogy with synthetic medical products, it should suffice to demonstrate that a vaccine contains a certain minimum amount of the effective component. In vitro testing or the determination of the antigen content could be used for the potency testing of the new well defined, non-living vaccines composed of purified antigens (e.g. polysaccharide vaccines, influenza vaccine and conjugated vaccines such as Hib and hepatitis B). In general, the effective components in most immunobiologicals are not known or probably not yet well characterized. Thus potency testing must be performed through immunogenicity testing.

The immunogenicity test relies on the induction and measurement of the immune response when a vaccine is injected into a test animal. The animal species used in immunogenicity tests is never the same as the target species (human), thus the tests are artificial in design and performance. The design of an experimental test in an animal requires considerable effort. Moreover, an assessment of the relevance of the model can only be made after validating it by comparison with human data from outcomes of field trials.

There are two types of testing that can be performed:

- Several groups of animals are immunized with serial dilutions of vaccine and then the animals are challenged with the corresponding microorganism or toxin.
- A group of animals is injected, and after a certain period of time, blood is taken and specific antibody titres are measured.

In these tests, the response of a group of animals is used to predict the response of a whole population, thus the confidence of the result will increase with the increase in the number of animals used. Due to the individual variation of each animal, usually large numbers are required to guarantee the results. The type, strain and quality of the animal used, the feeding, the environment, as well as animal facilities have a direct impact on the results of these assays.

Besides the obvious moral issues related to animal testing, there are other important financial, safety and practical aspects that have become a major driving force in the last years to replace animals in various tests with valid alternative assays.

Table 1
Number of Vaccine Doses That Justify Potency Tests

Vaccine	Number of doses justifying a test	Number of doses needed for a test	Time when report is expected (months)	Required temperature for transport
OPV Measles (freeze-dried) Yellow fever (freeze-dried)	20,000	20	One month	From 0° C to +8° C
BCG (freeze-dried)	20,000		Three months	
DPT	200,000			
Hepatitis B	10,000			
Tetanus toxoid	50,000			
IPV	Until potency test is established do not retest			

Follow-up Measles Campaign in the Dominican Republic

Six weeks after sustaining significant damage from Hurricane Georges, the Dominican Republic carried out a national *follow-up* measles vaccination campaign on November 6-12, targeting 29 provinces and the capital city. The campaign was the first mass vaccination effort in the country, following the initiation of decentralized delivery of health services.

Priority was given to vaccinating against diphtheria, whooping cough, and tetanus, especially in refugee camps. Over half a million vaccines were administered to different age groups in these areas. Almost 100,000 of those immunized were under five years of age.

Dr. Altagracia Guzman, Minister of Health, administers a dose of measles vaccine to the 22 month old son of Dr. Socorro Gross, PAHO's Country Representative in the Dominican Republic. The boy had already been vaccinated. This gesture was to show that all children ages 1-4 years needed to be immunized in the campaign regardless of their previous vaccination status.

The *follow-up* campaign was carried out in three stages: the first one was held in areas where health services had not been severely affected by Hurricane Georges. These included ten provinces in the northern part of the country. Next were the provinces in border areas and those nearby, and finally the provinces of the eastern part of the country and the capital city (five municipal health centers). Following the recommendations of a recent nutritional evaluation, the latter two areas provided vitamin A supplementation to children 6 months to 5 years of age, as well as to mothers in the pospartum period or early lactation.

The target population of the *follow-up* campaign was 830,517 children between the ages of nine months and five years, regardless of their vaccination status. It took only three days to immunize approximately 70% of the target population in each area. Vaccination activities were continued until all the remaining target population was reached. The opportunity was also used to immunize children ages 2 months through 2 years against poliomyelitis. So far, no important side effects have been reported.

The last measles cases in the Dominican Republic were reported at the end of 1994 (a clinical case with serology confirmation, but without epidemiological link occurred in 1997). However, at the end of 1998, it was estimated that the cohort of susceptibles (unvaccinated and vaccinated but not immunized) under 5 years would equal a birth cohort for that year. This situation prompted health officials to undertake the national vaccination campaign, which was endorsed by the country's medical societies and those international agencies currently supporting the national immunization program.

The Government of Mexico, through its Ministry of Health showed its solidarity, by donating 300,000 doses of measles vaccine. Other vaccines required for the campaign were obtained through the PAHO Revolving Fund for Vaccine Procurement.

