

EPI Newsletter

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IMMUNIZE AND PROTECT YOUR CHILDREN

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Update: Measles Outbreak in Bolivia

Background

Following the establishment of Bolivia's Expanded Program on Immunization in 1979, measles vaccination coverage has progressively increased, reaching a level of 80% in 1993. In 1994 the country joined the regional measles eradication goal for the year 2000 and carried out an indiscriminate *catch-up* measles vaccination campaign aimed at children 9 months-14 years. The 1994 campaign reached 94% coverage at the national level. Departments failing to reach 80% coverage with measles vaccine were Potosi (78%), La Paz (66%) and Pando (77%).

In 1995, Bolivia's measles vaccination coverage declined to 80% and then climbed to 98% in 1996 and 1997. Partly due to the lack of sufficient vaccines and syringes, coverage fell down again to 85% in 1998. Lowest coverage has been found in the states of Beni, Pando, Cochabamba, La Paz, and Santa Cruz. It should be noted that approximately 70% of the country's population resides in the states of Cochabamba, La Paz, and Santa Cruz. These states also have the largest concentration of urban population.

Due to the accumulation of susceptible children since the 1994 campaign, a *follow-up* measles vaccination campaign was planned for May 1998, targeting children 1-4 years. However, it had to be postponed for five months due to a lack of vaccines and syringes. The results were modest (85%), mainly because the campaign was organized without sufficient preparation.

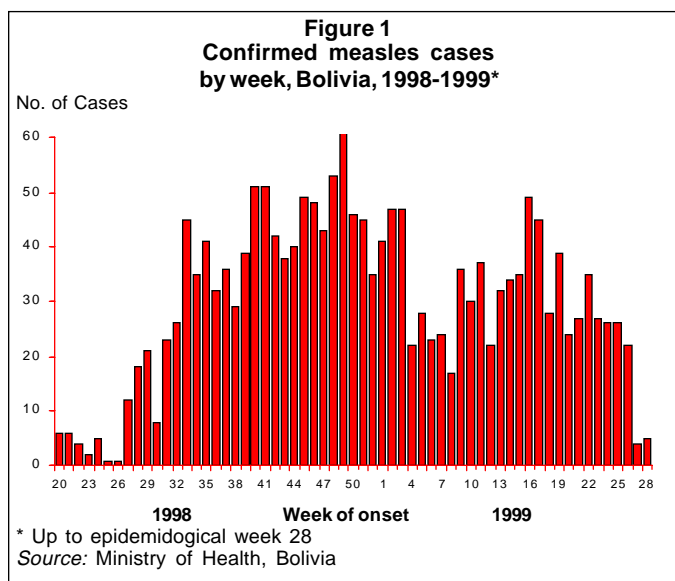
Measles Outbreak

The 1998 measles outbreak in Bolivia began on May 21, (epidemiological week 20), following a period of more than 19 weeks without confirmed cases. Initially, the epidemic affected the municipality of Yacuiba, in the department of Tarija. The municipality of Yacuiba, especially its localities of Pocitos and Yacuiba, borders the province of Salta in Argentina and is an area that has a heavy flow of people crossing from Argentina to Bolivia to shop. At the time of the outbreak, Argentina was experiencing an important measles outbreak (10,229 confirmed cases in 1998). From Yacuiba, the outbreak spread first to the city of Santa Cruz in the Department of Santa Cruz, and subsequently to rural areas within this Department, as well as to the Departments of Cochabamba and Oruro. Thereafter, it traveled to seven of the country's nine Departments, affecting 66 of 311 municipalities. Eventually, the outbreak affected all departments except Pando.

The population hardest-hit in the initial stages of this outbreak were young children. Fifty seven percent of those affected were children under the age of 5. A *mop-up* measles campaign targeting children under 5 years, regardless of vaccination history was first held between June 1-21, 1998 in the localities of El Salvador Masa in Argentina, and Pocitos and Yacuiba in Bolivia.

Current Situation

As of July 10, 1999, 2,254 suspected cases have been reported in Bolivia (since the beginning of the outbreak). Of



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those cases, 1,871 (83%) were reported from the public sector and 383 (13%) from the private sector. The remaining 4% came from other sources, including 26 cases identified during an active search that took place during the vaccination campaigns in Cochabamba, Sucre and El Alto. Of the suspected cases, a total of 1,836 (81%) were confirmed, 385 were discarded, and 42 are still under investigation. Of the confirmed cases, 1,827 (99%) were laboratory confirmed. Of the 1,836 confirmed cases, 1,004 (56%) occurred in 1998 and 832 during the first 29 weeks of 1999 (Figure 1).

