



EPI Newsletter

Expanded Program on Immunization in the Americas

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IMMUNIZE AND PROTECT YOUR CHILDREN

October 1993

Directing Council Reviews EPI

The XXXVII Meeting of the Directing Council of PAHO, held in Washington D.C. from 27 September to 1 October, 1993, reviewed the status of the EPI on 30 September and passed a resolution calling for further support of immunization activities and established a Special Fund for the elimination of measles.

A brief summary of the proceedings follows, along with the resolution passed by the Council.

The President of the Session noted that the last case of paralytic poliomyelitis caused by indigenous wild virus occurred in Pichinaki, Junín, Peru on August 23, 1991. He continued that the American Region now must make a concerted effort to contain importations that may occur from other regions of the world that are not free of polio, and to meet surveillance requirements to certify the eradication of this cause of childhood illness from the Hemisphere.

The report before the Council underlined the importance that countries not lapse into self-complacency at a time when rigorous surveillance is called for.

Regarding measles it was noted that although progress toward elimination has been significant, resources have not been adequate to carry out the level of surveillance for rash and fever illnesses that is required.

As for neonatal tetanus, it was pointed out that the countries of the Americas are on the verge of eliminating this disease as a public health problem.

Lastly, concern was expressed that vaccination coverage rates have declined in some countries with respect to 1990. In many cases this is due to inadequate vaccine and other supplies and materials. It was suggested that, if necessary, countries redistribute their health sector resources to en-

sure that vaccination goals are reached and the region's commitment to its children is kept.

The Directing Council approved the following resolution:

Having considered and reviewed the report of the Director on the Expanded Program on Immunization (Document CD37/16);

Noting with great satisfaction that more than two years have passed since detection of the last case of poliomyelitis, on 23 August 1991 in the district of Pichinaki, department of Junín, Peru; that there has been tremendous progress made toward securing the control and definitive elimination of measles, as well as notable achievements in the control of neonatal tetanus; and that in most of the countries the levels of vaccination coverage have been maintained or increased;

Recognizing that the consolidation of these achievements requires further commitment on the part of all the governments and agencies that are collaborating with the program, as well as the strengthening of ties between the public and private sectors; and

Noting with concern that in Alberta, Canada, an importation of wild poliovirus from the Netherlands has been detected,

RESOLVES:

1. To congratulate all the health workers of the Region for their dedication and their outstanding achievements toward securing control of diseases preventable by vaccination.

2. To commend the health authorities of Canada for their prompt detection and apparent containment of the spread of wild poliovirus following its importation from the

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Netherlands, as well as the authorities of other countries that acted swiftly to investigate and vaccinate all communities potentially at risk.

3. To urge all the Member Governments to intensify their surveillance among groups potentially at risk for transmission of poliovirus associated with the aforesaid or future importations.

4. To recommend to all the Member Governments that they establish national certification commissions to collect and analyze the data on the eradication of poliomyelitis, which are then to be reviewed by the international commission.

5. To call on all the Member Governments to increase their support for activities aimed at achieving control and the definitive elimination of measles and at achieving in-

creased control of neonatal tetanus; this will require allocation of resources in the national budgets to support vaccination programs, including national campaigns, expansion of national surveillance systems, and support for diagnostic laboratories.

6. To thank all the collaborating governmental and nongovernmental agencies, bilateral as well as multilateral, for their ongoing support, and to call on them to maintain and increase this support.

7. To request the Director:
- a) To continue his efforts to mobilize additional resources for the EPI and its disease control and elimination initiatives;
 - b) To establish a special fund for the control and elimination of measles.

Central America: Defeating Measles

The Ninth Central American EPI Meeting, held in Guatemala from 17 to 19 August, 1993, reviewed the measures that have been taken since their elimination campaign was launched, and fine-tuned the strategies required to achieve it. Central American countries have found that if they are to succeed by 1997, as planned, they will have to push farther than ever before past the barriers of routine access to health services. National immunization programs must carry out extensive "catch-up" campaigns to vaccinate children in older age groups (1 to 14 years of age) who may not have been vaccinated or have had measles in the past. Ninety-five percent or more of all infants must

then be reached and vaccinated by their first birthdays. This vaccination coverage level among one-year olds must be sustained to break the chain of transmission. The degree of consistent outreach required is the most ambitious yet of any EPI campaign.

