



EPI Newsletter

Expanded Program on Immunization in the Americas

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IMMUNIZE AND PROTECT YOUR CHILD

October 1980

Epidemiology

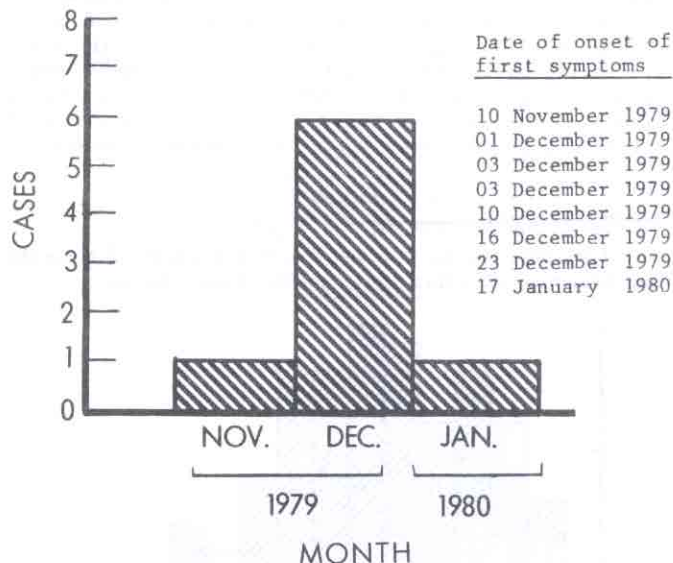
Observations on an Outbreak of Measles in Serrana Municipality, São Paulo State, Brazil

During December 1979 the district public health team of the Ribeirão Preto subregion began to be alarmed at the relatively large number of hospitalized measles cases reported among the resident population of Serrana Municipality, one of the twelve towns in the health district.

The first case occurred in November 1979 and the others were reported during December, except for one which was reported in January 1980. The shape of the outbreak is illustrated in the following bar chart:

Graph 1

Number of hospitalized measles cases in
November and December 1979 and January
1980. Municipality of Serrana, São Paulo State.



Six (75 percent) of the eight hospitalized cases had broncho-pneumonia as a complication.

Dividing the cases among their age groups, as illustrated in Table 1, one finds that the one to four year olds accounted for 62.5 percent of the cases.

Table 1

Hospitalized Measles Cases Reported in November and December 1979 and January 1980 among Residents of Serrana Municipality, São Paulo State

Age Group	Cases	
	Number	%
Under 1 year	1	12.5
1 to 4 years	5	62.5
5 to 14 years	2	25.0
Total	8	100.0

Source: Boletim Epidemiológico Semanal and epidemiological records.

It was found that one case (12.5 percent) had definitely been vaccinated against measles, three (37.5 percent) had not been vaccinated, and in four cases (50 percent) the vaccination history was unknown. These figures are shown in Table 2.

Index

	<u>Page</u>
EPIDEMIOLOGY	
- Observations on an Outbreak of Measles in Serrana Municipality, São Paulo State, Brazil	1
- Measles: United States, First 39 Weeks of 1980	5
- Poliomyelitis: Dominican Republic, 1980	6
COLD CHAIN	
- Developing Alternatives for the Solution of Cold Chain Problems.	6
REPORTED CASES OF EPI DISEASES IN THE AMERICAS.	
	7

Table 2

Vaccination History of the Hospitalized Measles Cases, by Age Groups, Serrana, São Paulo State

Age Group	Vaccinated		Not Vaccinated		Unknown		Total	
	No.	%	No.	%	No.	%	No.	%
Under 1 year	-	-	-	-	1	12.5	1	12.5
1 to 4 years	1	12.5	2	25.0	2	25.0	5	62.5
5 to 14 years	-	-	1	12.5	1	12.5	2	25.0
Total	1	12.5	3	37.5	4	50.0	8	100.0

Source: Boletim Epidemiológico Semanal and epidemiological records.

These data pointed to an outbreak of measles, which warranted an investigation to determine the real situation so that practical and effective control measures could be taken.

The period studied comprised the months of November and December 1979 and up to the 28th day of January 1980. The survey of the occurrence of cases in the community consisted of a single house-to-house inquiry about cases of measles and other pertinent data for the period in question.

It was found at the outset that seven of the eight measles cases hospitalized during those months came from the same quarter in the town of Serrana: the one most distant from the center and inhabited by the poorest members of the community.