Of the total confirmed cases in 1999, 319 (38%) occurred in children 1-4 years and 150 (18%) in children 6-11 months. A total of 151 cases (18%) occurred in young adults aged 20-29 years (Figure 2). The highest incidence rate occurred in children between the ages of 6-11 months, followed by those aged 12-23 months, 2-4 years and young adults 20-29 years of age (Figure 2). Of the 469 confirmed cases in children aged 6 months-4 years, 408 (87%) had not been vaccinated or could not present proof of measles vaccination, which indicates that failure to vaccinate rather than vaccine failure was the cause of this outbreak. Of the total confirmed cases, 270 (32%) occurred in the state of Santa Cruz, 268 (32%) in Cochabamba, and 200 (24%) in La Paz. The remaining 12% come from states of Oruro, Potosi, Beni, Chuquisaca and Tarija. Of the total confirmed cases, 607 (73%) occurred in urban areas. During the last four weeks, the majority of cases have occurred in the cities of La Paz and El Alto. Although information concerning origin and occupation of the adult cases is still fragmentary, many of these cases are recent migrants from rural to urban areas and market merchants. Adult cases have also occurred among health care workers, students and military personnel living in barracks.

Control Measures

The national *follow-up* measles vaccination campaign initially planned for April 1998, was postponed due to lack of vaccines and syringes. The campaign targeting children 1-4 years commenced in October, 1998, five months after the onset of the outbreak, and reached 85% coverage. However, these measures were not enough to stop the epidemic. In spite of a second vaccination campaign starting in March 1999, with all vaccines, the epidemic has continued through 1999. Between June and August 1999, additional measles vaccination campaigns have been implemented, targeting all children 6 months-4 years in the urban areas of Cochabamba, Sucre, Beni, and El Alto and in some rural

areas, including El Chapare, and El Pailon and Warnes in the Department of Santa Cruz. These campaigns were combined with an active search of measles cases during which 26 suspected measles cases were found. Due to the lack of reliable official coverage data, vaccination coverage of these last campaigns has been validated by cluster surveys carried out on the same day as the vaccination campaigns. Following these last vaccination efforts, coverage has reached more than 90% in Cochabamba, Beni, and Sucre. In these areas where vaccination coverage was high during the campaign, there was a dramatic drop in cases. Nonetheless, campaign coverage was low in El Alto and cases have continued to occur there and in La Paz, which is located next to El Alto. A *mop-up* vaccination campaign has been re-initiated in El Alto. At this time, a vaccination campaign targeting children aged six months to four years is being held in La Paz, with the collaboration of international partners, as well as government and non governmental organizations.

Editorial Note: The Bolivia outbreak has primarily

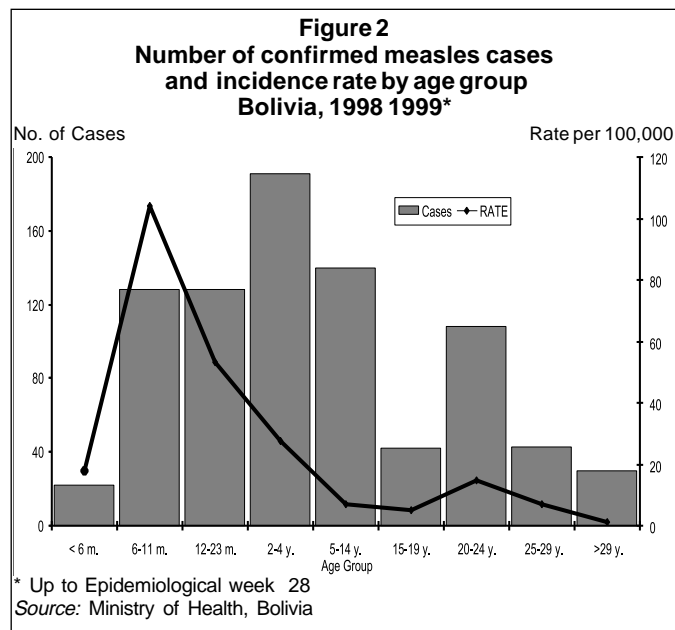
affected children between the ages of six months and four years living in urban areas. Detecting measles virus circulation in *all* areas of the country is critical, since it allows for the rapid implementation of control activities that will result in decreased virus transmission. In this regard, it is encouraging to see the growing participation of Bolivia's private sector in reporting suspected measles cases.