Progress Review

The health ministries of Central America, Mexico, the Dominican Republic, and Haiti, the regional diagnostic laboratory (INCAP), the Guatemalan Social Security Institute, Rotary International, the European Economic Community, the Spanish Cooperation Agency, the Swedish

Number of Children Vaccinated and Coverage by Country and Age Group, Central America, 1992-1993

Country	1 - 4 Years		%	5 - 14 Years		%	1 - 14 Years		%
	Population	Vaccinated		Population	Vaccinated		Population	Vaccinated	
Costa Rica	321,646	158,336	49	726,130	627,136	86	1,047,776	785,472	75
El Salvador	590,607	403,639	68	1,352,844	1,326,704	98	1,943,451	1,730,343	89
Guatemala	1,358,219	1,085,214	80	2,802,914	2,438,535	87	416,133	3,523,744	85
Honduras	697,669	669,327	96	1,512,449	1,443,162	95	2,210,118	2,112,489	96
Nicaragua	581,551	433,429	75	1,195,788	1,237,641	100	1,777,339	1,671,070	94
Panama	238,754	198,932	83	572,441	476,774	83	811,195	675,706	83
Total	3,788,446	2,948,877	78	8,162,566	7,549,952	93	11,951,012	10,498,829	88

Source: Country reports

International Development Agency, the U.S. Agency for International Development, and UNICEF and PAHO/WHO of the United Nations were represented at the meeting to review progress to date.

The meeting focused on several main issues: the status of the effort to vaccinate all children from 9 months to 14 years of age, surveillance, and laboratory confirmation.

Increasing coverage

The first phase of the Central American campaign launched in 1992 to vaccinate all children between the ages of 9 months and 14 years was conducted in two stages: to vaccinate school-aged children in October/November 1992, and to vaccinate pre-school and the remaining school-aged children in March-June 1993.

The mass media and several companies in the private sector collaborated in publicizing the campaign widely.

Ten million, or over 84%, of the children between the ages of 1 and 14 years old were vaccinated, although only 74.8% of those between one and four—the hardest to reach—were covered. Another 347,491 infants 9 to 11 months old were vaccinated. A breakdown of coverage levels at the municipality level, however, found that only half meet the required 80% coverage level for that age group. Thus, although an extraordinary number of children were vaccinated in a short period of time, large pockets of susceptibles remain.

Mexico will carry out a mass vaccination campaign the week of 18-23 October, targeting all 5 to 14 year-olds regardless of their vaccination history, and those 1-4 who have not yet been vaccinated.

The Dominican Republic started vaccinating school-aged children and revaccinating children under 5 years of

age during 1993. Fifty-five percent of children 9 months to 14 years old were covered.

Surveillance

To measure progress and target susceptible groups accurately, good surveillance is essential. Good surveillance, in turn, requires a standard case definition and the participation of private clinicians as well as the public sector. All of the countries of the Central American subregion now have established surveillance systems for rash and fever illness, the most sensitive case definition for measles.

A weekly Central American Measles Notification Bulletin is now published in which outbreaks, and reported and confirmed cases are listed. As of 30 September, 1,586 cases had been reported for 1993, of which 634 were confirmed.

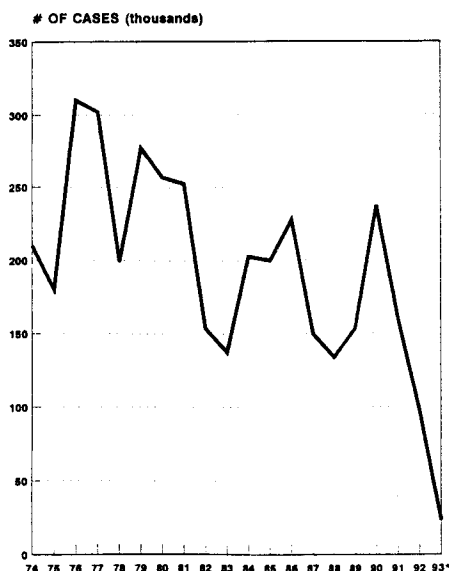
In Mexico 515 cases were reported as of the same week, 108 of which were confirmed by laboratory serology, and 41 of which were classified as compatible (not analyzed in time by a laboratory, or lost to follow-up).

