



# EPI Newsletter

## Expanded Program on Immunization in the Americas

Volume XIV, Number 5

IMMUNIZE AND PROTECT YOUR CHILDREN

October 1992

*The following statement was issued by Dr. Carlyle Guerra de Macedo, Director of the Pan American Health Organization, in Washington, D.C. on September 11, 1992.*

We are very pleased to announce that a year has elapsed since the onset of the last polio case in the Americas, marking an important step in the drive to eradicate this disease from the Hemisphere, and, soon, from the entire world.

This marks an important milestone in medical history, following in the steps of our success in eradicating smallpox.

I credit this historic achievement directly to the hard work of thousands of health workers in every country of the Americas, who labored tirelessly to immunize children in cities, villages, rural areas, and zones of poverty.

The fact that a 2-year-old boy in Junin, Peru had the last onset of confirmed paralytic polio a year ago, and that despite an extensive and active surveillance effort we have not found any other cases since then anywhere in the Americas, is a momentous tribute to human achievement. When we are able to certify that polio has been eradicated from the whole world in the year 2000, we will have attained an important goal. But it is only one of the many important challenges to humanity which face us in the years ahead, as we seek to conquer the blights of other diseases and to ensure that all people enjoy their right to health.

The Pan American Health Organization took the initiative to eradicate polio transmission, but the dedi-

cated health workers are the ones who deserve the recognition. Toiling in very difficult conditions, often with low pay and under severe economic restraints, they have worked a miracle. We have more than 20,000 health units and laboratories all over the Americas linked in an active surveillance system, looking for cases of polio. They deserve more support, and we need more resources allocated to health systems if we are to continue on this road of medical achievements. Along with this polio eradication effort, of course, we are taking the opportunity to vaccinate children against the other diseases preventable by immunization: Diphtheria, Pertussis, Tetanus, Measles, and Tuberculosis. Our next goals, of eliminating measles, neonatal tetanus, leprosy, and diseases due to vitamin deficiencies, will also take hard work, dedication, and money, as will our goals for investments in water and sanitation needed to improve health conditions.

We want to thank collaborating agencies including the U.S. Agency for International Development, Rotary International, UNICEF, the Inter-American Development Bank, and the Canadian Public Health Association. Their support was an invaluable part of the effort, and shows what humanity can do when we all work together. We will need more support from them, from our Member Countries, and from other agencies to achieve our important health goals in the future.

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# PAHO Directing Council Reviews EPI

The XXXVI Meeting of the Directing Council of the Pan American Health Organization, which met in Washington, D.C. from 21 to 26 September, 1992 approved the following resolution in support of the Expanded Program on Immunization.

## Resolution VIII

### IMPLEMENTATION OF THE EXPANDED PROGRAM ON IMMUNIZATION AND THE PLAN OF ACTION FOR THE ERADICATION OF INDIGENOUS TRANSMISSION OF WILD POLIOVIRUS FROM THE AMERICAS

THE 109TH MEETING OF THE EXECUTIVE COMMITTEE,

Having considered and examined the progress report presented by the Director (Document CE109/13 and ADD. I),

#### Resolves:

To recommend to the XXXVI Meeting of the Directing Council the adoption of a resolution along the following lines:

THE XXXVI MEETING OF THE DIRECTING COUNCIL,

Having considered and examined the progress report presented by the Director (Document CD36/13) on the implementation of the Expanded Program on Immunization and the Plan of Action for the Eradication of Wild Poliovirus from the Americas;

Noting with great pride that:

- Transmission of wild poliovirus appears to have been interrupted or is on the verge of being interrupted, with only nine cases being reported in 1991 and no cases in the past 12 months;

- Major advances have been made in the efforts to eliminate neonatal tetanus;

- Several countries have given high priority to the control of measles;

- Considerable effort has been made to ensure that the Region is self-sufficient in terms of vaccine production and quality control;

- Immunization coverage levels have been maintained and even increased in most countries, reaching an all-time high of over 75% for all the vaccines being used (DPT, polio, measles and BCG and TT);

- New initiatives have been started, such as a better understanding of pertussis epidemiology in the Americas, a search for strategies for controlling hepatitis B and rubella, and the possibility of introduction of new vaccines in national immunization programs, such as against *Haemophilus influenzae* type B; and

Recognizing that as the program reaches this high level of performance, it also represents the beginning of a very challenging period, namely the consolidation of poliomyelitis eradication, elimination of neonatal tetanus, control of measles, and further increase of immunization coverage, and that the possibility of inclusion of new vaccines in the national programs poses a major challenge, both in terms of strategies and of resource allocation in already strained national health budgets,

#### Resolves:

1. To congratulate all Member Governments and all concerned, particularly the health workers, for their continuing commitment and efforts, sometimes under the most difficult circumstances.