Main factors contributing to the persistent and ongoing transmission of measles virus in the country are: 1.) lack of permanent and sufficient supply of measles vaccines; 2.) failure to carry out a *follow-up* measles vaccination campaign on time; and 3.) low vaccination coverage through routine immunization services.

The situation in Bolivia clearly shows the difficulties in controlling an outbreak once it is fully blown, particularly in densely populated areas. In order to prevent this situation, routine vaccination coverage should be at least 95% in all municipalities.

The Bolivia experience also emphasizes the importance of adequate planning of vaccination campaigns:

- Sufficient time should be allowed for ample involvement of communities, and for adequate distribution of human and financial resources.
- Special attention should be given to the decentralization of activities, to ensure that health areas take full responsibility for implementation.



Measles Vaccination Campaigns in the Americas

Region	Country/Territory	Campaign 1-14 (<i>Catch-up</i>)		Average routine coverage 1994-1998 (<i>Keep-up</i>)	Campaign 1-4 (<i>Follow-up</i>)		Next <i>Follow-up</i> Due
		Year	Coverage (%)		Year	Coverage (%)	
Andean	Bolivia	1994	98	92	1998	85	2002
	Colombia	1993	96	85	1995	90	1999
	Ecuador	1994	100	74	1998	96	2002
	Peru	1992	75	89	1997	97	2001
	Venezuela	1994	100	77	1998	93	2002
Brazil	Brazil	1992	96	87	1997	77	2000
Central America	Belize	1993	82	86	1995	85	1999
	Costa Rica	1993	75	92	1998	87	2002
	El Salvador	1993	96	92	1996	82	2000
	Guatemala	1993	85	75	1996	60	1999
	Honduras	1993	96	92	1996	85	2000
	Nicaragua	1993	94	88	1996	97	2000
	Panama	1993	88	89	1996	94	2000
English-speaking Caribbean	Anguilla	1991	99	96	1996	100	2000
	Antigua & Barbuda	1991	96	97	1996	92	2000
	Bahamas*	1991	87	92	1997	96	2001
	Barbados	1991	96	96	1996	91	2000
	British Virgin Islands	1991	88	100	1996	90	2000
	Cayman Islands	1991	85	93	-	-	-
	Dominica	1991	95	100	1996	100	2000
	Grenada	1991	98	93	1996	81	2000
	Guyana	1991	94	87	1996	90	2000
	Jamaica	1991	71	90	1995/6	95	1999
	Montserrat	1991	100	100	1996	100	2000
	St. Kitts & Nevis	1991	98	99	1996	100	2000
	St. Lucia	1991	97	91	1996	85	2000
	St. Vincent & Grenadines	1991	97	100	1995	84	1999
	Suriname	1991	89	80	1997	100	2002
	Trinidad & Tobago	1991	90	88	1997	96	2001
	Turks & Caicos	1991	81	99	1996	95	2000
Latin Caribbean	Cuba	1987	98	100	1993	99	
	Dominican Republic	1993	77	85	1999	99	2004
	Haiti	1994	94	29	1999	...	**
Mexico	Mexico	1993	88	92	1998	96	2002
Southern Cone	Argentina	1993	97	80	1998	98	2002
	Chile	1992	99	94	1996	100	2000
	Paraguay	1995	70	74	1998	99	2002
	Uruguay	1994	95	88	1998	95	2002

... Data not available - No campaign

** *Follow-up* campaign ongoing

Last updated: 30 July, 1999

* Bahamas = Age group for Bahamas was 4-40 years = 67% but coverage for the 4-14 years was 96%

- Hours of vaccination should be planned based on the best time to reach target populations.