Table 3 illustrates the distribution of the measles cases discovered, by age group, and the attack rates based on the estimated population.

Table 3

Cases of Measles Occurring in November and December 1979 and January 1980, by Age Groups, Estimated Associated Populations, and Attack Rates per 100,000 Residents of the Town of Serrana, São Paulo

Age Group	No. of Cases	Estimated Population	Attack Rate
0 to 4 years	57	1,189	4.8
5 to 9 years	56	1,242	4.5
10 to 14 years	23	1,130	2.0
15 years and older	4	5,096	0.8
Total	140	8,657	1.6

Source: Household epidemiological survey.

The ages in months of the cases among infants under one year of age are given in Table 4.

Table 4

Distribution of Cases of Measles among Infants under One Year, by Age in Months, During the Outbreak of Measles in Late 1979 and January 1980 in the Town of Serrana, São Paulo State

Age	No. of Cases	%
1 month	-	-
2 months	-	-
3 months	-	-
4 months	1	12.5
5 months	-	-
6 months	2	25.0
7 months	-	-
8 months	-	-
9 months	3	37.5
10 months	1	12.5
11 months	1	12.5
Total	8	100.0

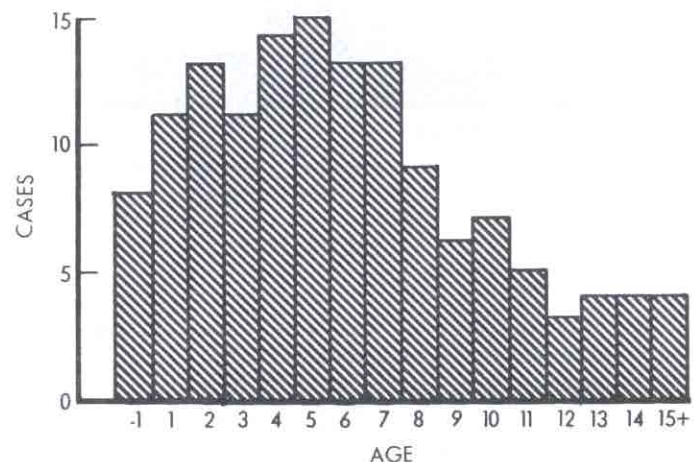
It will be noted that three of the eight cases (37.5 percent) were infants under nine months of age, and eight of the 140 cases (5.7 percent) were under one year of age.

Among the 140 cases there were three deaths from measles, which gave a case fatality rate of 2.1 percent and a mortality rate of 34.7 per 100,000 inhabitants. One of the deaths was of an infant under one year of age and two were in the one-to-four year group. No deaths occurred among the hospitalized patients.

The age distribution of the cases is given in Graph 2, which shows the number of cases at each year of age. The graph shows that the age group most heavily attacked was that of children between one and eight years old. This does not bear out the conventional wisdom that children between the ages of 18 and 30 months are the most frequently attacked in measles epidemics, particularly among the more indigent populations, as was the case in Serrana. Moreover, the outbreak occurred during the summer months, which is not surprising in hot areas where the disease is endemic.

Graph 2

Number of measles cases, by age in years, which occurred in the city of Serrana, São Paulo State, during the months of November and December 1979 and January 1980. Total: 140 cases.



In the survey to detect cases among the population, an attempt was made to discover the measles vaccination history of each individual; the results are presented in Table 5. As can be seen, the proportion of measles cases among vaccinated individuals was relatively high (17.1 percent). In 68.6 percent of the cases the patient had not been vaccinated, and in 14.3 percent the vaccination history was unknown.

Table 5

Vaccination History of Measles Cases Occurring in November and December 1979 and January 1980, by Age, among Residents of Serrana Municipality, São Paulo State

Age	Vaccination History							
	Vaccinated		Not Vaccinated		Unknown		Total	
	No.	%	No.	%	No.	%	No.	%
Under 1 year	1	0.7	5	3.6	2	1.4	8	5.7
1 year	2	1.4	9	6.4	-	-	11	7.9
2 years	5	3.5	7	5.0	1	0.7	13	9.3
3 years	1	0.7	8	5.7	2	1.4	11	7.9
4 years	4	2.9	7	5.0	3	2.1	14	10.0
5 years	4	2.9	7	5.0	4	2.9	15	10.7
6 years	2	1.4	8	5.7	3	2.1	13	9.3
7 years	4	2.9	7	5.0	2	1.4	13	9.3
8 years	-	-	8	5.7	1	0.7	9	6.4
9 years	1	0.7	5	3.6	-	-	6	4.3
10 years	-	-	7	5.0	-	-	7	5.0
11 years	-	-	5	3.6	-	-	5	3.6
12 years	-	-	1	0.7	2	1.4	3	2.1
13 years	-	-	4	2.9	-	-	4	2.9
14 years	-	-	4	2.9	-	-	4	2.9
15 years and more	-	-	4	2.9	-	-	4	2.9
Total	24	17.1	96	68.6	20	14.3	140	100.0

Source: Household epidemiological survey.