Laboratory Confirmation

Clinicians often confuse measles with other febrile illnesses involving rashes, especially rubella. Laboratory analysis and confirmation of suspected cases is therefore critical to determine whether an outbreak is occurring. The Swedish International Development Agency (SIDA) is helping to fund a laboratory network that will be provided with the equipment and supplies needed to improve laboratory serology techniques. Staff training in new techniques was held in August at INCAP with the support of the U.S. Centers for Disease Control and Prevention.

Source: IX Meeting of the EPI for Central America, 17-19 August, 1993, Guatemala, Guatemala. Final Report.

Measles in the Americas



The number of cases of measles has declined steadily throughout the Americas as vaccination coverage has increased and elimination initiatives have gotten underway. The speed with which unvaccinated children add up to a sizeable group of susceptibles, however, means that outbreaks still occur on a regular basis. The wave-like pattern with which measles has declined illustrates the point. Although each peak is lower than the one preceding it, epidemics such as those experienced a few years ago in Brazil, Chile, and the U.S.A. attest to the fact that the virus continues to circulate and will cause outbreaks whenever a sufficiently large number of unvaccinated children builds up.

Despite progressively higher coverage rates, the build-up of groups of unvaccinated children remains the major reason outbreaks still occur. To prevent outbreaks high coverage levels must be maintained among each new cohort of infants born yearly, surveillance must be fine-tuned to pinpoint any pockets of susceptibles that require special vaccination efforts, and, depending on the situation, mass vaccination campaigns may be needed periodically.

Unvaccinated children also tend to have the least access to and are hardest to reach by any health service. Special outreach approaches are required to extend vaccination services to them.

Poliomyelitis: Toward Certification

With no apparent transmission of indigenous wild poliovirus since the last case reported in August 1991 in Peru, surveillance of acute flaccid paralysis (AFP) remains critical as a means to isolate possible wild poliovirus transmission. Cases of AFP that are classified as compatible with poliomyelitis represent missed opportunities to verify the absence of wild poliovirus transmission in the Americas and, therefore, represent failures in our surveillance system.

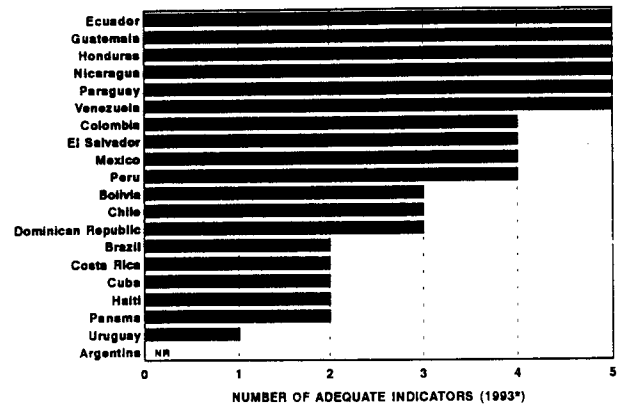
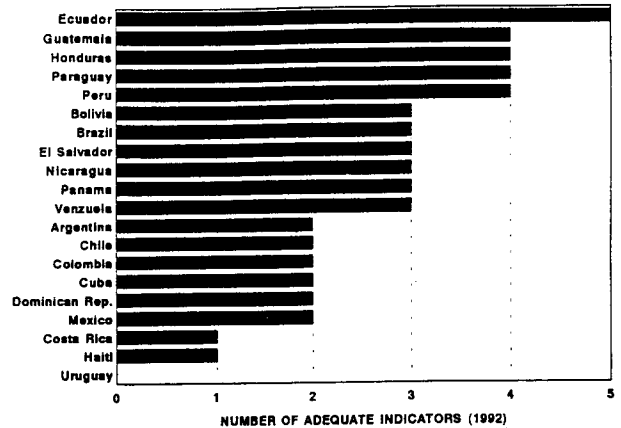
The International Certification Commission has mandated the use of surveillance performance indicators to assess whether countries should be certified as being free of poliomyelitis. The accompanying tables show the number of indicators each country has met so far this year out of the five indicators being used compared to last year. The five performance indicators are: 1) weekly negative notification from at least 80% of all weekly reporting units; 2) detection of a rate of at least 1.0 cases of AFP per 100,000 children under the age of 15; 3) investigation, by a trained epidemiologist, of at least 80% of cases of AFP, within 48 hours of notification; 4) collection of two stool specimens within two weeks of paralysis onset, from at least 80% of AFP cases; 5) for at least 80% of AFP cases, collection of stool samples from at least five contacts.