The Bolivia outbreak as well as other outbreaks occurring in several countries in the Americas (Argentina, Brazil and the United States) that had been free of measles for prolonged periods of time, demonstrates the inevitability of measles re-introduction as long as the virus circulates in

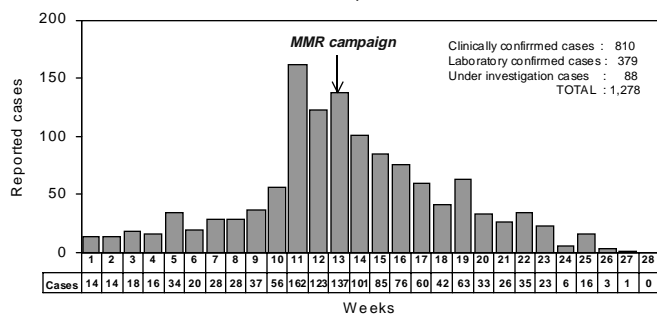
other regions of the world. These outbreaks will be short-lived in countries with high vaccination coverage through routine services and timely *follow-up* campaigns. However, in countries with low measles coverage in routine services and where *follow-up* measles campaigns are not carried on time and fail to reach sufficient coverage, the re-introduction of measles can have severe consequences.

Rubella Outbreak in Costa Rica

As of July 3, 1999 (epidemiological week 26), the provisional total of confirmed rubella cases reported in Costa Rica was 1,189. This total included 379 laboratory confirmed cases and 810 clinically confirmed cases. This is Costa Rica's first rubella outbreak since 1987, when 1,105 cases were reported.

The rubella outbreak reached its peak between weeks 10 and 14 (Figure 1). The age group primarily affected by the current outbreak was adults between the ages of 25 and 34 years. Of the cases in which age was known, 480 (44%) were reported from this age group alone. The groups aged 20-24 years 133 (12%) and 35-44 years 186 (17%) were also affected by the outbreak. Of the cases which occurred in children, 96 (9%) were aged <1-4 years, and 85 (8%) were aged 5-14 years. Overall, females made up a slightly greater percentage (56%) of reported cases.

Figure 1
Number of rubella cases reported by week
Costa Rica, 1999*

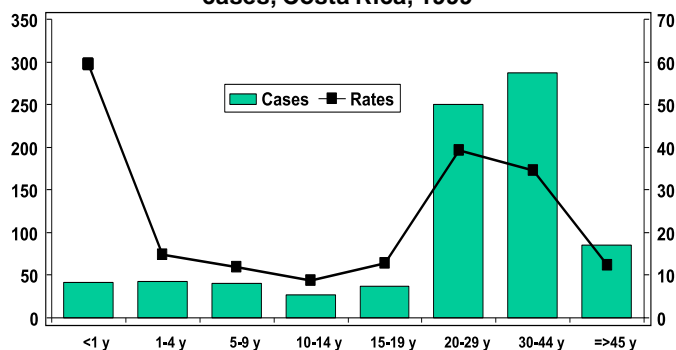


Source: Ministry of Health, Costa Rica
*Week #28 ending 17 July
Note: 21 cases without weekly classification

The attack rates for children in the age groups of <1-4 years and 5-14 years were notably lower than for ages 15-50 (Figure 2). One explanation for this distribution is the introduction and continued presence of MMR vaccine. MMR vaccine was introduced into Costa Rica's immunization program in 1972. It is for this reason, that the group aged 25-34 years reported the highest attack rate. The age group 35-44 years reported a lower attack rate. This may be due to

their having been infected as children and consequently having developed a natural immunity against rubella. It is important to note that of all the age groups under the age of 50 years, the groups aged 5-9 years and 10-14 years reported the lowest attack rates. This is a result of improved coverage as well as proper vaccination through routine immunization and campaigns since the introduction of MMR vaccine.

Figure 2
Case distribution and attack rate by age group of rubella cases, Costa Rica, 1999*



Source: Ministry of Health, Costa Rica * Data as of 3 July

As of 5 June, according to case distribution by region, Costa Rica's central area reported 83% of the country's total. 701 (51%) cases were from the Southern Central region and 385 (28%) cases were from the Northern Central region. Many cases were found among persons living in densely population areas, especially factory workers and market vendors.

In response to the outbreak, the country's Ministry of Health implemented a vaccination campaign using MMR vaccine between the end of March and the beginning of April (week 13). The selective campaign targeted adults, placing priority on women of childbearing age (15-44 years). As a result of the campaign, there has been a decline in the number of cases reported (Figure 1).