2. To recognize the continued support from the agencies involved in this effort (AID, UNICEF, IDB, Rotary International, CPHA, and PAHO) and to call on them to maintain and increase their contributions to the program, particularly in this critical phase of consolidation of gains and starting of a new phase.

3. To urge all Member Governments to maintain the priority accorded to this program and its goals and to assign the necessary human and financial resources to implement the actions outlined in the progress report, especially the ones described in Chapter II, of Document CD36/13; for these purposes it is necessary that:

a) Resources both human and financial, including those required for the purchase of vaccines, be available in national health budgets and be allocated to the areas at highest risk for disease transmission and of low immunization coverage;

b) Specimens for poliovirus diagnosis from all patients with acute flaccid paralysis and their contacts be collected at appropriate times and examined in the laboratory network, to ascertain that no wild virus is circulating in the Region;

c) Following the schedule outlined in the progress report, countries appoint national certification commissions to start collecting and analyzing the data eventually needed for certification of the interruption of transmission of wild poliovirus;

d) Priority be given to vaccination of women of child-bearing age in the areas identified as at risk for the disease, with involvement of the traditional birth attendants, and that cases of neonatal tetanus be reported separately from postnatal tetanus;

e) In the efforts to control or eliminate measles, all countries assure that surveillance is properly implemented;

f) Strategies to include other vaccines, such as hepatitis B, rubella or *haemophilus influenzae* B, be carefully considered, particularly in relation to the epidemiological situation and resource availability; and

g) All vaccines used in the program comply with the minimum requirements of PAHO/WHO.

4. To request the Director to:

a) Maintain the high priority accorded to this program and to the actions needed to consolidate the eradication of poliomyelitis and the efforts to control or eliminate other vaccine preventable diseases;

b) Start implementation of a plan for the certification of eradication of poliomyelitis from the Americas;

c) Give strong support to the search for additional resources for measles elimination initiatives under way in several countries of the Region and assess the feasibility of the elimination of measles throughout the Hemisphere;

d) Utilize the incidence of neonatal tetanus as an indicator of the performance of maternal and child health services, particularly in areas at risk.

## Wild Poliovirus Surveillance in the Americas

Over a year has passed since the last culture-confirmed poliomyelitis case was reported in the Americas. This marks the first time that no transmission has been documented for than a year on any continent. Despite this success, surveillance of wild poliovirus must be maintained at the highest possible levels to ensure that eradication has been achieved.

By the end of week 40 of this year, 2400 stool specimens from 1318 patients with acute flaccid paralysis (AFP) had been processed in the regional laboratory network. This number does not include stool specimens from contacts or those collected in large special studies. Of the 1792 laboratory results reported to PAHO, 3% (60) were poliovirus isolates, 20% (366) were other non-polio enteroviruses, and 76% (1366) were negative for enteroviruses. Of the 60 polioviruses isolated in the first 40 weeks of 1992, none were wild poliovirus; 10 were vaccine-like type 1, 8 vaccine-like type 2, 8 vaccine-like type 3, 6 vaccine-like mixture, and 28 pending characterization.

In comparison, by the end of week 40 of 1991, 2700 stools specimens from 1664 patients with AFP (not including contacts) had been processed in the regional laboratory network. Of these, 5% (137) were poliovirus isolates (15 wild-type 1 polioviruses and 122 vaccine-like polioviruses), and 16% (441) other non-polio enteroviruses. Similarly, by the end of week 40 of 1990, 2604 stool specimens from 1648 patients with AFP (not including contacts) had been processed in the regional laboratory network. Of these, 5% (143) were poliovirus isolates (16 wild-type polioviruses - 6 wild-type 1 and 10 wild-type 3, and 127 vaccine-like polioviruses) and 16% (416) other non-polio enteroviruses.

