



EPI Newsletter

Expanded Program on Immunization in the Americas

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International Importations of Measles from the Americas into the United States, 1990-1994

Internationally imported cases of measles have been a well recognized problem in measles control in the United States.¹ This issue has been recently highlighted by the apparent interruption of indigenous transmission of measles in the United States in the fall of 1993 and presumed re-introduction by subsequent imported cases.²⁻³

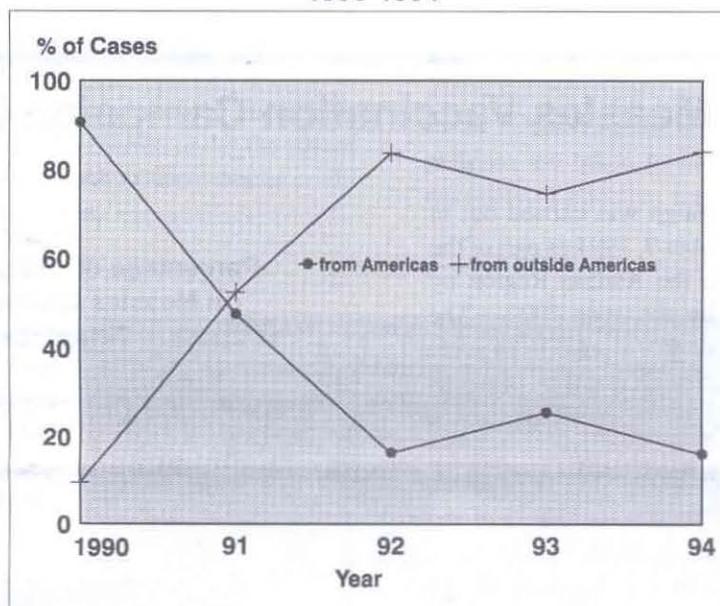
Historically, countries of the Western Hemisphere have been the most common source for imported measles cases into the United States with Mexico being the leading source country. For the period of 1980-85, an average of 108 internationally imported cases were reported in the U.S. annually, with 19.7% of imported cases coming from Mexico and another 20.6% com-

ing from other countries of the Americas. More recently, the period of 1990-94 has witnessed a progressive decline in

both the absolute number and the percentage of imported cases coming from Mexico and other countries of the Americas (Table 1). In 1990, during a peak of measles activity throughout the Western Hemisphere, 178 (69.8%) of the 255 imported cases came from Mexico and 53 (20.8%) came from the other countries of the Americas. In contrast, only 2 (4%) of the 50 imported cases reported in 1994 came from Mexico and only 6 (12%) from other countries of the Americas. While the number of imported cases from other regions of the world has either remained steady or in-

creased (see Graph 1), the near-elimination of imported

Graph 1
Percent Change of Origin of Measles Cases Imported into the United States 1990-1994



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cases from the Americas has resulted in a substantial decline in the total number of imported cases into the U.S.

The Pan American Health Organization's strategy for measles elimination, emphasizing national mass campaigns targeting all children within an age group for a dose of measles vaccine regardless of prior immunization status, has produced striking declines in reported measles cases throughout the Western Hemisphere. The success of this program is reflected in fewer imported measles cases reaching the United States, thereby facilitating measles elimination activities here. These results show that the benefits of improved international control of measles extend beyond national boundaries and that improved global control of measles is required to help all countries achieve and sustain measles elimination goals.

References:

1. Markowitz LE, Tomasi A, Hawkins C, et al. International Measles Importations United States, 1980-1985. *Int J of Epidemiol* 1988;17:187-92.
2. CDC. Absence of reported measles-United States, November 1993. *MMWR* 1993;42:925-6.
3. CDC. Measles-United States, first 26 weeks, 1994. *MMWR* 1994;43:673-6.

Table 1. Measles cases imported to the U.S. by country of exposure, 1990—1994.