Source: Epidemiological Surveillance Unit, Ministry of Health Costa Rica

Brazil's Response to the Polio Outbreak in Angola

Information of a large poliomyelitis outbreak in Angola, Africa was first reported by the international medical press at the end of April and beginning of May 1999. More than 882 cases of polio were reported, primarily in unvaccinated children (over 85%) and children under 5 years of age (over 90%). The Brazilian government assembled a team, to implement a series of steps that would avoid the risk of importation of wild poliovirus from Angola into Brazil. A team with representatives from the immunization and surveillance units of the Ministry of Health's National Health Foundation and a staff from the Pan American Health Organization's office in Brazil met to develop a national response to the Angolan outbreak.

The last laboratory confirmed case of indigenous poliomyelitis was reported in March, 1989 in the Northern State of Paraiba. The Brazilian polio eradication program took off in 1980, with two national immunization campaigns during which one dose of oral poliomyelitis vaccine (OPV) was administered to children under 5 years. To date, these annual campaigns continue to be maintained. National vaccination coverage has mostly been around 90% for children under 5 years of age (approximately 17 million) in the last 19 years.

Preventive Measures

Due to low notification levels of acute flaccid paralysis (AFP) during the first six months of 1999, the team

recommended enhanced AFP surveillance at hospitals of large cities that were most likely to receive visitors from Angola. These cities include Recife, Salvador, Victoria, Rio de Janeiro and Sao Paulo. Special emphasis has been placed on Rio de Janeiro and Sao Paulo because of their large population and because they are the main ports of entry for visitors to Brazil. Both cities also have two direct flights every week coming from Angola. Visiting Angolans usually stay in Rio de Janeiro for a few days, travel to São Paulo by bus and return to Rio de Janeiro on their way back to Angola. In this regard, PAHO is providing technical and financial assistance to support the search of AFP cases at hospitals in these two cities. AFP cases have been reported, but the majority were clinically compatible with the Guillain - Barré Syndrome. To date, no clinically compatible cases with acute wild poliovirus infection have been detected in Brazil.

CARITAS, a non-governmental organization that assists new Angolan immigrants helped in identifying the areas where most Angolans live in Rio de Janeiro. Families in these areas were contacted and asked to check the immunization status of all children under the age of 5, and to administer one dose of OPV. This recommendation included all Brazilian children under the age of 5, regardless of their immunization status. Over 11,000 doses of OPV were administered during visits made to the greater Rio de Janeiro area in May and June. Stool samples were collected from children under 5 years and sent for possible signs of wild poliovirus to the virology department of the Oswaldo Cruz Institute.

The National Immunization Advisory Committee discussed the Angolan outbreak and outlined specific recommendations on immunization for people travelling from Brazil for Angola and/or other endemic areas. The Committee recommended that all travelers be required to complete their national immunization schedule prior to leaving the country, especially children under five years. This includes immunization with at least three doses of OPV. If this is not feasible, the Committee said that all persons should receive at least one dose of OPV before travelling. These recommendations were submitted to the Ministry of Foreign Affairs and other organizations that frequently send expatriates to Angola.

The National Health Foundation has sent a letter to all Regional Medical Registration Offices requesting that they advise all registered physicians to follow specific recommendations. These include immediate notification of any AFP case, independent of clinical hypothesis, full investigation (adequate stool samples collected for laboratory diagnosis), and immunization guidelines for travelers.

With the support of the Sanitary Surveillance Authorities, which are medical units placed at ports and airports, all passengers arriving from Angola on the two direct flights into the Rio de Janeiro are checked at the airport. The immunization status of all children under the age of 5 is evaluated, and one dose of OPV is administered to all persons regardless of their immunization status. Children under the age of 5, that show an incomplete immunization schedule or lack a vaccination card are referred to a health post to be vaccinated promptly.

Other Actions

During the last national meeting of managers of immunization programs in 27 states, the national and international

polio situation was further discussed. It was agreed that all states review coverage data by municipality, in order to identify risk areas or groups of people with an average OPV vaccination coverage lower than the state or national averages. These groups received special attention during the National Immunization Campaign, scheduled for August 14.

These activities have brought about renewed attention to poliomyelitis in the country. Following the eradication of the disease in Brazil, it has been found that health workers have to be reminded that until the world is free from wild poliovirus circulation, polio is still a threat to Americas.