Of the 20 Latin countries listed for 1993, 50% are meeting at least four of the five surveillance performance indicators for wild poliovirus and AFP. It is a cause for concern, however, that half of the countries meet only three or fewer criteria. Three of these had recent transmission of wild poliovirus: Brazil and Venezuela in 1989, and Bolivia in 1988.

As of the week ending 21 August 1993, 15 cases of AFP that are compatible with poliomyelitis have been reported. All of them represent missed opportunities to verify the absence of circulation of indigenous wild poliovirus. However, the number of compatible cases has improved since last year, when 25 poliomyelitis-compatible cases were reported over the same period. Although not statistically significant, 20% (3/15) of the cases reported in 1993 had the risk factors of age <6 years and fever at the onset of

paralysis, compared to 32% (9/28) of the compatible cases reported in 1992. Progress is being made. Nonetheless it is cause for concern that the three compatible cases reported this year that were at risk for being culture-confirmed poliomyelitis, occurred in Brazil and Mexico, countries in which wild poliovirus transmission has occurred in the last four years (1989 and 1990, respectively).

Performance Indicators for Certification



* DATA AS OF WEEK 18 SEPTEMBER
NR - NO DATA RECEIVED

The Future of DTP Vaccine

The First Regional Meeting on Improved DTP and DTP-based Combination Vaccines was held jointly by representatives of the Children's Vaccine Initiative (CVI) and the PAHO's Regional System for Vaccine Development in Latin America and the Caribbean (SIREVA) at PAHO headquarters in Washington, D.C. from 7 to 9 September 1993.

The purpose of the meeting was to evaluate laboratory capability in Latin America to produce affordable, quality-controlled DTP vaccines and DTP-based vaccine combina-

tions in the quantities needed to ensure that regional self-sufficiency is possible in the near future. Representatives of all the Latin American vaccine producers and of several major industrialized pharmaceutical firms attended to review the status of regional vaccine production and the potential for cooperative agreements.

The following provides a brief background and summary of the extensive and complex deliberations.

CVI

The Children's Vaccine Initiative, or CVI, is a joint global effort sponsored by the United Nations Development Program (UNDP), the United Nations International Children's Fund (UNICEF), the World Bank (IBRD), the World Health Organization and the Rockefeller Foundation. It is headquartered at WHO, Geneva. CVI grew out of the September 1990 World Summit for Children at which the need to speed up the production of new and better vaccines was urged. The improvements sought are that vaccines be effective with a single dose, administered near birth, heat stable, affordable, effective against diseases for which vaccines are currently unavailable, and combine antigens in new ways.

These requirements stem from the most common obstacles to achieving universal vaccination coverage: the need for multiple visits to or by health personnel to receive the full complement of doses of each vaccine, the complexity of tracking vaccination histories, the difficulties in ensuring proper temperature controls, and the expected rise in prices and production shortfalls of vaccines purchased in bulk from industrialized country suppliers.

SIREVA

The Regional System for Vaccine Development in Latin America and the Caribbean, known by its Spanish acronym SIREVA, is a Western Hemisphere project started in 1991 due to concerns similar to CVI's. The SIREVA project is sponsored by PAHO and received initial funding from the Interamerican Development Bank, the IDRC of Canada, the government of Mexico, and the Rockefeller Foundation. Currently funded by the government of Brazil and the Swedish and Canadian International Development Agencies, with continued PAHO sponsorship, the SIREVA Project is intended to eventually become an independent, financially self-sustaining collaborative network of laboratories producing vaccines in the Latin American and Caribbean region.

The purpose of the SIREVA is to analyze epidemiologic trends of the main childhood illnesses in the region, research and produce vaccines according to the epidemiologic priorities, and share technological knowledge, production techniques, and personnel training toward self-sufficient vaccine supply. SIREVA has concentrated to date on vaccines against *Streptococcus pneumoniae*, *Salmonella typhi*, *Neisseriae meningitidis*, serogroup B, and dengue, all of which are important in preventing infant mortality and are considered feasible to produce in combination with DTP by the turn of the century. The SIREVA Project places special emphasis on the quality control and safety of the vaccines developed and produced.

DTP

The meeting focused on DTP (Diphtheria-Tetanus-*Per*tussis) vaccine—in itself and as a base vaccine to which other antigens may be added—for a number of reasons. Most importantly:

- DTP is a major vaccine of EPI,
- a number of countries already produce their own DTP although they currently do not have the capability to develop new versions, and

- the private sector in industrialized countries is expected to phase out current DTP production within several years, as they introduce new combination vaccines, thereby eliminating them as a source of supply.