Country	1990	1991	1992	1993	1994
Argentina		1		1	
Bahamas		1			
Brazil	2				
Canada		6			1
Caymans	3				
Colombia	2				
Cuba			1		
Dom. Rep.	2	4		3	2
Ecuador		1			2
El Salvador	1	1		1	
Guatemala	7				
Haiti	1	1		2	
Honduras		1			
Jamaica	6				
Mexico	178	12	1	1	2
Nicaragua	1				
Puerto Rico	25	1	2	2	1
Trinidad	1				
Uruguay			1		
Venezuela	2		1	3	
Virgin Islands			1		
Total From the Americas:%	231 (90.6%)	30 (47.6%)	7 (16.3%)	13 (25.5%)	8 (16.0%)
Total imported	255	63	43	51	50

The National Measles Vaccination Campaign in Ecuador

A national vaccination campaign was carried out in Ecuador from August 1 to September 9, 1994 as part of the effort to eliminate measles from the Andean Region by 1998 and from the Americas by the year 2000. The objective was to vaccinate all children 9 months to 14 years of age, irrespective of their vaccination status or previous exposure to measles virus.

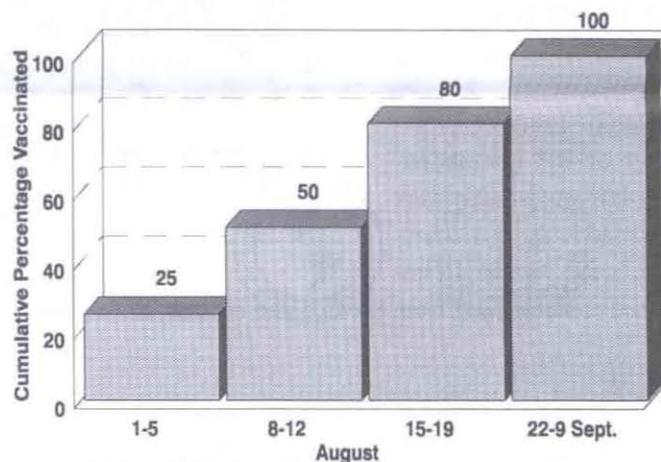
The campaign was organized in 3 phases:

The first one, from 1 to 12 August, consisted of the vaccination of all school children, in their respective institutions. Additionally, children 1 to 14 years of age attending any health institution were vaccinated. During this first phase 50% of the target population was expected to be covered.

The second phase, from 13 to 19 August, began with National Vaccination Day which was extended through the week to cover all children in the target age group who did not attend educational institutions and lived in densely populated areas. About 30% of the target population was expected to be covered during this phase.

The third phase, from 22 August to 9 September, aimed to cover rural areas with sparse population.

Figure 1
Percentage of Children Vaccinated in Measles Campaign by Week August to September 1994, Ecuador

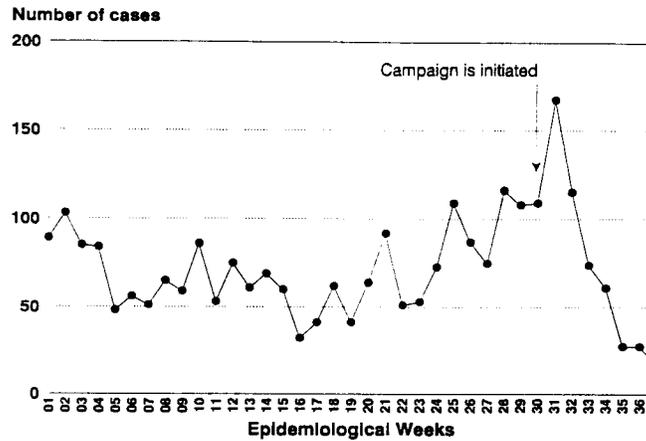


Source: Technical Committee - MOH, Ecuador

During the six weeks of the campaign, 3,958,427 children less than 15 years of age were vaccinated, a number greater than the expected target of 3,950,441 children. (Figure 1)

Figure 2
Distribution of Measles Cases by Week
Ecuador, 1994*

The total cost of the campaign was estimated at 2.5 million dollars. Apart from the national budget, PAHO, UNICEF and, for the first time, the World Bank (through its "FABASE" Project), contributed financially to the campaign. As shown in Figure 2, the impact of the vaccination on the reported incidence of measles was immediate.