Source: Epidemiological Surveillance Unit, National Health Foundation, Ministry of Health, Brazil and PAHO Country Office in Brasilia.

Editorial Note: In a recent statement Dr. Gro Harlem Brundtland, WHO Director-General said that the Angolan outbreak shows us “the tragic consequences of failing to vaccinate every child”. This outbreak has already claimed over 1,000 victims.

Although the Region of the Americas has maintained a polio-free status for the past eight years, the risk for importation remains constantly at hand. High levels of immunization coverage are needed to prevent the re-establishment of poliovirus if it is re-introduced from other countries, through international travelers, migrant populations, or population groups who refuse routine immunization.

PAHO recommends that countries in the Americas maintain 95% vaccination with OPV in 80% of the districts. Countries unable to reach this coverage level should carry out at least two National Immunization Days (NIDs). Immunization coverage should be monitored at the lowest geopolitical level. For rapid poliovirus detection, it is critical that the AFP surveillance systems remain fully functional. All countries should strengthen the key surveillance indicators of AFP reporting. National surveillance systems must detect at least one AFP case per 100,000 population <15 years of age per year, and at least 80% of AFP cases should have an adequate stool sample collected within 15 days of paralysis onset.

AFP Surveillance Table

Country	80% weekly reporting units	80% of cases investigated within 48 hours	80% of cases with 1 adequate stool sample taken	AFP Rate ≥ 1:100,000 in children < 15 years
Chile				
Ecuador				
Honduras				
Nicaragua				
Peru				
Colombia				
Panama				
Venezuela				
Argentina				
CAREC				
Cuba				
Dominican Republic				
El Salvador				
Guatemala				
Mexico				
Bolivia				
Brazil				
Costa Rica				
Haiti				
Paraguay				
Uruguay				

* Data as of 17 July, 1999

Source: HVP/PAHO (PESS)

Ecuador Holds National Immunization Day

A National Immunization Day (NID) was conducted in Ecuador between August 2-13, against 10 vaccine-preventable diseases. The campaign included collaboration with the Ministry's of Health's Nutrition Program to distribute Vitamin A supplementation to children between 6-36 months of age. Eighteen percent of the population under 5 years of age suffers from moderate Vitamin A deficiency. Correcting this problem will lead to a reduction in the morbidity and mortality of diseases caused by measles, diarrhea and pneumonia, especially in the under 3 age group.

Following the recommendations of the 13th Meeting of the PAHO's Technical Advisory Group on Vaccine-Preventable Diseases held April 1999, in Canada, the goals of the campaign were:

- Indiscriminate (additional dose or routine dose) vaccination with oral polio vaccine of all children under 5 years of age to prevent the re-introduction of wild poliovirus in the country;
- Nationwide introduction of measles, mumps and rubella vaccine to all children 12-23 months of age, to

contribute to the goal of measles eradication, rubella control and to reduce the incidence of mumps;

- Introduction of hepatitis b to all children under 1 year of age in the eastern part of the country;
- Vaccination with dT of 60% of all women of child bearing age (pregnant and non-pregnant) in 71 areas identified at risk for neonatal tetanus, and nationwide vaccination with dT of all pregnant women, to accelerate the elimination of NNT;
- Yellow fever immunization of all children 1-14 years of age in the eastern provinces located in the Amazon Basin, and of all adults 15-49 years in the provinces of Sucumbios, Napo, Orellana, and the area of Mumullacta in Pastanza, to strengthen control measures among communities at high risk in the East.

These campaigns were also used as an additional opportunity to recuperate vaccination coverage with all antigens for the under 5 age group. The difficult economic situation in Ecuador has resulted in a reduction of preventive health services being offered to the population.

Regional Activities

- The first supervision mission of the World Bank's Health Sector Reform project in Bolivia was held between July 26-August 4 in La Paz, Bolivia. HVP/PAHO is collaborating with the Government of Bolivia and the World Bank in strengthening the country's national immunization project. Objectives of this collaboration are to increase vaccination coverage of vaccines included in the national immunization program, and introduce new and other vaccines of public health importance in the routine schedule. The July mission included a project implementation workshop and supervision of progress achieved in the implementation of the overall intervention since January. It also provided support to the development of implementation plans for next year, as well as to the phased transfer of supervision and policy dialogue responsibilities to Bolivia.
- An evaluation of the national immunization program will be carried out by the Ministry of Health and PAHO, August 2-13 in the Dominican Republic, August 9-20 in Peru and September 27-October 8 in Jamaica. These evaluations look into the national program's strength and weaknesses, its efficiency

and effectiveness, its impact on disease, as well as its capacity to adapt to new demands, such as those generated by health sector reform and decentralization and those that arise in response to the population's need for access to new vaccines.