The slogan for the *follow-up* campaign: *Together we will...Eradicate Measles,* was disseminated widely throughout the entire country. The decentralized implementation of the campaign allowed for the active participation of the population. This resulted in high vaccination coverage rates, which will guarantee the protection of the most vulnerable groups and act as a barrier to stop the spread of any outbreak.

Private Donation of Syringes to Hurricane Victims

UNIVEC, a commercial organization producing non-reusable syringes in New Jersey, and Mitsubishi from Japan donated together over 3 million syringes to assist the victims of Hurricane Georges in areas of Puerto Rico, Haiti and the Dominican Republic.

Maintaining the Public's Trust in Immunization

The following are excerpts of a speech delivered by Dr. Louis W. Sullivan during the opening plenary of the U.S. National Immunization Conference on July 21, 1998, in Atlanta, Georgia. Dr. Louis W. Sullivan is President of the Morehouse School of Medicine in Georgia and former Secretary of the U.S. Department of Health and Human Services (HHS). Dr. Sullivan currently co-chairs the newly-formed Vaccine Initiative, along with Dr. Samuel Katz, who is the Wilburt Cornell Davidson Professor and Chairman Emeritus of Pediatrics at Duke University. This initiative is sponsored by the Infectious Diseases Society of America and the Pediatric Infectious Diseases Society and is designed to ensure that public dialogue on immunization progresses with adequate information.

During the next several days you will be reminded, many times of the progress we have made through vaccination in the prevention and control of infectious diseases. Vaccine-preventable diseases are at an all time low level in the United States - and in many areas of the world. It is the most remarkable public health success story of this century. You in the fields of public health and immunization, your colleagues and predecessors are to be credited and thanked for helping to write this story.

But the story is not over. We have many more chapters ahead. There is still a long way to go before we reach the happy ending we seek - the total elimination of all vaccine-preventable diseases. We must continue to do everything we can to knock down the barriers that prevent access to immunizations. If the issue is education, we must address it through outreach programs. If the issue is convenience, we must provide early morning or after hours clinics, including nights and weekends. If the problem is cost, we must reduce the cost of, or improve access to vaccines for those that cannot afford them.

At the same time we face another challenge that is more subtle, but equally or even more important - to maintain and strengthen the public's trust in vaccines and in our immunization programs. Not only is this critical to the continued success in our fight against infectious diseases, but to all of public health. Our immunization programs are the most visible public health programs that we have. When we think of public health, immunization is often the first thing that comes to mind.

It is the ultimate irony that as we celebrate the prevention of epidemics of diseases, that just a few generations ago sent fears through the community - meningitis, polio, diphtheria, congenital rubella, measles - we must also acknowledge growing misconception that vaccines cause more harm than good. Imagine! We are in danger of becoming a victim of our own success. As these serious diseases fade from memory, their threat is no longer perceived as real. At the same time, anti-vaccine forces, fueled by the media and greatly empowered by the new global information age, are focusing public attention on the risks, both real and perceived, rather than the enormous benefits of immunization.

Many of our citizens cannot remember seeing a child with measles or polio, but they are constantly reading and hearing about the adverse reactions linked to the vaccines that have nearly vanquished these threats in the United States. The diseases are seldom in the news; but stories of adverse reactions to vaccines are. This is creating public concerns about the vaccines and a climate for the erosion of public trust, confidence and interest in immunization.

As a colleague explained: "If parents have no fear of vaccine, but fear of disease, the argument in favor of vaccination is clear cut. If they have no fear of vaccine, but also no fear of disease, there may be inertia. When they have no fear of disease, but fear of vaccines, parents are likely to refuse immunization."

It is a quirk of history that the decline in vaccine-preventable diseases has coincided with the explosion in information technology and communications. Anyone with a computer and a modem can have a voice on the Internet and a competitive media environment is constantly trying to beat the competition in the race to be first to announce a story. As a result, questions and concerns that we fail to address are taken to another platform and another level.

Reports in the lay press question the safety of routine immunization, alarming parents with unsupported accounts of the dangers of vaccines and affording as much credence to unsubstantiated hypotheses as they do to the weight of the scientific data. Over the past several months, one major national television network broadcasted a feature piece that linked diabetes to childhood immunizations. On another, the unfounded hypothesis that links multiple sclerosis to the receipt of the hepatitis B vaccine has also rippled around the country as "news."