*Data up to week 36 - Total number of cases=2618
 Source: Ministry of Health

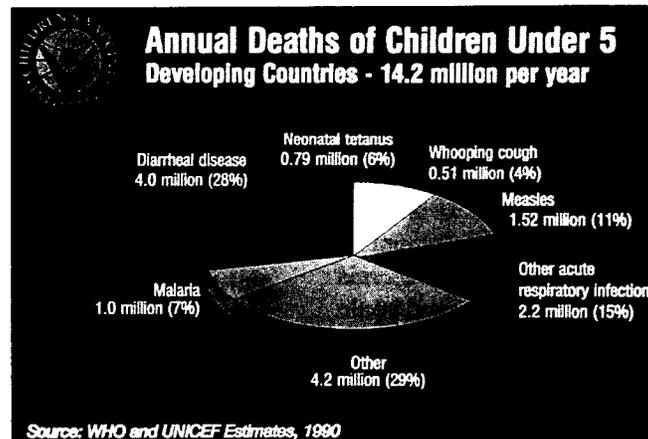
The next phase and challenge is to implement rash and fever surveillance to permit the timely detection of any measles cases and the organization of adequate control measures. Efforts will also be aimed at raising measles vaccine coverage to over 85% for each newborn cohort in order to minimize the build-up of susceptibles.

Children's Vaccine Initiative

The Children's Vaccine Initiative (CVI) was conceived in 1990, and embodies a plan which will allow the world community to apply scientific advances to the development, manufacture, and delivery of improved vaccines in order to benefit children worldwide. At the time of the CVI's conception over fourteen million children under the age of five died every year, over one fourth of these deaths could have been prevented by vaccination.

Timely immunization presently prevents three million children from dying of diseases such as measles, pertussis, and tetanus on a yearly basis. Eight million deaths from other diseases could possibly be avoided by the further development, improvement and application of appropriate vaccines. The CVI, with the support of its primary sponsors, the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the Rockefeller Foundation, the World Bank, the World Health Organization (WHO), and other public and private sector institutions, biomedical researchers, and vaccine manufacturers, is striving to create an immunization package and system which can overcome the obstacles which confront the present effort.

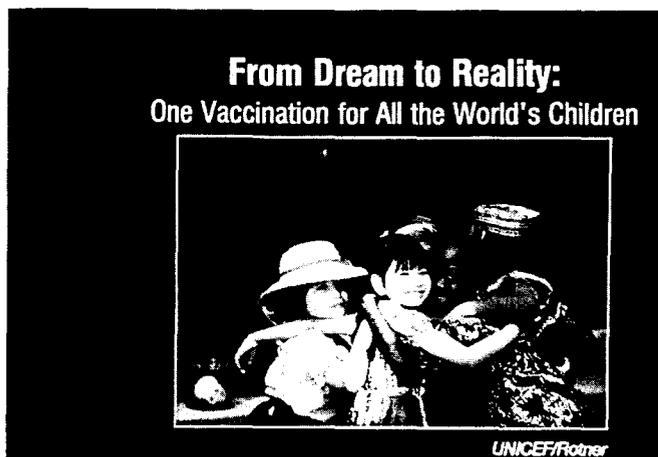
There are many barriers to a successful childhood immunization program. These barriers are elevated when applied to children in isolated areas of developing countries. These are the children most vulnerable to childhood infections. Opportunities for immunization are missed when children are taken to health facilities for illnesses. The necessity of injection further limits vaccine administration potential. Also, many vaccines require booster doses but often children who receive the first dose of a vaccine are not brought back for subsequent doses.



Source: WHO and UNICEF Estimates, 1990

In order to overcome the above barriers, the CVI has developed goals based upon the Declaration of New York, an agreement on global vaccine policy made in September of 1990 at the World Summit for Children. As outlined in these goals, the CVI intends to develop vaccines that require only one or two doses, can be given earlier in life, can be combined (thereby reducing the number of doses and visits required), are more heat stable, are effective against a variety of diseases (including those for which vaccines do not presently exist), and are affordable.

The CVI's original and ultimate objective is being called the "children's vaccine". A vaccine that could be trickled into an infant's mouth in a single dose shortly after birth. A multi-component single vaccine which could, for example, protect against diphtheria, pertussis, tetanus, pneumococcus, *H. influenzae* type B, influenza, hepatitis A and B, Japanese encephalitis, and meningococcus types A and C. Some scientists say such a supervaccine could be available within five to ten years and may change immunization forever.