A more detailed study was performed in order to correlate the ages at which the patients had been vaccinated against measles and the ages at which they contracted the disease. The results are given in Table 6. Roughly speaking, four cases may be disregarded because they were vaccinated at the same age at which they contracted measles--one at nine months, one at one year and two at two years of age. Since the precise dates on which they were vaccinated and on which they contracted the disease are unknown, it cannot be reliably determined whether the infection emerged before the vaccination could confer immunity (assuming, of course, that the vaccine administered was potent).

Disregarding the four cases who caught measles at the same age at which they were vaccinated, there remain 14 cases out of 20 (70 percent) who were vaccinated at the age of seven months or younger and who then contracted the disease.

The vaccination coverage was found to be adequate in the one-to-four year age group, but inadequate in those under one year of age and low in the five-to-fourteen year age group. This can be seen in Table 7 which illustrates the results of a survey among 726 inhabitants of the area of the town at highest risk of infection.

Table 7

Coverage of Measles Vaccination in a Sample of Residents of the Highest Risk Area in Serrana, São Paulo State, January 1980

Age Group	Population Studied	No. Vaccinated			
		1 dose	%	Booster	%
Under 1 year	12	4	33.3	-	-
1 to 4 years	88	59	67.0	11	12.5
5 to 14 years	211	34	16.1	2	0.9
15 years and +	415	0	-	0	-
Total	726	97	13.4	13	1.8

Source: Household investigation.

Table 6

Comparison between Age of Vaccination against Measles and Age at which the Disease was Subsequently Contracted - Cases During November and December 1979 and January 1980. Serrana, São Paulo State

Age at vaccination \ Age at illness	2 Months		6 Months		7 Months		8 Months		9 Months		10 Months		1 Year		2 Years		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
9 months	-	-	-	-	-	-	-	-	1	4.2	-	-	-	-	-	-	1	4.2
1 year	-	-	-	-	-	-	-	-	1	4.2	-	-	1	4.2	-	-	2	8.3
2 years	-	-	-	-	3	12.5	-	-	-	-	-	-	-	-	2	8.3	5	20.8
3 years	-	-	-	-	1	4.2	-	-	-	-	-	-	-	-	-	-	1	4.2
4 years	-	-	1	4.2	3	12.5	-	-	-	-	-	-	-	-	-	-	4	16.7
5 years	-	-	2	8.3	2	8.3	-	-	-	-	-	-	-	-	-	-	4	16.7
6 years	-	-	-	-	1	4.2	-	-	-	-	-	-	1	4.2	-	-	2	8.3
7 years	1	4.2	-	-	-	-	1	4.2	-	-	1	4.2	1	4.2	-	-	4	16.7
8 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4.2	1	4.2
10 years and +	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1	4.2	3	12.5	10	41.7	1	4.2	2	8.3	1	4.2	3	12.5	3	12.5	24	100.0

Source: Household epidemiological survey.

The survey data in Table 7 on children under one year of age diverge markedly from the data on children in the same age group vaccinated during 1979 in the entire population, according to information of the local health unit as presented in Table 8.

Table 8

Monthly Measles Vaccination Coverage of Children under One Year of Age* During 1979 in Serrana, São Paulo State. Population Officially Estimated at 219 Children

Month	No. Vaccinated	Cumulative Percentage
January	10	4.6
February	18	12.8
March	24	23.7
April	19	32.4
May	18	40.6
June	25	52.0
July	38	69.4
August	28	82.2
September	32	96.8
October	29	110.0
November	46	131.0
December	25	142.5
Total	312	142.5
Monthly Average	26	11.9

*Vaccination performed beginning at seven months of age.

Source: Vaccination records of the local health unit.