The percentage of AFP cases with two adequate stools (taken within 15 days after paralysis onset) during the first 40 weeks of 1990, 1991, 1992, was 77%, 77%, and 83%, respectively. Because over 10% of all confirmed cases of polio reported over the last three years have been confirmed on the basis of contact investigations, the EPI program has placed additional emphasis on these types

of investigations. For the first 40 weeks of years 1990, 1991, and 1992, the percentage of AFP cases with at least five contact investigations was 4%, 22%, and 48%, respectively.

The number of reported AFP cases declined during the first 40 weeks of 1992 compared to similar periods in 1990 and 1991. Although the enterovirus isolation rate increased from 16% to 19% from 1990 to 1992, the poliovirus isolation rate dropped from 5% to 3%. In 1992 no wild-type polioviruses have been isolated, compared to 15 and 16 during of first 40 weeks of 1991 and 1990, respectively. The data indicate that procedures for the proper collection of stool specimens from AFP cases and their contacts have improved markedly. However, the collection of adequate stools (two within 15 days of paralysis onset) was not achieved in 17% of the reported AFP cases in 1992. Further improvement in case investigations and the collection of adequate stools will be necessary to ensure polio has been eradicated in the Western Hemisphere.

## Polio Surveillance in the Andean Countries

The Andean sub-region (Bolivia, Colombia, Ecuador, Peru, and Venezuela) is the last area of risk for wild poliovirus transmission in the Americas. In 1991, all nine culture-confirmed cases of poliomyelitis reported in the Americas were from the Andean sub-region. All nine were associated with wild-type 1 polioviruses indigenous to two well-defined reservoirs of transmission, the Atlantic coast of Colombia and north-central Peru. Accordingly, targeted intensive house-to-house immunization campaigns were conducted. Over four million children were immunized in two rounds of house-to-house campaigns last year in Colombia and Peru. As a result of these efforts, more than a year has passed since the last culture-confirmed poliomyelitis case was reported in the Americas (Peru, August 23, 1991). To evaluate risk of continuing transmission, three surveillance indicators from the Polio Eradication Surveillance System of the Expanded Program on Immunization were analyzed for each of the five countries in the Andean sub-region.

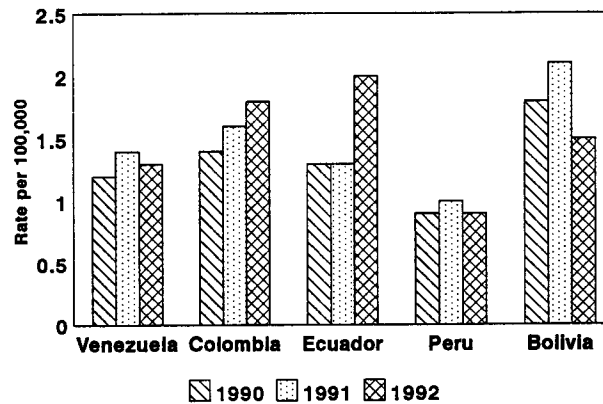
Figure 1 shows the reporting rates of AFP per 100,000 children 15 years of age for 1990-1992. Colombia and Ecuador were the only two countries that improved their reporting each year. Although still within the acceptable range (1.0 per 100,000 children 15 years of age), the 1992 reporting rates for Bolivia, Peru, and Venezuela dropped from previous levels reported in 1991. Despite civil and economic upheaval, the reporting rate in Peru has been remarkably stable, nearly 1.0 per 100,000 children 15 years of age for each of the last three years.

Figure 2 shows the percentage of AFP cases with two stools collected within 15 days of paralysis onset during the first 40 weeks from 1990-1992. Since 1990, Bolivia, Ecuador, Peru, and Venezuela have demonstrated steady improvement. In 1992, Colombia continues to have a rate below 50%, which is a cause for concern.

Since 1990, all five countries of the Andean sub-region have achieved notable progress in the proportion of AFP cases that have contact investigations. Bolivia, Ecuador, Peru, and Venezuela have attained levels greater than 60%, whereas in 1990, all were below 10%. Although there has been steady improvement, in 1992 less than 40% of AFP cases reported from Colombia had at least five contact investigations.