The basic technology for making a supervaccine already exists, the CVI experts to develop and use improved versions of existing vaccines. A promising new technique for a supervaccine is microencapsulation. A liquid which might be swallowed in one gulp, it would contain several doses of vaccine. The first dose would take effect immediately, subsequent doses would be enveloped in microscopic material which would be taken up by cells that live in the lining of the gut and held there for weeks or months until they dissolve, thus evading the necessity of return visits to health centers for administration of further dosage. This is the same basic technology used in cold medicine time-release capsules.

Another possible strategy in supervaccine development has its roots in the earliest vaccine research. The vaccinia virus (originally used to immunize against smallpox) could be brought out from retirement and genetically altered to immunize against other pathogens. This would be done by transplanting a surface protein gene of the offending virus into the vaccinia virus which would then make and carry that protein along with its own. The vaccinia virus could possibly be engineered to carry genes from various pathogens.

Other research areas include the development of heat resistant vaccines. Already in the works is a heat resistant poliomyelitis vaccine being developed by the Product Development Group on Thermostable Oral Poliovaccine.

The potency of the projected vaccine could be maintained at temperatures of 45 degrees Celsius for at least seven days. Several antiviral compounds have been identified which can stabilize the antigenic structure, but these still fall short of the target. Another approach being explored is the drying of the poliovirus in the presence of the carbohydrate trehalose, this produces a completely stable vaccine when dried but the resulting decline in vaccine potency and virus infectivity must be overcome.

CVI has targeted a number of vaccines currently available as well as unlicensed vaccines for improvement. Figure 1 shows the vaccines and diseases targeted by the CVI initiative.

Figure 1
CVI Target Diseases

EPI vaccines	Unlicensed vaccines likely to be available within the next five years
Tetanus toxoid	Dengue
Heat-stable poliomyelitis	Enterotoxigenic E. coli
Measles	Rotavirus
Pertussis (whooping cough)	
Hepatitis B	
Licensed non-EPI vaccines	Under consideration
Haemophilus influenzae type B	Malaria
Meningococcus	Shigella
Pneumococcus	Tuberculosis
Typhoid	

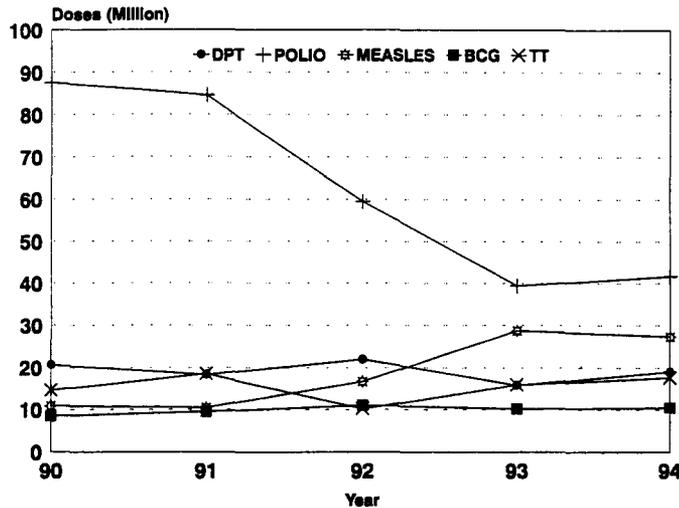
Aside from supervaccine plans and supporting studies to increase vaccine heat stability, the CVI issues a publication three times yearly, *CVI FORUM*, which informs on disease incidence in specific regions and reports on the progress of various disease campaigns. In the latest issue Neonatal tetanus was highlighted with emphasis on the fact that it was formerly a "forgotten disease". It was often overlooked because to protect newborn babies, mothers must be given anti-tetanus shots either before or during pregnancy. A neonatal tetanus elimination strategy is presently underway, eradication, however, is not a viable option. Tetanus is widespread in the environment and therefore an alert for new outbreaks must always be maintained. Neonatal tetanus cannot be "forgotten" again if it is to be kept under control.