According to the previous table, the vaccination coverage of children under one year of age was excellent, even having exceeded the officially estimated population in the age group. This excess may be accounted for by the influx of immigrants from rural areas in the neighboring states of Minas Gerais and Paraná, attracted by extensive cane plantations and a large sugar mill operating in the area.

In any event, it is clear that a substantial part of the population under one year of age residing in the measles outbreak area under consideration did not receive the preventive care offered by the Secretariat for Health. Actually, such pockets of unvaccinated residents of poor urban areas are not uncommon, even in highly developed countries, as has been well documented in the literature.

In view of a clearly epidemic situation, the district health team decided to intensify its vaccination against measles, particularly among the population regarded as being at highest risk by the standards of the Epidemiological Surveillance System of the State Secretariat for Health. Susceptible children between seven months and five years of age were vaccinated and

booster shots were given to individuals between one and fourteen years of age, as shown in Table 9.

Table 9

Distribution of First Dose and Booster Shot of Measles Vaccine Administered, by Age Group, Between 17 and 28 January 1980 in Serrana, São Paulo State

Age Group	1st dose		Booster	
	No.	%	No.	%
Under 1 year*	36	30.5	-	-
1 to 4 years	70	59.3	58	48.3
5 to 14 years	12	10.2	62	51.7
Total	118	100.0	120	100.0

*Beginning at seven months of age.

Source: Records of the local health unit.

Of the 238 doses of vaccine administered, 122 (51.3 percent) were given on the premises of the local health unit and 116 (48.7 percent) in epidemiological field work.

The percentage of unvaccinated individuals in the Ribeirão Preto region remains high for two reasons: measles vaccination was only recently begun (in 1971) and its administration has been predominantly static. Moreover, until 1979 all children seven months and older were given only one dose. At the end of 1979 this practice was modified to include the administration of a booster shot, beginning at 15 months of age, to all children who had received their first dose before reaching one year of age.

Source: Germano Neto, J., public health physician, Technical Director; Freitas S.B., public health nurse; and Santos, M.T., public health educationist, all of Ribeirão Preto, Health District, São Paulo, February 1980.

Editor's Note

A study to determine the optimum age for measles vaccination is in progress under the auspices of PAHO/WHO and four Latin American countries, including Brazil (see *Boletim Epidemiológico* XI(14), 1979). This study is necessary because, unlike temperate-zone countries where hereditary immunity is retained for up to one year or slightly longer after birth, in tropical countries it is lost earlier.

Source: *Boletim Epidemiológico* XII(5):42-51, 1980, published by the Fundação Serviços de Saúde Pública, Ministério da Saúde, Brasil.

Measles: United States, First 39 Weeks of 1980

As of 27 September 1980 (the 39th reporting week), investigations by immunization project¹ staff revealed only one active chain of transmission² of measles in the United States. Projects in 15 other counties throughout the country reported isolated cases that were not associated with documented spread (Figure 1).

Figure 1
U.S. Counties* with measles, week ending 27 September 1980
(39th reporting week)



*In CALIFORNIA: Contra Costa, Glenn, Imperial, Los Angeles, San Diego, San Francisco, and Tulare counties; FLORIDA: Broward and Pinellas counties; ILLINOIS: McLean; MISSOURI: Gentry; NEW YORK: Kings; OHIO: Columbiana; TEXAS: Harris and Uvalde; VIRGINIA: Warren; WISCONSIN: Marathon.

The single outbreak, which began 9 September and is still being investigated, occurred in Warren County, Virginia. The index patient was a 15-year-old girl, who had been exposed to the disease in England. A rash developed after she returned to Virginia on 9 September. Four of her siblings subsequently had onset of measles from 18-21 September. An additional 27 suspected cases --all in persons attending the same private day school in Rappahannock County--are being investigated in five contiguous counties.