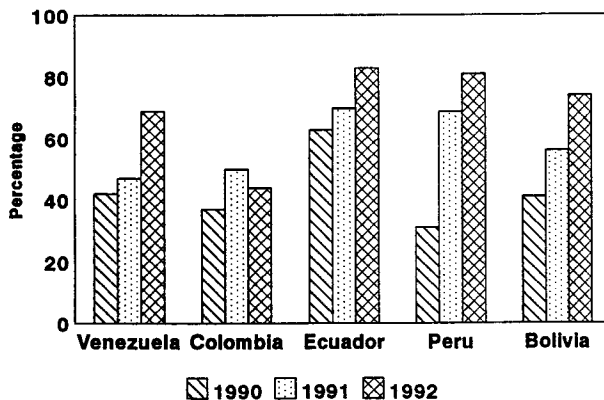
In conclusion, surveillance of AFP continues to be the most important component of the Polio Eradication Initiative, particularly for defining risk areas where the appropriate immunization activities can be directed. With transmission occurring as recently as last year, the Andean sub-region must continue to be a focus for improving surveillance of AFP.

**Figure 1. Reporting Rates of AFP per 100,000 Children < 15 Years of Age Andean Countries, 1990-1992\***



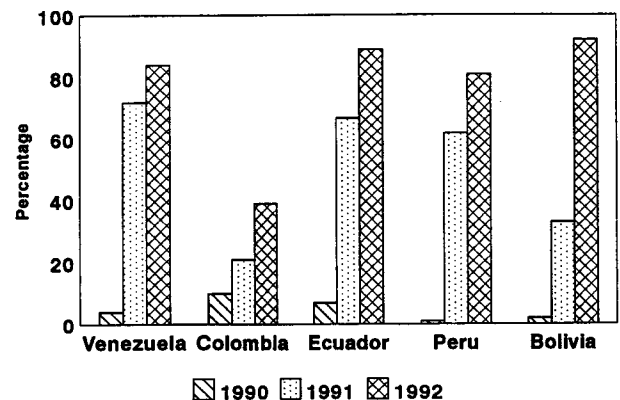
\* 1992 data adjusted for 1 year

**Figure 2. Percentage of AFP Cases With 2 Stools Taken Within 15 Days of Paralysis Onset, Andean Countries, 1990-1992\***



\* First 40 weeks of each year

**Figure 3. Percentage of AFP Cases With 5 or Greater Contact Investigations Andean Countries, 1990-1992\***



\* First 40 weeks of each year

# Estimated Cost of Measles in Guadeloupe Based on Hospital Morbidity

On 25 September 1988, the English-speaking Caribbean nations and Suriname committed themselves to eliminate measles from this PAHO sub-region by 1995. Measles is one of the diseases targeted by the EPI and the feasibility of measles elimination was confirmed in 1990, by the International Task Force for Disease Eradication.

The population movements that exist between this French Department and the surrounding CAREC countries require that surveillance and control measures be increased.

In order to support the case for the elimination campaign, it seemed important not only to show the epidemiologic data, but also the average cost for hospital treatment of a measles case.

## Methods

The files of all 103 patients hospitalized with confirmed measles from 1981 to 1991, in the three pediatric wards of Guadeloupe's public hospitals have been reviewed.

Since computerized medical data are not yet available in Guadeloupe to calculate the cost of a group of illnesses, only a rough estimate could be made. This estimate was obtained by establishing the mean hospital stay of measles patients and multiplying that figure by the daily hospital rate in 1991. (1)

Data on measles was obtained from the sentinel physicians network (2) between 1983 and 1990, and from the vaccine coverage survey carried out in January 1992 on a cluster sample basis, made it possible to estimate the effect of an expected outbreak.

## Results

The ages of the 103 children admitted for measles ranged from 6 months to 9 years. Seventy-four and one-half percent of the cases occurred in the 1 to 5 year-old age group (Figure 1).

The case distribution per year showed an endemic pattern of the disease in Guadeloupe and confirmed the outbreak reported in 1984 by the sentinel network (34 admissions and 625 notifications) (Figure 2).