What percentage of the United States population knows that smallpox was eradicated over 20 years ago?; or that last year only 135 cases of measles were reported in the United States, compared to the 3-4 million cases that occurred before vaccinations?; or that we are on the verge of eradicating polio from the planet by the end of the millennium?

Indeed we have entered a new era. With the decline in disease, we must improve our efforts to respond to concerns about our vaccines and all that we know about their safety and effectiveness. We must also improve our efforts to communicate all that we know about the value of vaccines to individuals and to the community at large. I'm afraid that many of us have not put as much energy toward listening to and answering the questions of our patients as we have in reaching the goals that we have attained. This is the era of communication. Therefore, we must ensure that we do more than just providing the information about the risks and benefits of our vaccines. We must do what we can to better understand the nature of these concerns.

As I said earlier, immunization is a success story that is not yet over. As we look toward the new millennium, the total eradication of vaccine-preventable diseases is a realistic goal. Together we can write that happy ending to our story. Thank you.

The Global Situation of Polio Eradication

In 1988, when the global polio eradication goal was set, over 35,000 cases of polio were reported to the World Health Organization (WHO). The provisional number of cases reported in for 1998 is 2,843, a reduction of over 90%. Polio is disappearing from vast areas of the world. Transmission of wild poliovirus is now concentrated in three major areas—South Asia, West Africa, and Central Africa. Infection rates are highest in the largest and most populous countries of Bangladesh, India, and Pakistan in Asia, and the Democratic Republic of Congo, Ethiopia, and Nigeria in Africa.

The Region of the Americas is completing its seventh year polio-free, and in 1998, the Western Pacific region reported zero cases of polio. Of the cases reported to WHO in 1998, 2,527 (89%) originated in South East Asia, where India accounts for 2,181 of these cases. Improved surveillance in India (acute flaccid paralysis rate (AFP) 1.03) may help explain the number of cases being reported. In 1998, India conducted a National Immunization Day (NID), during which 130 million children under the age of 5 years were vaccinated. In the European region, Turkey was the only country to report transmission of wild poliovirus, with 21 cases that occurred in the areas bordering Syria, Iraq and Iran. A "cross-border" *mop-up* activity was conducted in that area during October/November 1998. The Eastern Mediterranean region reported 256 cases, 172 (67%) of which were reported in Pakistan. Afghanistan, which has improved AFP surveillance in 1998 despite an ongoing armed conflict, reported 31 cases of polio. The African region has reported 39 cases to WHO in 1998. Efforts are being made in Africa to accelerate improvements in AFP surveillance, and additional resources are urgently needed.

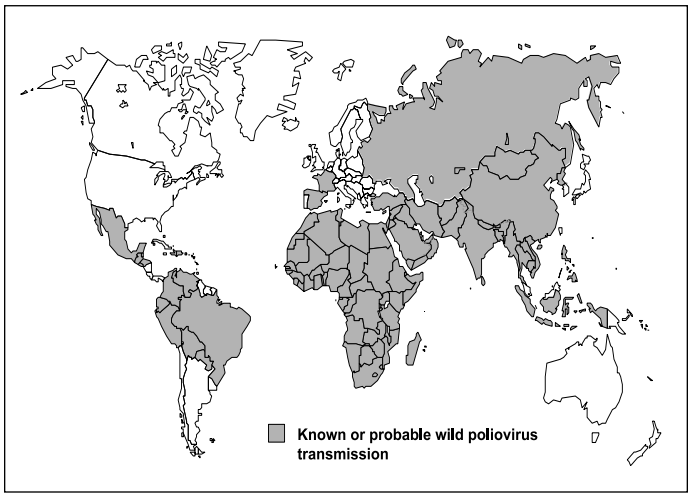
Worldwide immunization coverage with three doses of oral polio vaccine (OPV) in 1998 reached 83% in infants, ranging from 62% in Africa to 94% in the Western Pacific. By September 1998, only four polio-endemic countries—the Democratic Republic of Congo, Liberia, Sierra Leone, and Somalia—had failed to carry out National Immunization Days (NIDs). However, whereas renewed civil war has caused NIDs to be postponed in DR Congo, other three African countries had carried out their first NIDs by the end of 1998.

Currently, the standard of AFP surveillance is high in the Western Pacific and European regions, and parts of the Eastern Mediterranean, and there has been a steady improvement in surveillance standards in South East Asia. In the Americas, the decline of the AFP rate this year brings an important reminder of the need to sustain the political commitment for polio eradication to maintain its polio free status. Major improvements are urgently needed in Africa where surveillance is not yet well established. Six African countries—Burundi, Equatorial Guinea, Eritrea, Gabon, Liberia, and Sierra Leone—have not even started AFP surveillance.