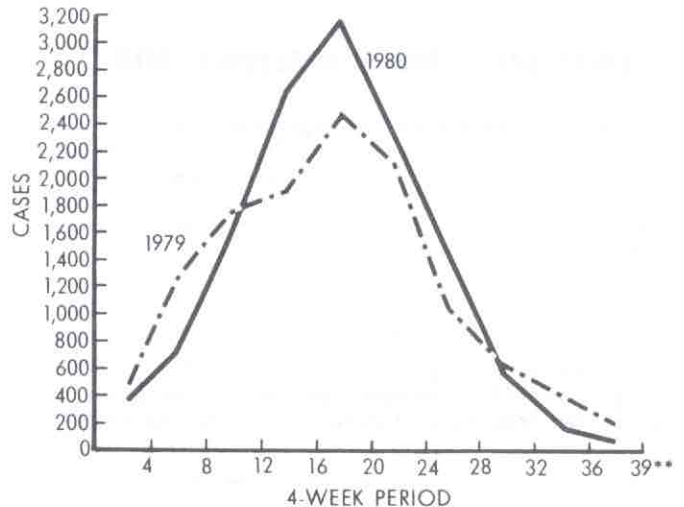
Nationwide, 12,881 cases of measles were reported for the first 39 weeks of this year. This is second only to last year's total (12,207) as being the lowest ever recorded for a comparable period. Actually, the incidence of measles this year has been lower than in 1979 for all periods except 23 March-12 July (weeks 13-29, Figure 2). For 9 of the last 11 weeks, the

¹State or local health jurisdictions which have been awarded federal funding for immunization programs.

²An active chain of transmission is one in which there are two or more epidemiologically linked cases, and less than four weeks has elapsed since onset of rash in the last known case.

reported numbers of cases have been record lows, and the 23 cases reported in week 39 were the fewest ever reported for a single week.

Figure 2
Reported measles cases, by 4-week period, 1979-1980*



*Through the 39th reporting week.

** 3-week period

Thirty-one states and the District of Columbia have not reported any measles cases in the last four weeks. Since 1 January 1980, 41 states and the District of Columbia have not reported any cases of measles for at least a 4-week period. Only Arizona, California, Florida, Illinois, Minnesota, New York, Ohio, Texas, Wisconsin, and New York City have not had as many as four consecutive measles-free weeks this year.

During the first 39 weeks of 1980, 20 states had a measles incidence of $>10/100,000$ among persons <18 years old, whereas 24 states reported such rates in 1979. Thus far in 1980, nine states have reported a measles incidence of $<1/100,000$, as did only five states in the same period last year.

Reported by R.S. Wood, MD, G.A. Dengel, MD, P.D. Pedersen, MD, Warren County Health Dept; J. Einardon, MD, Rappahannock County, Virginia; G. Miller, MD, State Epidemiologist, Virginia State Dept. of Health; and Immunization Div., Bur. of State Services, CDC.

Editorial Note

The record low numbers of reported cases of measles in recent weeks and the fact that there is only one known active chain of transmission in the United States indicate that transmission of measles has been interrupted throughout most of the country. Intensive measles outbreak control efforts are thus even more important in the few areas still reporting measles. Prompt attention should be paid to reports of isolated cases since they may develop into continuing outbreaks. An integral part of measles outbreak control programs should be the exclusion of students who do not have valid evidence of measles immunity not only from the

schools reporting measles cases, but also from other schools in the area that are at risk of measles introduction³.

Source: Morbidity and Mortality Weekly Report 29(40): 501-502, 1980. Center for Disease Control, Public Health Service, Atlanta, Georgia.

Poliomyelitis: Dominican Republic, 1980

Between 1 January and 30 September 1980, a total of 93 cases of paralytic poliomyelitis were reported in the Dominican Republic. These cases came from 11 of the country's 27 provinces; their monthly distribution is shown in Table 1. The highest number of cases occurred in July and led to stepped-up control activities.

Table 1

Number of reported cases of paralytic poliomyelitis, by month of onset of symptoms
Dominican Republic: 1 January - 30 September 1980

Months	Number	%
January	1	1.1
February	1	1.1
April	1	1.1
May	10	10.7
June	18	19.4
July	28	30.1
August	22	23.6
September	12	12.9
TOTAL	93	100.0

The distribution of cases by age group shows that 94.6% of them occurred in children under 2 years of age (Table 2), and 92.5% occurred in children who had not received the complete schedule of three doses of vaccine (Table 3).

Table 2

Distribution of cases of paralytic poliomyelitis by age group
Dominican Republic: 1 January - 30 September 1980

Age Group	Number	%
Less than 1 year	45	48.4
1-2 years	43	46.2
3-4 years	3	3.2
5 years or more	2	2.2
TOTAL	93	100.0

³Reference: MMWR 27:427-430, 435-437, 1980.

Table 3

Vaccination history of cases
of paralytic poliomyelitis
Dominican Republic: 1 January - 30 September 1980

No. of doses	No. of cases	%
0 doses	38	40.9
1 "	42	45.2
2 "	6	6.4
3 "	4	4.3
3 " + 1 booster shot	1	1.1
Unknown	2	2.1
TOTAL	93	100.0

The 93 reported cases represent an incidence rate of 2.53 per 100,000 population. Of the 93 persons, 5 died from causes attributable to poliomyelitis, which is equivalent to a case fatality rate of 5.37%.