The hospital stays ranged from 1 to 66 days. Eleven children were in hospital for only one day, and 3 spent 35, 37, and 66 days in hospital, respectively.

The hospital stay was shorter than 30 days for 97% of the 103 children (Figure 3).

The hospital stays of more than 24 hours, which seem numerous at first glance, can be explained by the occurrence of complications or the existence of a prior morbid state (sickle cell disease, for instance). The most common

Figure 1. Measles in Guadeloupe between 1981 & 1991  
Age distribution (years) of admitted patients

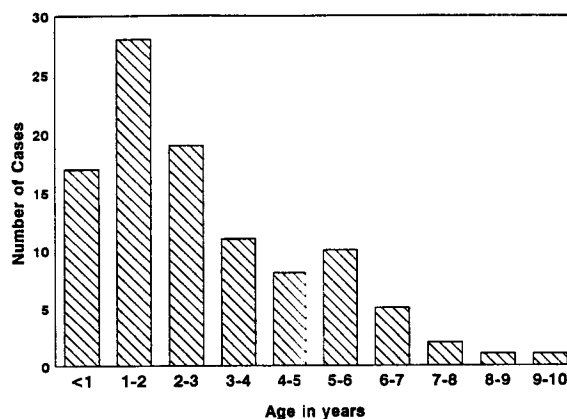


Figure 2. Measles in Guadeloupe between 1981 & 1991  
Data from hospital admission files and reports of the sentinel networks

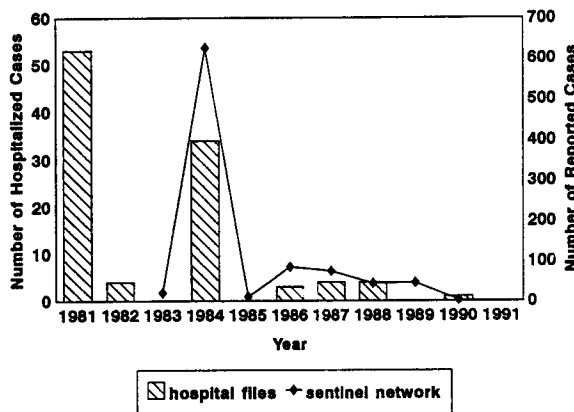
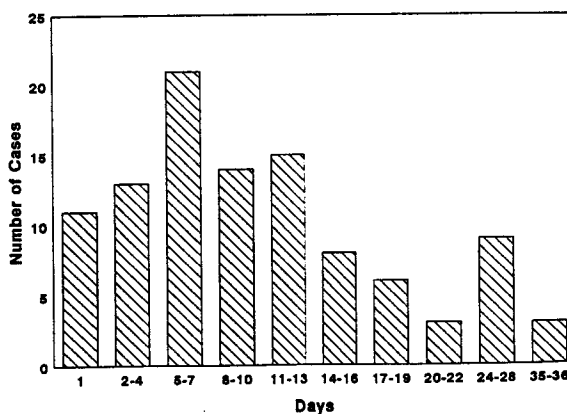


Figure 3. Measles in Guadeloupe between 1981 & 1991  
Hospital stays in days



Note: This article was prepared by M. Levy, Physician and Health Inspector, and M. Theodore, Health Actions Physician. Office of Departmental Solidarity Action, General Council of Guadeloupe.

complications occurring were, in order of frequency: pneumonia, otitis, gastroenteritis with dehydration, convulsions, anemia, and laryngitis. Less often, measles was contracted while the child was in hospital for another reason.

When all 103 cases are considered, the mean stay in hospital was 11.2 days; if the stays which lasted longer than one month are discarded, the mean stay was 10.6 days. Similarly, if only cases of patients hospitalized for fewer than 17 days (80% of the 103 cases) are included, the mean stay was 7.4 days.

The cost of hospitalization ranged from 1,892 FF<sub>r</sub> (for a one day stay), to 124,872 FF<sub>r</sub> (for the 66-day stay).

The total cost of hospitalization for a mean stay of 11.2 days can be placed at 21,196 FF<sub>r</sub>, and at 14,004 FF<sub>r</sub> for a mean stay of 7.4 days.

This estimate does not include the cost of home care, nor does it take into account the days of work that were missed by a parent.