The cost of the new combinations—made with sophisticated biotechnology including genetic engineering—is likely to be prohibitive for many routine national childhood vaccination programs. Concern already exists regarding the expected rise in prices of standard internationally supplied EPI vaccines. The new technology being developed, moreover, is patented and will not be available in most developing countries unless cooperative agreements are reached.

Meanwhile, as the countries of the hemisphere strive to increase their DTP coverage levels, demand for DTP vaccine will grow even if birth rates are stable or gradually decline. Region-wide, coverage with three doses of DTP in children under 1 year old was around 77% in 1992, although some countries had significantly lower levels.

Challenges

Currently, there are 13 vaccine manufacturing laboratories in Latin America and the Caribbean. Their infrastructure, equipment, technology, quality control, and economic sustainability differ widely. The INSP (National Public Health Institute) of Chile and the INHRR (the Rafael Rangel National Institute of Hygiene of Venezuela) are the only laboratories producing sufficient DTP vaccine to meet its national demand. Several laboratories in Brazil, Mexico and Cuba are investing in major modernization projects, overhauling plant and equipment and training staff. Many other national laboratories lack the resources to upgrade their production facilities.

Meeting participants concurred that ensuring self-sufficiency is a major challenge. Whether or not cooperative agreements and their implied transfer of technology can be attained, substantial funding will be required to train personnel and replace obsolete plant and equipment, introduce new production and purification techniques, research and develop the DTP-based combination vaccines deemed most feasible and appropriate, carry out trials to test efficacy, and ultimately certify the laboratories for WHO quality control standards.

In a number of countries, national policy support has yet to be given to such an undertaking. Even in those where such support exists, it would be unrealistic to expect each laboratory to produce and test all of the possible vaccine combinations. From the standpoint of the national laboratories, cooperative agreements with industrialized country producers are highly desirable. Representatives expressed the need for these agreements to include the transfer of new technology and the supply of bulk antigens by private pharmaceutical firms.

Several industrialized country vaccine manufacturers' representatives voiced their willingness to consider entering into cooperative agreements with the Latin American laboratories as long as they felt that they too would benefit from the enterprise. Some types of cooperative agreements are in their interest and several have already been reached with countries in other regions. Each new vaccine combination requires formula experimentation and clinical trials

with countries in other regions. Each new vaccine combination requires formula experimentation and clinical trials for efficacy and potential adverse reactions before it can be approved and marketed--even if the base vaccine has been marketed for years. Among the potential benefits of agreements is the possibility of conducting clinical trials in Latin American countries and of dividing responsibility for the antigens produced for combination.

Meeting participants developed a Strategic Plan, for which a plan of action is being drafted. The key elements of the Strategic Plan are the development of a regional net-

work of quality control laboratories, the establishment a program to certify national quality control laboratories in order to enhance exchanges and complementary antigen manufacture arrangements, interlaboratory cooperation toward technological development, and investment in specific projects at the national level.

Source: First Regional Meeting on Improved and DTP-based Combination Vaccine, 7-9 September 1993, Washington, D.C. Further information may be obtained by writing: Dr. Akira Homma or Dr. Ciro de Quadros, Pan American Health Organization (PAHO), 525 23rd St. N.W., Washington, D.C. 20037, U.S.A.

World Bank Endorses Boosting EPI

The World Bank (International Bank for Reconstruction and Development) dedicated its 1993 World Development Report to the theme of "Investing in Health." Released in July 1993, the report takes an in-depth look at financial and public policy impact on development through investment in public health measures.

The report finds that while most countries have made significant advances in health, 11 million poor children in developing countries still die each year before they reach their 5th birthdays, from causes that are preventable or curable.

After examining the demographic, economic, and health conditions that prevail in eight economic regions of the world (defined by the Bank as Sub-Saharan Africa, India, China, Other Asia and islands, Latin America and the Caribbean, Middle Eastern crescent, Formerly socialist economies of Europe, and Established market economies) the report concludes that public investments in health can do much in all of them to reduce premature mortality and disability (from poliomyelitis, for example) among the poor.

Simultaneously, the report recommends reforms to make the public health sector more effective in this endeavor and in facing deadly new health threats such as HIV and the resurgence of malaria.