Significant strides have been made in all regions of the world toward the goal of polio eradication, however significant barriers still remain. Unless circulation of the virus can be rapidly halted in the remaining reservoirs, the disease could re-seed itself in polio-free countries, thwarting global eradication efforts. Global eradication will depend on the availability of the effective implementation of eradication activities in the remaining polio-endemic countries, as well as sustained political and financial commitment in both polio-free and polio-endemic countries.

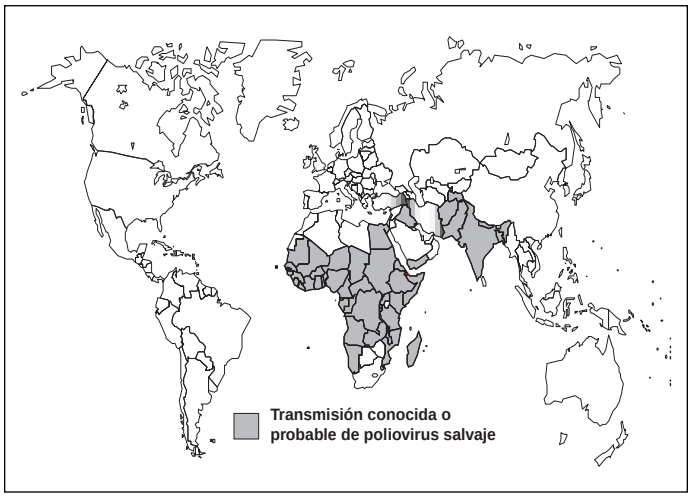
Source: WHO/GPV Polio Eradication Website at http://whqsabin.who.int:8082

Wild Poliovirus 1988



Source: WHO/GPV

Wild Poliovirus 1998



Source: WHO/GPV

Reported Cases of Selected Diseases

Number of reported cases of measles, poliomyelitis, tetanus, diphtheria, and whooping cough, from 1 January 1998 to date of last report, and the same epidemiological period in 1997, by country.

Country/Territory	Date of last report	Measles				Polio		Tetanus				Diphtheria		Whooping Cough	
		Confirmed 1998			Confir-med*			Non Neonatal		Neonatal					
		Labo-ratory	Clini-cally	Total	1997	1998	1997	1998	1997	1998	1997	1998	1997	1998	1997
Anguilla	12-Dec	0	0	0	0	0	0	…	…	…	0	…	0	…	0
Antigua & Barbuda	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Argentina	12-Dec	7,182	…	7182	75	0	0	9	18	0	3	1	0	29	321
Bahamas	12-Dec	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Barbados	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Belize	12-Dec	0	0	0	0	0	0	…	2	…	1	…	0	…	0
Bermuda	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Bolivia	12-Dec	351	0	351	7	0	0	11	2	7	7	6	1	32	77
Brazil	12-Dec	1,458	677	2,135	25,900	0	0	…	58	…	13	…	32	…	101
British Virgin Islands	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Canada	12-Dec	11	0	11	577	0	0	…	2	…	…	…	1	772	2,415
Cayman Islands	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Chile	12-Dec	0	0	0	58	0	0	5	4	1	0	0	0	561	321
Colombia	12-Dec	2	10	12	66	0	0	0	18	3	17	2	2	81	15
Costa Rica	12-Dec	0	2	2	15	0	0	1	2	0	0	…	176	…	10
Cuba	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Dominica	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Dominican Republic	12-Dec	0	0	0	1	0	0	5	17	0	0	3	4	7	1
Ecuador	12-Dec	1	0	1	0	0	0	10	42	14	19	17	17	136	148
El Salvador	12-Dec	0	0	0	0	0	0	0	3	0	2	0	0	0	2
French Guiana	...	…	…	…	…	0	0	…	…	…	…	…	…	…	…
Grenada	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Guadeloupe	12-Dec	2	0	2	116	0	0	…	…	…	…	…	…	…	…
Guatemala	12-Dec	0	1	1	8	0	0	0	5	4	6	0	0	377	92
Guyana	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Haiti	12-Dec	…	…	…	0	0	0	…	0	…	0	…	0	…	0
Honduras	12-Dec	0	0	0	5	0	0	5	5	1	1	0	0	23	121
Jamaica	12-Dec	1	0	1	0	0	0	3	0	0	0	0	0	0	1
Martinique	...	…	…	…	0	0	0	…	…	…	…	…	…	…	…
Mexico	12-Dec	0	0	0	0	0	0	123	104	25	20	0	0	139	292
Montserrat	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Netherlands Antilles	...	…	…	…	…	0	0	…	…	…	…	…	…	…	…
Nicaragua	12-Dec	0	0	0	0	0	0	1	10	0	0	0	0	0	41
Panama	12-Dec	0	0	0	0	0	0	1	1	0	1	0	0	120	85
Paraguay	12-Dec	68	0	68	121	0	0	9	24	8	11	0	0	10	24
Peru	12-Dec	0	0	0	83	0	0	83	60	14	35	2	2	2,202	962
Puerto Rico	12-Dec	0	—	0	0	0	0	…	…	…	…	…	…	…	…
St Vincent/Grenadines	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
St. Kitts/Nevis	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
St. Lucia	12-Dec	0	0	0	0	0	0	…	0	…	0	…	0	…	0
Suriname	12-Dec	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Trinidad & Tobago	12-Dec	0	0	0	1	0	0	…	2	…	0	…	0	…	0
Turks & Caicos	12-Dec	0	0	0	0	0	0	…	1	…	0	…	0	…	0
United States	12-Dec	92	—	92	128	0	0	34	41	…	…	1	5	5,799	5,411
Uruguay	12-Dec	1	0	1	2	0	0	…	0	…	0	…	0	…	10
Venezuela	12-Dec	0	4	4	26	0	0	15	18	2	6	0	0	241	393
TOTAL		**9,169**	**694**	**9,863**	**27,190**	**0**	**0**	**315**	**441**	**79**	**142**	**32**	**240**	**10,529**	**10,843**