Thanks to data from the sentinel network and the vaccine coverage level, it is possible to extrapolate the total hospitalization cost of the next outbreak of measles in Guadeloupe. This total has been calculated using the probable hospitalization ratio and the number of susceptibles (non-immunized children). The immunization coverage survey carried out in January 1992 shows that, in Guadeloupe, 82.5% of children in the 1 to 5 year-old age group are immunized against measles. It has been established that 3 out of 4 children hospitalized for confirmed measles between 1981 and 1991 came from that age group. At present, the 1-5 year-old group contains 17.5% of all susceptibles.

An approximation of the incidence of measles can be calculated using data from the sentinel network for the 1983-1991 period. Matching these data with admissions to hospital for confirmed measles makes it possible to extrapolate the hospitalization rate by year; it ranges from 0 to 0.9%.

During the 1984 outbreak, the ratio of measles cases requiring hospital admission was 0.5%. In the event of

another measles outbreak, 6120 confirmed cases could be expected, using the same ratio. With a 0.5% hospitalization rate, 31 children would require admission, at a total cost ranging from 434,139 FF<sub>r</sub> to 657,076 FF<sub>r</sub>. The smaller sum is equivalent to the cost of purchasing 8040 doses of measles vaccine, or 3455 doses of MMR from private manufacturers.(3)

## Conclusions

The cost of hospital treatment for measles cases in 1992 is still high in Guadeloupe.

Routine immunization against measles began here in 1978. Although this was followed by a decrease in the incidence and a change in the epidemic patterns of the disease, the accumulation of successive cohorts of unvaccinated children may favor the occurrence of an outbreak with an excessive number of hospital admissions.

The expense incurred by these avoidable admissions would be more than sufficient to immunize all the children born in a year in Guadeloupe.

Such an expense justifies setting up a measles elimination program in Guadeloupe, in collaboration with our Caribbean neighbors.

The components of this program are an enhanced surveillance system, aggressive outbreak control, and the intensification of immunization activities in order to achieve and maintain a high level of coverage.

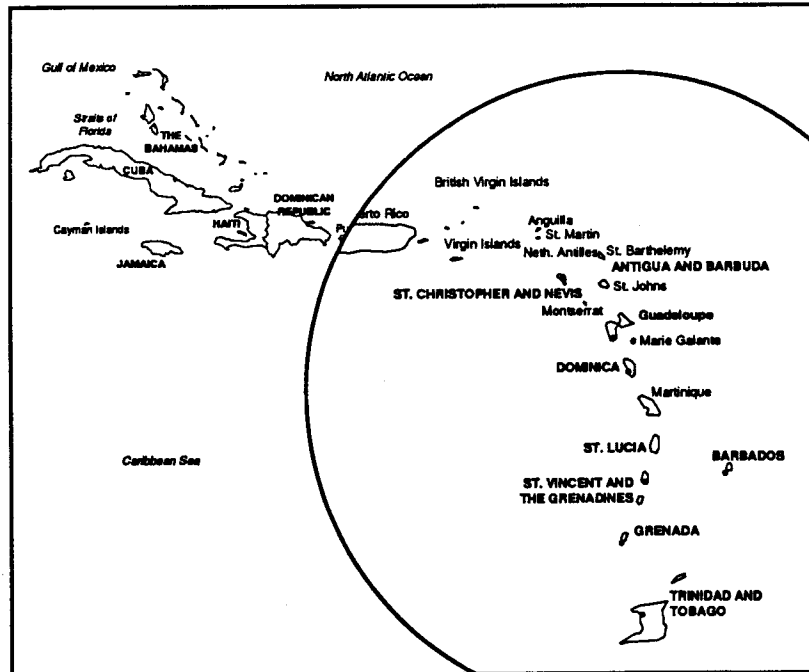
The authors are grateful to Pr C. Berchel, Drs. H. Loret, and G., Sybille, chiefs of the pediatric wards of Guadeloupe public hospitals; Drs. J. Armougron and V. Mazille, coordinators of the sentinel network; DDASS of Guadeloupe.

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(1) In 1991, this rate was 1,985 French Francs per day in the CHRU of Pointe-a-Pitre and 1,800 French Francs in the DH of Basse-Terre.