Chief among the areas requiring changes, according to the report, are:

- misallocation of funding currently spent on low cost-effectiveness tertiary care, which should go to district level facilities providing preventive services such as immunizations;
- inequity of access to services fostered by disproportionate government funding of services used by upper income groups;
- inefficient use of resources, such as the purchase of brand-name drugs in lieu of generics, poor assignment and supervision of staff, and underutilization of hospital capacity;

- rising costs due to the disproportionate growth of the medical/tertiary care sector compared to the public health sector.

Despite these problems, developing countries still spend less than one-thirtieth of what industrialized countries invest per capita in their health sectors.

Recommendations for Future Action

The report finds that of all government policies, investing in the delivery of essential clinical services, including childhood immunization is the most favorable measure to "reach the disadvantaged" and, along with investment for education (especially of females), is the most likely to "improve health outcomes."

Furthermore, investment in immunizations is one of the most cost-effective per capita investments, according to the report, which calls for intensified government support to extend EPI. Extended EPI services can be delivered at the level of district clinics or hospitals, and do not require funding of sophisticated facilities and specialized medical personnel.

The report estimates that "EPI currently protects 80% of the children in the developing world against six major diseases at a cost of around \$1.4 billion a year. Expanding EPI coverage to 95% of all children," it continues, "would have a significant impact on children in poor households, who make up a disproportionately large share of those not yet reached by the EPI. Other vaccines, particularly those for hepatitis B and yellow fever, could be added to the six currently included in the EPI, as could vitamin A and iodine supplements. In most developing countries such an 'EPI Plus' cluster of interventions in the first year of life would have the highest cost-effectiveness of any health measure available in the world today."

Source: World Development Report 1993, Investing in Health, World Development Indicators and Executive Summary. The Report may be obtained from The World Bank, 1818 H Street, N.W., Washington, D.C. 20433, U.S.A.

Reported Cases of Selected Diseases

Number of reported cases of measles, poliomyelitis, tetanus, diphtheria, and whooping cough, from 1 January 1993 to date of last report, and the same epidemiological period in 1992, by country.

Subregion and country	Date of last Report	Measles				Poliomyelitis		Tetanus				Diphtheria		Whooping Cough	
		Reported		Confirmed				Non Neonatal		Neonatal		1993	1992	1993	1992
		1993	1992	1993	1992	1993	1992	1993	1992	1993	1992	1993	1992	1993	1992
LATIN AMERICA															
Andean Region															
Bolivia	26 Jun.	223	...	...	...	0	0	...	...	8	...	4	...	38	...
Colombia	26 Jun.	3	7 976	...	...	0	0	...	...	20	105	2	76	...	972
Ecuador	29 May	1 584	...	...	...	0	0	...	...	31	...	...	...	103	...
Peru	19 Jun.	855	...	...	...	0	0	47	...	38	...	3	...	167	...
Venezuela	28 Aug.	13 809	7 620	...	...	0	0	...	...	15	14	0	1	331	269
Southern Cone															
Argentina	...	...	...	...	...	0	0	...	...	...	...	...	...	...	...
Chile	10 Jul.	1	...	...	...	0	0	8	...	1	...	8	...	473	...
Paraguay	3 Jul.	627	128	...	...	0	0	29	11	18	7	3	2	135	79
Uruguay	31 Jul.	7	171	...	...	0	0	2	3	0	0	0	0	13	29
Brazil	12 Jun.	1 187	...	...	...	0	0	456	...	74	...	119	...	1 779	...
Central America															
Belize	28 Aug.	6	5	...	...	0	0	...	...	...	0	...	...	...	0
Costa Rica	4 Sept.	507	...	163	...	0	0	...	...	...	...	...	...	...	...
El Salvador	21 Aug.	78	...	35	...	0	0	...	...	...	...	...	...	...	...
Guatemala	21 Aug.	257	...	18	...	0	0	...	...	...	...	...	...	...	...
Honduras	21 Aug.	85	...	11	...	0	0	...	...	...	...	...	...	...	...
Nicaragua	21 Aug.	382	211	317	...	0	0	...	13	...	6	...	...	...	178
Panama	4 Sept.	271	734	90	...	0	0	...	2	...	3	...	...	...	25
Mexico	21 Aug.	106	456	106	456	0	0	96	114	45	85	0	0	107	69
Latin Caribbean															
Cuba	6 Mar.	0	...	...	...	0	0	0	...	0	...	0	...	0	...
Dominican Republic	...	...	...	...	...	0	0	...	...	...	...	...	...	...	...
Haiti	...	...	...	...	...	0	0	...	...	...	...	...	...	...	...
CARIBBEAN															
Antigua & Barbuda	28 Aug.	0	...	0	0	0	0	...	...	...	0	...	...	...	...
Bahamas	28 Aug.	0	...	0	0	0	0	...	...	...	0	...	0	...	...
Barbados	28 Aug.	3	0	0	0	0	0	...	...	...	0	...	...	...	0
Cayman Islands	28 Aug.	0	...	0	0	0	0	...	1	...	0	...	...	...	...
Dominica	28 Aug.	8	...	0	0	0	0	...	...	...	0	...	...	...	...
Grenada	28 Aug.	3	...	0	0	0	0	...	...	...	0	...	...	...	...
Guyana	28 Aug.	1	...	0	0	0	0	...	...	...	0	...	...	...	...
Jamaica	28 Aug.	36	...	0	0	0	0	...	...	...	0	...	...	...	...
St. Kitts/Nevis	28 Aug.	0	...	0	0	0	0	...	...	...	0	...	...	...	...
Saint Lucia	28 Aug.	9	...	0	0	0	0	...	...	...	0	...	...	...	...
St. Vincent	28 Aug.	0	...	0	0	0	0	...	...	...	0	...	...	...	...
Suriname	28 Aug.	1	...	0	0	0	0	...	...	...	0	...	...	...	...
Trinidad & Tobago	28 Aug.	2	79	0	0	0	0	...	7	...	0	...	0	...	1
NORTH AMERICA															
Canada	24 Apr.	95	...	...	...	0	0	...	...	...	0	...	...	1 238	...
United States	3 Jul.	150	...	150	...	0	0	15	...	...	0	...	...	1 301	816