The CVI is working to insure that no diseases are forgotten and vaccines are available to all elements of the world's population. Efforts to create a vaccine which would be easy to store and ship, affordable and easy to administer are all worthwhile and achievable goals with modern technology and the work of scientists dedicated to the cause.

Up-date EPI Revolving Fund

The EPI Revolving Fund was created in 1977 by the ministers of health and is now commencing its sixteenth year of operation. The EPI Revolving Fund began operations with a working capital of US \$1 million. Since that time working capital has grown to \$5.6 million.

Graph 1
EPI Revolving Fund Number of
Doses of Vaccines Procured
1990-1994



Graph 1 shows the history of the number of doses that have been procured between 1990 and 1994. The initial procurement of large numbers of doses of polio vaccine reflect polio eradication efforts undertaken by the governments of the Western Hemisphere. By 1993, two years had lapsed since the last case was detected in the Americas (Junin, Peru, 1991). At this time the number of doses of OPV required for vaccination began to decline to its present level of approximately 40 million doses.

The purchase of measles vaccine has increased since 1990 when the initiative to eliminate the transmission of measles in the Western Hemisphere was undertaken by countries in the Region. This is evident especially between 1992 and 1993 when the governments carried out mass vaccination campaigns with measles vaccine as part of the strategy to eliminate all susceptibles between 9 months and 14 years of age.

Vaccine prices have risen since the Revolving Fund began its operations in 1979. Table 1 shows the vaccine prices under contract since the Revolving Fund came into use as well as those that were incorporated at a later time. A comparison of vaccine price changes between 1979, 1990 and 1995 is also made in Table 1.

When one compares the vaccine prices for those vaccines that were under contract at the commencement of operation with the prices in effect for 1995, it is evident that polio

vaccines have experienced the largest price increase, followed by DPT vaccines. Only measles vaccine in 10 dose vials has virtually maintained its original price.

When one compares the vaccine prices of 1990 and 1995, one sees that all vaccines registered substantial price increases.

Table 1
Vaccine Price Changes
1979-1995

VACCINE	COST PER DOSE			% +/- 1979-1995
	1979	1990	1995	
BCG-10		.08	.1191	-
BCG-20	.0465	.041	.0645	38%
DPT-10	.0372	.043	.097	160%
DPT-20	.0365	.0295	.075	105%
DT(A)-10		.03	.083	-
DT(A)-20		.021	.065	-
DT(P)-10		.03	.0795	-
DT(P)-20		.021	.0575	-
MEASLES-1	.33	.275	.6640	101%
MEASLES-10	.14	.075	.1345	-4%
MMR-1		.89	1.20	-
MMR-10		.89	.7250	-
POLIO-10	.022	.0353	.0835	279%
POLIO-20	.01898	.0343	.07	269%
TT-10	.0256	.0224	.0501	95%
TT-20	.02085	.0176	.0364	75%

Despite the rather large price increases over the years, the cost of providing all vaccines (from 10 or 20 dose vials) needed to fully immunize a child is only US \$0.70. If the price of syringes is included, the cost is approximately \$1.00.

This is a small price to pay for preventing disease and possible death of our children. Given the relatively low prices of EPI vaccines, a missed opportunity may be created because a child is not vaccinated due to lack of vaccine in a health establishment, every time a government does not include the cost of vaccines and syringes in the budget of its ministry of health.

The provision of sufficient funds for the procurement of vaccines in a timely manner reduces the overall cost of managing the health care of a sick child. Generally the sick child visits the health establishment for major complaints such as malaria, pneumonia, diarrhea or malnutrition. Preventive health care should be provided at all these encounters. Indeed, all health workers should be instructed to use all sick child encounters to check immunization status and vaccinate when indicated.