- The 1999 schedule for the annual HVP/PAHO sub-regional meetings of EPI Managers is: Central America (including the Latin Caribbean countries and Mexico), October 6-8; Andean region, October 11-13; Caribbean countries, November 15-19; and Southern Cone and Brazil, December 8-9. Discussion will focus on progress and obstacles of national surveillance and immunization programs, with special emphasis on the goal of measles eradication by the year 2000.
- A course on measles epidemiological surveillance and control will be held August 30-September 3 in Buenos Aires; September 4 in Brazil; and September 20-25 in Bolivia. The course is designed for national and regional epidemiologists and covers topics, such as measles surveillance, clinical aspects, measles vaccines and strategies for measles eradication, as well as laboratory confirmation of infection.

Reported Cases of Selected Diseases

Number of reported cases of measles, poliomyelitis, tetanus, diphtheria, and whooping cough, from 1 January 1999 to date of last report, and the same epidemiological period in 1998, by country.

Country/Territory	Date of last report	Measles				Polio		Tetanus				Diphtheria		Whooping Cough	
		Confirmed 1999			Confir- med* 1998	1999	1998	Non Neonatal		Neonatal		1999	1998	1999	1998
		Labo- ratory	Clini- cally	Total				1999	1998	1999	1998				
Anguilla	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Antigua & Barbuda	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argentina	3-Jul	186	...	186	584	0	0	2	12	1	0	0	0	270	295
Bahamas	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barbados	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Belize	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bermuda	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bolivia	3-Jul	754	7	761	25	0	0	1	5	1	7	1	5	6	30
Brazil	3-Jul	57	82	139	843	0	0	84	296	11	44	64	...	690	...
British Virgin Islands	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canada	3-Jul	4	0	4	10	0	0	...	...	...	...	...	...	...	...
Cayman Islands	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Chile	3-Jul	27	0	27	0	0	0	10	8	1	0	0	0	1157	874
Colombia	3-Jul	9	13	22	46	0	0	6	5	14	13	0	2	211	191
Costa Rica	3-Jul	0	55	55	0	0	0	1	0	0	0	0	0	1	1
Cuba	3-Jul	0	0	0	0	0	0	2	1	0	0	0	0	0	0
Dominica	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dominican Republic	3-Jul	90	0	90	2	0	0	17	5	1	0	12	10	13	13
Ecuador	3-Jul	0	0	0	0	0	0	0	1	0	1	0	0	0	4
El Salvador	3-Jul	0	0	0	0	0	0	2	0	0	0	0	0	3	4
French Guiana	...	...	...	...	...	0	0	...	...	...	...	...	...	...	...
Grenada	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guadeloupe	3-Jul	0	0	0	0	0	0	...	...	...	...	...	...	...	...
Guatemala	3-Jul	0	0	0	1	0	0	1	0	0	2	0	0	26	40
Guyana	3-Jul	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Haiti	3-Jul	0	0	0	3	0	0	...	...	11	11	4	0	18	4
Honduras	3-Jul	0	0	0	0	0	0	2	...	0	...	0	0	8	...
Jamaica	3-Jul	0	0	0	1	0	0	4	5	0	1	0	0	6	0
Martinique	...	...	...	...	0	0	0	...	...	...	...	...	...	...	...
Mexico	3-Jul	0	0	0	0	0	0	48	98	5	14	...	...	20	163
Montserrat	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands Antilles	...	...	...	...	...	0	0	...	...	...	...	...	...	...	...
Nicaragua	3-Jul	1	0	1	0	0	0	1	1	0	0	0	0	11	0
Panama	3-Jul	0	0	0	0	0	0	2	3	1	0	0	0	172	101
Paraguay	3-Jul	0	0	0	3	0	0	3	12	4	10	0	0	10	15
Peru	3-Jul	0	0	0	0	0	0	27	31	8	8	4	2	530	492
Puerto Rico	3-Jul	0	—	0	0	0	0	...	...	...	...	...	...	...	...
St Vincent/Grenadines	3-Jul	0	0	0	0	0	0	...	0	...	0	...	0	...	0
St. Kitts/Nevis	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St. Lucia	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Suriname	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trinidad & Tobago	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turks & Caicos	3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	3-Jul	41	—	41	37	0	0	11	14	...	...	0	1	2,539	2,448
Uruguay	3-Jul	34	0	34	0	0	0	...	...	...	...	...	...	...	...
Venezuela	3-Jul	0	0	0	4	0	0	10	14	0	2	0	0	197	473
TOTAL		1,203	157	1,360	1,559	0	0	234	512	58	113	85	20	5,891	5,148