(2) This voluntary network of doctors was set up in 1983 for the surveillance of several diseases. It represents 10% of the total population of practitioners in Guadeloupe.

(3) Purchase price on 01.05.92: Measles = 54 FF<sub>r</sub>/dose; MMR = 126 FF<sub>r</sub>/dose.



# Reported Cases of EPI Diseases

Number of reported cases of measles, poliomyelitis, tetanus, diphtheria, and whooping cough, from 1 January 1992 to date of last report, and the same epidemiological period in 1991, by country.

Subregion and country	Date of last Report	Measles		Poliomyelitis #		Tetanus				Diphtheria		Whooping Cough	
		1992	1991	1992	1991	Non Neonatal		Neonatal		1992	1991	1992	1991
						1992	1991	1992	1991				
<b>LATIN AMERICA</b>													
<b>Andean Region</b>													
Bolivia	22 Aug.	756	803	0	0	24	1	17	34	12	4	67	56
Colombia	11 Jul.	2 218	8 136	0	8	32	102	39	66	1	8	310	904
Ecuador	5 Sept.	3 043	796	0	0	32	41	50	46	6	3	239	430
Peru	29 Aug.	13 645	393	0	1	38	30	65	70	5	2	125	46
Venezuela	8 Aug.	7 271	14 466	0	0	33	73	13	36	1	0	223	859
<b>Southern Cone</b>													
Argentina	8 Aug.	6 626	6 648	0	0	42	26	3	4	2	2	1 113	1 410
Chile	15 Feb.	198	166	0	0	2	3	0	0	2	1	21	11
Paraguay	8 Aug.	156	216	0	0	12	21	9	0	2	1	88	68
Uruguay	29 Aug.	175	839	0	0	4	3	0	0	0	0	37	42
Brazil	8 Aug.	4 896	19 546	0	0	619	725	144	157	171	409	1 996	4 588
<b>Central America</b>													
Belize	22 Aug.	5	7	0	0	1	0	0	1	0	0	0	2
Costa Rica	27 Jun.	2 100	1 698	0	0	...	1	...	...	...	0	9	14
El Salvador	8 Aug.	330	539	0	0	30	32	16	9	0	0	15	62
Guatemala	25 Jul.	49	116	0	0	6	14	8	3	0	1	84	47
Honduras	21 Mar.	6	39	0	0	8	...	7	4	0	0	52	10
Nicaragua	15 Aug.	2 112	2 437	0	0	13	18	6	5	0	0	178	38
Panama	27 Jun.	471	1 968	0	0	3	1	3	0	0	0	23	6
Mexico	29 Aug.	587	4 117	0	0	98	118	75	51	0	0	46	118
<b>Latin Caribbean</b>													
Cuba	19 Sept.	...	11	0	0	...	1	...	...	...	0	...	0
Haiti	...	...	...	0	0	...	...	...	...	...	...	...	...
Dominican Republic	11 Jul.	4 558	324	0	0	18	24	2	3	7	9	...	...
<b>CARIBBEAN</b>													
Antigua & Barbuda	27 Jun.	0	0	0	0	0	0	0	0	0	0	0	0
Bahamas	27 Jun.	0	0	0	0	0	1	0	0	2	0	0	0
Barbados	18 Jul.	0	0	0	0	1	4	0	0	0	0	0	0
Dominica	27 Jun.	0	2	0	0	0	0	0	0	0	0	0	0
Grenada	27 Jun.	0	2	0	0	0	1	0	0	0	0	0	0
Guyana	27 Jun.	0	2	0	0	0	0	0	0	0	0	0	0
Jamaica	27 Jun.	12	243	0	0	3	5	0	0	0	1	0	14
St. Kitts/Nevis	27 Jun.	0	5	0	0	0	0	0	0	0	0	0	0
St. Vincent	27 Jun.	0	2	0	0	1	1	0	0	0	0	0	0
Saint Lucia	27 Jun.	9	6	0	0	0	0	0	0	0	0	0	0
Suriname	27 Jun.	0	0	0	0	0	0	0	0	0	0	0	0
Trinidad & Tobago	27 Jun.	66	83	0	0	5	7	0	0	0	1	0	4
<b>NORTH AMERICA</b>													
Canada	19 Sept.	311	743	0	0	2	0	0	0	2	0	521	637
United States	19 Sept.	2 738	5 393	0	0	2	2	0	0	2	0	1 356	1 526

Data not available.