Polio Surveillance

Indicators for Evaluating Poliomyelitis Surveillance in Latin America, 1994*

	1	2	3	4
Colombia				
Cuba				
Ecuador				
El Salvador				
Honduras				
Nicaragua				
Paraguay				
Peru				
Venezuela				
Brazil				
Chile				
Guatemala				
Mexico				
Panama				
Bolivia				
Argentina				
Costa Rica				
Dom. Rep.				
Uruguay				
Haiti				

Meet criteria

1. 80% Weekly Reporting Units
2. 80% Investigated within 48 hours
3. 80% of Cases with 2 adequate stool samples taken
4. AFP Rate

* Up to week 31 December
Source: EPI/PAHO (PESS)

Five months have passed since the Region of the Americas was certified polio free. Surveillance for cases of

Acute Flaccid Paralysis (AFP) is still of the utmost importance, however. Congratulations are extended to those countries meeting the surveillance indicator criteria published in this newsletter. It should be the goal of every country to bring surveillance up to the highest possible level. Of particular importance is the third indicator in the chart, the collection of two adequate stool samples within two weeks of paralysis onset in AFP cases. It is a matter of great concern that in some cases two samples are not being taken, this is imperative for accurate diagnosis and reporting. All countries are strongly encouraged to continue reporting and to improve the thoroughness of their reports.

Although wild poliovirus has been eliminated from the Americas, it continues to circulate in other parts of the world. Only with complete and accurate reporting, combined with maintaining high levels of population immunity, can we truly say we have seen the last of polio in the Americas.

The polio indicator chart shows how the countries performed in 1994.

Editor's note: It is of the utmost importance that all governments continue to supply resources for both surveillance and vaccine coverage with OPV. It would be a terrible tragedy for children of the Americas to suffer from imported polio cases after the Region has eliminated the disease.

James P. Grant: In Memoriam

James P. Grant, the crusading director of UNICEF who won the Presidential Medal of Freedom for his efforts to improve children's health around the world, died, two days after resigning for health reasons. He was 72. The cause of death was cancer, according to a statement from the United Nations Children's Fund. It said he died at a hospital in Mount Kisco, N.Y. Grant had been battling the disease for the past few years and his condition had recently deteriorated. His deputy, Richard Jolly, was appointed acting executive director.

As UNICEF Director, Grant emphasized simple, low-cost methods of improving pediatric health, such as immunization and oral rehydration. Since 1980, when he took over as head of UNICEF, the percentage of children receiving immunizations in the developing world has risen from 20 percent to 80 percent.

Grant traveled the world, meeting with more than 100 government leaders. He always carried a packet of oral rehydration salts in his pocket, as well as a note on the number of children killed by preventable diseases. The salts are used to treat children suffering from diarrhea, a leading child killer in developing countries.

"Very few men or women ever have the opportunity to do as much good in the world as James Grant; and very few have ever grasped that opportunity with such complete and dedicated commitment," U.N. Secretary-General Boutros Boutros-Ghali said. "He will be remembered as a most distinguished servant of the United Nations and as one of the greatest international public servants of his generation."

Grant was born in Beijing, China on May 22, 1922. He graduated from the University of California at Berkeley in 1943 and Harvard University Law School in 1951. A U.S. citizen, Grant was a founding member, president and director general of the Overseas Development Council before joining UNICEF. He served in the U.S. Agency for International Development from 1954 to 1969. He was a moving force behind the 1989 U.N. Convention on the Rights of the Child, which UNICEF called a "Magna Charta for Children." The convention recognizes children's political, economic and social rights, and UNICEF said it had been ratified by more nations than any other human rights treaty.

Grant was also a key organizer of the World Children Summit in 1990, which set children's health goals that are now incorporated in the national health plans of some 100

Reported Cases of Selected Diseases

Number of reported cases of measles, poliomyelitis, tetanus, diphtheria, and whooping cough, from 1 January 1994 to date of last report, and the same epidemiological period in 1993, by country.

