



# EPI Newsletter

## Expanded Program on Immunization in the Americas

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IMMUNIZE AND PROTECT YOUR CHILD

February 1983

### Colombia Undertakes Second EPI Evaluation

Colombia's Ministry of Health undertook its second multidisciplinary EPI evaluation between 31 May and 11 June 1982, following one of the recommendations made in the first evaluation in November 1980.

The main objectives of the second evaluation were to review the current program in light of the recommendations made in the previous evaluation and identify new problems that may be impeding program success.

As can be seen in Table 1, vaccination coverage has increased between 25 and 100 percent since the last evaluation, exceeding the 15 percent increase which had been set as the target.

TABLE 1. Percent vaccination coverages in children under 1 year and pregnant women, and percent increase in coverage achieved. Colombia, 1980-1981.

Vaccine	Coverage (%)		Coverage increase (%)
	1980	1981	
DPT III	16.0	20.0	25
Poliomyelitis III	16.1	22.2	38
Measles	13.1	25.5	95
BCG	45.0	56.7	26
TT (pregnant women)	2.5	5.9	136

One factor contributing to the increased coverage was the development of an alternative strategy to permit the vaccination of the entire susceptible population, in view of the low coverages achieved using the house-to-house and mass vaccination strategies. The new strategy, called "canalización" (channeling) is carried out at the operational level of the health system with the active participation of health and community workers. It is so named because persons are "channeled" from their homes to the vaccination posts.

The strategy basically works as follows: The health worker is assigned a sector to be covered in three months, which is further subdivided into work areas which can be covered in a single day. Together with a local community leader, the health worker makes house-to-house visits to

obtain census data and vaccination histories of all children under 4 years and pregnant women; at the same time an appointment is made for those household members who require immunization to go to the vaccination post. The community leader accompanies the women and children to the vaccination post, and later makes followup visits to those persons who fail to keep their appointments. At the end of three months the health worker will have covered the entire sector, and will begin the process again for subsequent vaccine doses.

This strategy has resulted in an efficient distribution of available resources and intensive community participation.



Rural health worker takes census data during home visit and makes appointment for mother to take unvaccinated children to vaccination center. (Photo: Julio Vizcarra Brenner/PAHO)

While there has been an increase in the vaccination coverage levels in children under 1 year, the proportion of polio vaccinations performed in this age group has not increased as compared to those performed in the 1-3 year-old age group (see Table 2).

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**TABLE 2. Number and percentage of polio vaccinations performed, by age group. Colombia, 1980-1981.**

Age group	1980		1981	
	No. of doses	%	No. of doses	%
Less than 1 year	116,871	37.0	166,349	28.0
1-3 years	195,441	63.0	426,377	72.0

The evaluation team also found that high desertion rates remain a major problem. Table 3 compares the dropout rates between doses of DPT and poliomyelitis vaccine in 1980 and 1981.

**TABLE 3. Percent vaccination coverages in children under 1 year and dropout rates between first and third doses of DPT and poliomyelitis vaccines. Colombia, 1980-1981.**

Vaccine	1980		1981	
	% coverage	% drop-out rate	% coverage	% drop-out rate
DPT I	39.8		57.1	
DPT III	16.0	60	20.0	65
Poliomyelitis I	41.6		62.4	
Poliomyelitis III	16.1	62	22.4	65

One problem that has made it difficult to interpret data properly has been the unreliability of baseline population estimates. This was noted in the previous evaluation, however the Ministry was not able to carry out the recommended survey to determine baseline population estimates. Therefore, as part of an effort to obtain such data, the evaluation team carried out a survey of vaccination coverages in one department. The following vaccination coverages in children under 1 were reported: BCG, 60 percent; measles, 46 percent; DPT III, 39 percent; and poliomyelitis III, 41 percent. These coverages are greater than those reported by the health services, perhaps because the latter tend to overestimate population groups. It would be interesting to know if this finding could be extrapolated to the rest of the country. In 1983 it is expected that the Ministry will carry out a national survey.

While it is difficult to begin to assert the causal relation of whether an immunization program is having the desired impact on disease reduction, the number of reported cases is obviously an important indicator. Table 4 compares the morbidity figures for 1980 and 1981. Despite the improvement in coverages in the 0-3 year age group (shown in Table 2), the morbidity rates of measles and poliomyelitis continue to increase.

It can also be seen in Table 4 that the magnitude of the neonatal tetanus problem is still unknown. One of the recommendations for 1982-1983, also made in the first evaluation, is to determine the incidence of neonatal tetanus, especially in high-risk areas.

While Colombia's immunization program still has problems with low vaccination coverages and high desertion rates, and has yet to have a significant impact on

**TABLE 4. Morbidity rates (per 100,000 population) of EPI diseases. Colombia, 1980-1981.**

Disease	Morbidity rate	
	1980	1981
Measles	35.1	116.8
Whooping Cough	29.2	23.2
Poliomyelitis	0.5	2.1
Tetanus (all ages)	2.3	2.1
Neonatal tetanus	...	...
Diphtheria	1.0	0.5
Tuberculosis	84.6	83.5

... Information not available

morbidity, its achievements in other program areas should permit greater progress towards controlling the EPI diseases in 1983-1984. Some of these achievements are listed below:

*Human resources:* An increase in the number of technical personnel; more rational utilization of existing human resources; better participation of local health workers in program activities.