So far, all the information provided is based on clinical diagnoses of paralytic poliomyelitis. For purposes of laboratory confirmation, stool specimens and matched blood specimens from the patients were sent to the Center for Disease Control, Atlanta, Georgia. The results are not yet available.

Three additional cases reported as paralytic poliomyelitis were ruled out as such by the Santo Domingo Rehabilitation Center.

Source: Division of Epidemiology, State Secretariat of Public Health and Welfare, Dominican Republic.

Cold Chain

Developing Alternatives for the Solution of Cold Chain Problems

The cold chain is one of many concerns facing countries in the Region in their efforts to expand immunization services. EPI Program Managers may find themselves faced not only with the lack of proper cold chain equipment but also with insufficient funds to remedy the deficiencies. Consequently, countries must make maximum use of already available resources in order to establish an adequate cold chain system.

Peru is one country which has made innovative use of locally available materials by developing a vaccine cold box from shipping containers. In collaboration with PAHO, Peru has produced a cold box for the transportation of vaccines by recycling the shipping containers in which measles vaccine is received from the supplier. The containers for measles vaccine are used because they afford the proper amount of polyurethane insulation.

Reported Cases of EPI Diseases in the Americas

NUMBER OF REPORTED CASES OF MEASLES, POLIOMYELITIS, TETANUS, DIPHTHERIA AND WHOOPING COUGH
FROM 1 JANUARY THROUGH THE LAST PERIOD REPORTED IN 1980
AND FOR THE COMPARABLE PERIOD IN 1979, BY COUNTRY

COUNTRY	DATE OF LAST REPORT	MEASLES		POLIOMYELITIS		TETANUS		DIPHTHERIA		WHOOPING COUGH	
		1980	1979	1980	1979	1980	1979	1980	1979	1980	1979
ARGENTINA	19 Apr.	1,096	1,287	23	1	64	75	31	43	7,466	5,325
BAHAMAS	25 Oct.	458	1,505	-	-	3	2	-	-	15	-
BARBADOS	4 Oct.	26	12	-	-	10	6	10	12	-	2
BOLIVIA	23 Feb.	258	360	1	138	18	23	10	4	233	131
BRAZIL	31 May	19,908	15,352	845	934	944	1,017	1,587	1,896	13,627	9,908
CANADA	6 Sep.	12,411	21,455	-	2	...	...	46	52	1,456	1,353
CHILE	16 Aug.	2,603	17,131	-	-	14	...	181	241	680	239
COLOMBIA	15 Jun.	3,769	10,529	53	309	288	...	162	95	3,664	5,838
COSTA RICA	18 Oct.	930	5,411	-	-	9	20	-	-	803	199
CUBA	13 Sep.	3,143	6,513	-	1	19	21	-	-	81	125
DOMINICA	26 Jul.	-	177	1	-	2	1	1 ^{a)} b)	-	1	-
DOMINICAN REP.	31 Mar.	3,132	1,411	93 ^{c)}	9 ^{c)}	31	33	82	50	88	27
ECUADOR	2 Aug.	1,257	3,192	5	5	59	40	4	7	599	1,316
EL SALVADOR	4 Oct.	1,458	9,761	7	1	57	91	- ^{d)}	-	559	719
GRENADA	18 Oct.	53	2	-	-	-	2	1	-	2	6
GUATEMALA	16 Aug.	1,798	2,795	47	24	47	36	5	1	1,036	877
GUYANA	23 Aug. ^{a)}	448	126	...	...	9	2	1	4	...	...
HAITI	20 Sep.	143	253	4	-	101	56	6	5	413 ^{d)}	182
HONDURAS	27 Sep.	3,282	3,946	3	221	21 ^{b)}	34	2	2	1,834	1,882
JAMAICA	16 Aug.	18	81	-	-	7	9	4	6	8	33
MEXICO	31 May	17,978	17,737	348	262	257	266	4	4	2,207	2,923
NICARAGUA	... ^{e)}	...	156	...	-	...	-	...	2	...	175
PANAMA	30 Aug.	1,383	3,676	-	-	20	25	-	-	429	426
PARAGUAY	27 Sep.	476	792	7	14	143	133	4	1	719	547
PERU	13 Sep.	4,917	2,517	94	41	178	123	131	81	2,240	6,994
SAINT LUCIA	11 Oct.	32	4	-	-	1	5	-	1	-	1
SURINAME	22 Mar.	-	-	-	-	-	-	-	1	-	-
TRINIDAD & TOBAGO	27 Sep.	264	364	-	-	19	22	-	1	9	28
U.S.A.	1 Nov.	13,095	12,588	8 ^{f)}	25 ^{g)}	60	59	4	58	1,419	1,164
URUGUAY	31 Jul.	83	902	-	1	7	7	-	-	126	148
VENEZUELA	11 Oct.	7,173	17,977	-	51	...	-	10	1	2,099	1,387