... Data not available.

Monitoring a Refrigerator's Temperature

It is important to monitor daily the temperature of refrigerators in which vaccines are stored. Check it in the morning and in the afternoon and write the temperature down on a control sheet.

If the temperature is not within the prescribed range (0°C to 8°C) take measures immediately to remedy the situation.

A refrigerator's temperature may vary during the day as outside temperatures change. It also is generally cooler in the morning because it has not been opened during the night.

Refrigerators containing vaccine should not be opened more than twice a day: once in the morning to check the temperature and take out the vaccines that will be used, and once in the evening to return any unused vaccine and check the temperature again.

Any thermometer that registers temperatures accurately can be used.

The thermometer should be placed on a middle shelf or next to the vaccine trays. It should not be moved unless the refrigerator is being cleaned and disinfected.

Daily temperature monitoring is not just useless paperwork. The information should be analyzed (see box) to keep track of the percent of the time that temperatures rise above 8°C, and to help pinpoint possible reasons, such as:

- the door is opened too often
- the thermometer is inaccurate
- the refrigerator is overloaded
- there are not enough bottles of water
- the user is trying to freeze too many ice packs

- the refrigerator requires repair
- the refrigerator is not appropriate for vaccine storage

Ranges of monitored temperatures	
Temperature (0°C)	Days
-10°C - 1°C	2
0°C - 8°C	48
9°C - 10°C	10
19°C - 30°C	0
% within range*	80

Observations:
 Total days analyzed = 60
 % within range = 48 divided by 60 days
 * % within range is the percent of days that the refrigerator maintains optimal temperatures.

Depending on the problem, it may be a good idea to take one of the following measures:

- improve supervision
- retrain the health workers
- add bottles of water
- store only the amount of vaccine that will be used immediately at the problem site until the refrigerator is repaired or replaced
- call a technician

Remember: A working refrigerator is the responsibility of EPI staff. Circulate this information. Use it for a poster or leaflet.

The *EPI Newsletter* is published every two months, in Spanish and English by the Expanded Program on Immunization (EPI) of the Pan American Health Organization (PAHO), Regional Office for the Americas of the World Health Organization (WHO). Its purpose is to facilitate the exchange of ideas and information concerning immunization programs in the Region, in order to promote greater knowledge of the problems faced and their possible solutions.

References to commercial products and the publication of signed articles in this *Newsletter* do not constitute endorsement by PAHO/WHO, nor do they necessarily represent the policy of the Organization.



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