... Data not available.
— Clinically confirmed cases are not reported.
* Laboratory and clinically confirmed cases.

PAHO's Revolving Fund Vaccine Prices for 1999

The PAHO Revolving Fund for Vaccine Procurement was founded in 1979, and is now entering its 20th year of operation. In 1979, the Revolving Fund had contracts for the procurement of five vaccines—DPT, polio, measles, BCG and TT. In 1999, the Revolving fund will have contracts for a total of 11 vaccines, including MMR, DT, hepatitis B, Hib, yellow fever and the DPT/Hepatitis B + Hib combined (pentavalent) vaccine. Three of these vaccines were added in 1999. First is the yellow fever vaccine, at a cost of US$ 0.58/ dose. The vaccine against *Haemophilus influenzae* type b (Hib), which has gained widespread use in the Region, is being offered at US$ 2.60 for single-dose and US$ 2.18 for the 10-dose presentation, the lowest prices to date for this vaccine. The third vaccine to be added is the "pentavalent" (DPT/Hepatitis B + Hib) vaccine for US$ 3.50.

Capitalization of the Revolving Fund has also increased steadily over the 20 years of operation, funded at US$ 2,300,000 in 1979 when a value of $2,259,000 of vaccines were purchase to around US$ 10,000,000 in 1998, when over US$ 47,000,000 worth of vaccines were purchased for the Region. The growth of the Fund demonstrates how countries of the Region have been able to take advantage of this mechanism to maintain immunization with the "traditional" EPI vaccines and expand the national vaccination schedules to include other vaccines of public health importance. The Revolving Fund will continue to play a critical role in assuring that a wide sector of the population enjoys the benefits of vaccination, and that additional vaccines such as Hib and hepatitis B can be rapidly integrated into routine immunization programs in the Region.

Table 1
1999 Prices for Vaccines Purchased through the PAHO Revolving Fund

Vaccine	Number of doses per vial	Price per dose FOB US$
BCG	10	0.0899
DPT	10 20	0.0671 0.0562
DT (Adult)	10 20	0.0425 0.0350
DT(Pediatric)	10 20	0.045 0.0385
Measles	1 10	0.680 0.1074
MMR	1 10	0.880 0.627
Polio (glass vial)	10	0.087
Polio (plastic dispenser)	10 20/25	0.0859 0.0800
TT	10 20	0.0345 0.0248
Hepatitis B recombinant 20 µg	1 10	0.92 0.69
Yellow Fever	10	0.58
Haemophilus influenzae type b (Hib)	1 (lyophilized) 10 (liquid)	2.60 2.18
DPT/Hepatitis B + Hib (pentavalent)	1 dose	3.50

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