... Data not available.

—Clinically confirmed cases are not reported.

* Laboratory and clinically confirmed cases.

Mexico Introduces Pentavalent Vaccine

Combination vaccines consist of two or more vaccine antigens in a physically mixed preparation. This combination can be done either by manufacturers, where each component is made independently and mixed with the other antigens before the final filling of vials and/or pre-filled syringes, or by health care providers prior to administration by mixing contents of separate vials or reconstituting one vaccine with another. The antigen composition in combination vaccines can be classified into two categories: 1) multiple different antigenic types of a single pathogen, such as is the case of the 23 valent pneumococcal polysaccharide vaccine, or 2) antigens from different pathogens causing different diseases, such as the DTP and MMR vaccines. The pentavalent vaccine belongs to the latter category and it is the result of the external re-constitution of freeze dried *Haemophilus influenzae* type b (Hib), with a DTP and hepatitis B vaccine suspension. Pentavalent vaccine provides protection against diphtheria, tetanus, pertussis and hepatitis B, as well as against invasive diseases produced by Hib.

The measles-mumps-rubella (MMR) vaccine was introduced in the national immunization program in Mexico in 1998, to replace the measles vaccine, primary and booster immunizations. The vaccination schedule was further expanded for the 1999 birth cohort by including *Haemophilus influenzae* type b (Hib) and hepatitis b vaccines at 2, 4, and 6 months respectively. During a period of economic constraints, the political will to introduce two new vaccines was greatly enhanced by:

- The availability of a combined diphtheria, tetanus, pertussis, hepatitis B, and *Haemophilus influenzae* type b (DTP-HB/Hib) vaccine
- The possibility of joining other countries in the Americas to purchase a larger volume of vaccines at reduced costs, through the Revolving Fund for Vaccine Procurement of the Pan American Health Organization

During the first trimester, vaccination coverage in children under 1 year old was 88% for the complete schedule,

and 87% for DTP. Over 800,000 doses of pentavalent vaccine have now been administered. Preliminary information from 32 state immunization programs and from a passive surveillance system of adverse events associated with vaccine application, suggest that the pentavalent vaccine is well accepted by both parents and health workers. Furthermore, the reactogenicity of the combined vaccine is similar to that observed with DTP alone.

The availability of the pentavalent vaccine has facilitated the rapid incorporation of two important vaccines in Mexico's Universal Immunization Program without modification of the immunization schedule or increases in the number of injections. A field study is currently underway to evaluate the impact of the introduction of Hib on the burden of invasive diseases caused by this microorganism. With the incorporation of MMR in 1998, and the pentavalent vaccine in 1999, Mexico has one of the most comprehensive immunization programs in Latin America.

Source: Dr. Jose Santos, National Immunization Council and Child Health Program, Mexico

Editorial Note: Uruguay, Peru, Bolivia, Nicaragua, and Costa Rica are also in the process of using pentavalent vaccine in their routine immunization programs. The availability and use of combination vaccines, such as DTP +Hib, DTP +HB and DTP/HB+Hib offer many benefits: They will simplify the administration of an increasing number of antigens against major childhood diseases in the regular immunization schedule, by decreasing the number of injections, visits to health care providers and discomfort for children and parents. It has been demonstrated that the indirect costs of fully immunizing a child are by far larger than the cost of the vaccines themselves. The use of combined vaccines will result in reduced costs in the logistics of delivering immunization services and surveillance of three different vaccines. These benefits should improve compliance and thereby immunization coverage.

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Division of Vaccines and Immunization

525 Twenty-third Street, N.W.
Washington, D.C. 20037
U.S.A.

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Editor: Ciro de Quadros
Associate Editor: Monica Brana

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