# Whooping Cough: A Huichol Myth\*

*Whooping cough is a significant cause of death in children under five years of age and is the leading cause of death due to vaccine-preventable childhood illnesses after measles and neonatal tetanus. The mortality rate is greatest in children under two years of age, and is the highest among those who are under 12 months old. Unlike other vaccine-preventable illnesses, children become susceptible to whooping cough almost as soon as they are born and immunity is not conferred with maternal antibodies as it is with measles.*

*Despite this situation, there is still no adequate surveillance system in place for whooping cough. This is partly due to the fact that there is no single case definition that is used Region-wide. Nonetheless, despite national variations, there has been an overall reduction in the number of cases of the disease reported to PAHO. This improvement coincides with the increase in coverage with three doses of DPT in children under 1 year of age.*

*The following is a brief article of historical interest on whooping cough, published in Mexico.*

Among the groups that have most ardently preserved their culture against the onslaught of so-called modern civilization are found the Virrarika, better known as "Huicholes," the name that the Spanish conquerors gave the tribes then inhabiting an area known as Chimalhuacán.

The Virrarika took refuge in the highlands of the western Sierra Madre mountains, in the states of Jalisco and Nayarit, and have kept their culture alive by means of the numerous myths that express its philosophical foundation. These myths explain the beginning and end of the universe from a naturalist perspective.

The group recognizes two types of illnesses: those that are foreign and those that are their own. The conquerors are believed to be the source of the first, although the myths also explain them in other ways. Shamans have a limited ability to cure these foreign ailments, so preventive magic rituals are used as protection.

Whooping cough, measles, and influenza are thought to be spawned in or arrive from a place called 'upayacuha (tepameras), which lies in the western section of the Huichol territory, bordering the Chapalangana river.

\* This article, written by J. Luís Vázquez C. and Agustín Salvador, appeared in *Vacunación No. 7*, issued by the National Vaccination Council of Mexico.

There is a myth about the origin of the "irukariya" or whooping cough. It is believed to have first appeared in "upauyakua" bordering the Huichol territory and according to the tale, it was caused by the urine of a mythic skunk.

Despite the apparent simplicity of this story, it is laden with enormous symbolism that can be clarified through the chronicles of the ancient mesoamerican beliefs. According to them, the skunk, called "epatl" ("upa" in Huichol), was the image of Tescatlipoca and when this little animal urinated it was said that this act had been performed by the god himself, considered to be a great magician and patron of sorcerers, possessing great powers to dispatch illnesses, particularly those of an epidemic nature.

The Huichol myth says:

"...Irukariya is the whooping cough that began in "Up-arithsie", a place close to the Chapalangana river where there are many rocks. The skunk, armadillo, and rat had been invited to a drum festival, but their wives had barely begun weaving the shirts that they were to wear to the party. They urged their wives to hurry and finish them since they were late going to the party. Because of this haste, the shirts did not turn out well and they put them on before they were completed. That is why the skunk has only a striped suit and the armadillo has a shirt that looks as if it is unfinished.

At the festival there was a beautiful girl named "Amaima" who was the sister-in-law of the skunk and who was in love with him. She thought to herself: "How can I make the skunk fall in love? He is very handsome, I like the skunk very much. I believe I am going to dance with him tonight."

When it was time to dance, the girl invited the skunk and when they were dancing, she gave him some ground corn powder, called pinole, and tickled him at the same time. It seemed as if the skunk would suffocate because he could not breathe. He began to cough and spray urine on everyone at the party and all the guests then began to cough since they all had the whooping cough. The healers then met to see what they could do since all the people were sick.

In times gone by, when there was widespread whooping cough, and when it was headed toward Tepic, the singers met and took offerings to "Upatsie," where that disease originated and thus it did not reach the area.

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Editor:                   Ciro de Quadros  
Associate Editor:       Ellen Wasserman

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Expanded Program on Immunization  
Maternal and Child Health Program  
Pan American Health Organization  
525 Twenty-third Street, N.W.  
Washington, D.C. 20037  
U.S.A.