a) Source: CAREC Surveillance Report, September 1980.

b) Data through 20 September.

c) Source: Secretariat of Public Health and Welfare, 30 September 1980.

d) Data through 30 August.

e) Data not available for 1980.

Data for 1979 through last epidemiological period in October.

f) Six paralytic cases.

g) Twenty-one paralytic cases.

- No cases

... Data not available

The original container, before undergoing the conversion process, is shown in Figure A. It is converted by recovering the interior and exterior with fiberglass and applying a rigid polyester resin. The lid of the container is made of wood and is also covered with fiberglass. The lid is then attached by means of a piano-type hinge. Finally, handles are embedded into the fiberglass and a padlock is attached.



Figure A

Original measles vaccine shipping container

The converted container is shown in Figures B and C. The internal dimensions of the container are 48 x 40 x 34.5 cm, while the exterior measures 63.5 x 56.5 x 52.5 cm. The container has 10.16 cm. of polyurethane insulation and weighs 9 kilos.

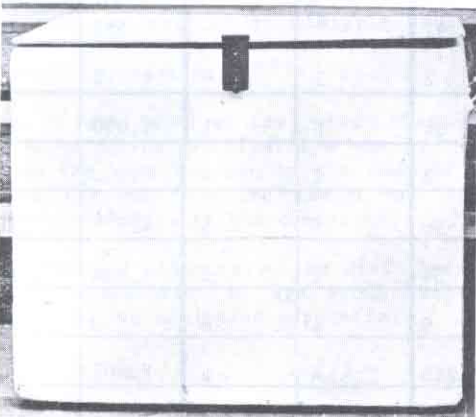


Figure B

Shipping container converted into cold box (exterior view)

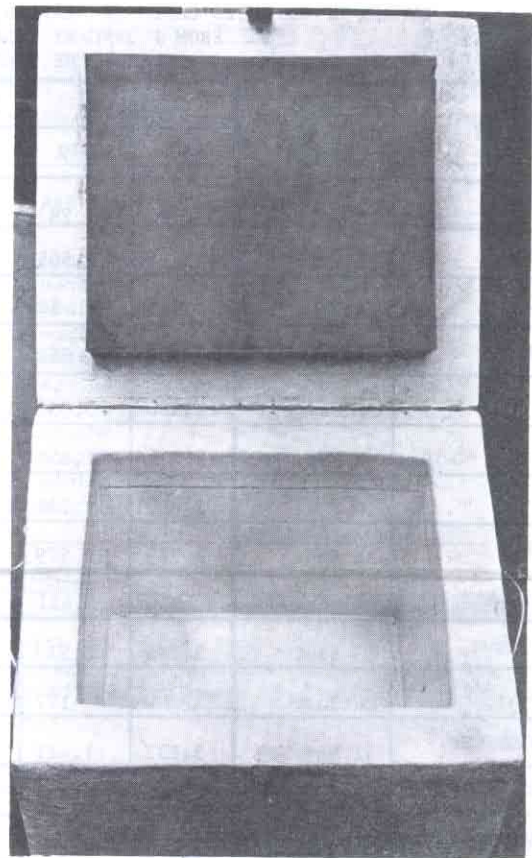


Figure C

Shipping container converted into cold box (interior view)

The container has been shipped to CIMDER, the Regional Cold Chain Center in Cali, Colombia, for testing in order to determine its cold life and robustness. Preliminary tests carried out in Peru indicate the converted container may have an excellent cold life. The results of the CIMDER tests will be published in the EPI Newsletter as soon as they are available.

The EPI Newsletter is a periodic publication prepared by the Expanded Program on Immunization (EPI) of the Pan American Health Organization, Regional Office for the Americas of 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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