Subregion and country	Date of last Report	Measles				Poliomyelitis		Tetanus				Diphtheria		Whooping Cough	
		Reported		Confirmed		1994	1993	Non Neonatal		Neonatal		1994	1993	1994	1993
		1994	1993	1994	1993			1994	1993	1994	1993				
LATIN AMERICA															
Bolivia	31 Dec.	...	3 391	...	3 391	0	0	...	...	...	21	...	4	...	245
Colombia	31 Dec.	1 815	9 105	525	9 105	0	0	...	91	...	70	...	45	...	1 271
Ecuador	31 Dec.	3 565	3 627	...	3 627	0	0	...	74	...	81	...	13	...	147
Peru	31 Dec.	581	855	...	855	0	0	...	98	...	120	...	10	...	1 013
Venezuela	31 Dec.	...	20 244	...	20 244	0	0	...	79	...	15	...	0	...	458
Southern Cone															
Argentina	31 Dec.	420	5 048	65	5 048	0	0	...	9	...	5	...	1	...	506
Chile	31 Dec.	205	284	0	1	0	0	...	14	...	1	...	10	...	592
Paraguay	31 Dec.	141	2 066	117	2 066	0	0	...	61	...	33	...	6	...	272
Uruguay	31 Dec.	14	16	...	16	0	0	0	4	...	0	...	0	...	17
Brazil	31 Dec.	1,803	5 830	35	5 830	0	0	...	1 277	...	218	...	256	...	4 750
Central America															
Belize	31 Dec.	28	16	0	0	0	0	...	0	...	0	...	0	...	0
Costa Rica	31 Dec.	281	792	4	273	0	0	...	2	...	0	...	0	...	29
El Salvador	31 Dec.	345	38	0	37	0	0	...	10	...	18	...	0	...	24
Guatemala	31 Dec.	232	278	204	17	0	0	...	12	...	19	...	0	...	123
Honduras	31 Dec.	198	13	1	13	0	0	...	14	...	6	...	0	...	15
Nicaragua	31 Dec.	587	383	3	339	0	0	...	7	...	6	...	0	...	47
Panama	31 Dec.	80	219	3	90	0	0	...	9	...	2	...	0	...	218
Mexico	31 Dec.	993	169	98	169	0	0	...	151	...	97	...	0	...	148
Latin Caribbean															
Cuba	31 Dec.	160	2	0	2	0	0	...	...	...	0	...	0	...	...
Haiti	...	...	...	...	...	0	0	...	...	...	...	...	...	...	...
Dominican Republic	31 Dec.	145	4 637	3	4 637	0	0	...	19	...	0	...	6	...	5
CARIBBEAN															
Antigua & Barbuda	31 Dec.	4	1	0	0	0	0	...	1	...	0	...	...	...	0
Bahamas	31 Dec.	5	2	0	0	0	0	...	0	...	0	...	0	...	0
Barbados	31 Dec.	37	44	0	0	0	0	...	2	...	0	...	0	...	1
Dominica	31 Dec.	13	14	0	0	0	0	...	0	...	0	...	0	...	0
Grenada	31 Dec.	16	8	0	0	0	0	...	0	...	0	...	0	...	0
Guyana	31 Dec.	24	26	0	0	0	0	...	0	...	0	...	0	...	0
Jamaica	31 Dec.	64	0	0	0	0	0	...	6	...	0	...	2	...	0
St. Kitts/Nevis	31 Dec.	5	4	0	0	0	0	...	0	...	0	...	0	...	0
St. Vincent	31 Dec.	2	...	0	0	0	0	...	0	...	0	...	0	...	0
Saint Lucia	31 Dec.	18	20	0	0	0	0	...	1	...	0	...	0	...	0
Suriname	31 Dec.	15	15	0	0	0	0	...	0	...	0	...	0	...	0
Trinidad & Tobago	31 Dec.	18	0	0	0	0	0	...	8	...	0	...	0	...	7
NORTH AMERICA															
Canada	31 Dec.	503	187	503	187	0	0	1	6	...	0	0	4	2 302	6 777
United States	31 Dec.	895	312	895	312	0	0	29	43	...	0	1	0	3 590	6 335

... Data not available.

James P. Grant: In Memoriam (cont.)

nations. In the August 1994 meeting in Washington DC celebrating the Certification of the Eradication of Polio in the Americas, Grant remarked, "...great things can be done within countries with Governments working to provide the leadership in setting goals by consensus, around which elements of society then come together in various ways to make them materialize."



Extracted from: United Nations (AP); The Associated Press.
Photo courtesy of UNICEF/940093/Giacomo Pirozzi

The eradication of polio symbolized for Grant "...a day of jubilation for the children of the world."

Grant is survived by his wife, three sons from his previous marriage, two step-daughters, a step-son and eight grandchildren.

The *EPI Newsletter* is published every two months, in Spanish and English by the Special Program for Vaccines and Immunization (SVI) 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.

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