*Surveillance and information system:* A simplified manual on epidemiological surveillance for the EPI has been distributed; a monthly telephone reporting system has been instituted for the notification of EPI diseases.

*Cold chain:* The cold chain has been established at the local level in 80 percent of the country; cold chain norms regarding distribution of vaccine temperature monitoring, use of proper equipment and vaccine storage are being observed in a majority of the health departments; the National Institutes of Health has an ongoing program of vaccine quality control; the Ministry is constructing new cold rooms for the storage of vaccine at the national level; a refrigerator truck has been added to the cold chain to transport vaccine from the national to the regional level.

*Training:* Since 1980 Colombia has held 16 EPI courses which have trained 1,129 health staff. The Health Ministry has used meetings to further the training process and continuing education, especially in relation to the new strategy of channeling.

*Financial and related program resources:* The budget available for the EPI has been increased threefold. The supply of vaccines and related equipment (e.g., needles and syringes) has been sufficient.

*Supervision:* The Ministry of Health has standardized the methodology for supervision by preparing standard forms and publishing a supervisory guide for central-level use. The personnel and resources for supervision have been increased which has led to an increase in the frequency and coverage of supervision.

*Coordination:* While the mechanism for coordinating and integrating the EPI with other health providers has not been fully effected, the national program has made advances in coordinating the implementation of the EPI with the programs of mother child health, human resources and primary health care within the Ministry. The EPI

has also established contact with the national pediatric society and national universities in order that these institutions may become informed about EPI norms and goals.

Although the achievements outlined above are necessary in order to assure the availability of immunization services, the following problems were identified as major constraints to the program:

*Resources:* Inadequate distribution of program funds within the national health services; insufficient human resources to allow increased immunization coverage; lack of the necessary resources to permit adequate supervision and training of personnel.

*Training:* Lack of training in the maintenance and repair of cold chain equipment; insufficient training of health staff in establishing community contact and stimulating community participation.

Colombia was the first country in the Region of the Americas to have a followup EPI evaluation. The continuous process of evaluation is important so that countries can identify the principal problems which are impeding program progress. Based on the study of possible solutions, the countries can then design a plan of action to improve the program. It is this evaluative process that the Colombian Ministry of Health has used to assess their progress towards the goal of providing immunization services to all children by 1990.

A copy of the complete report on Colombia's second EPI evaluation can be obtained from the national EPI program manager at the following address:

Dr. Enrique Silva  
 Jefe, Grupo de Inmunizaciones  
 Ministerio de Salud (Of. 604)  
 Calle 16, Nr. 7-39  
 Bogotá, Colombia

Source: Ministry of Health, Colombia.

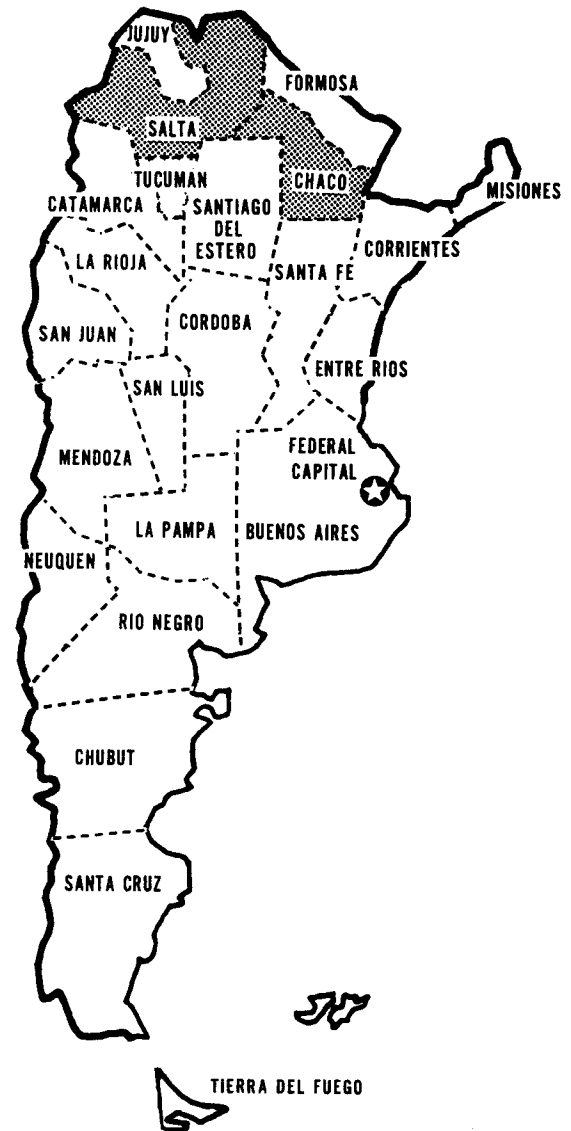
## Polio Surveillance: Argentina


During October 1982 Argentina reported three cases of poliomyelitis from two of its northern provinces, Salta and Chaco (see Figure 1). Case details are shown in Table 1.

Control measures were instituted and surveillance activities intensified in the last quarter of 1982. In the latter part of December two suspected cases were detected in a private clinic in Salta, but investigation showed the cases were not poliomyelitis.

On 11 January 1983 six cases compatible with poliomyelitis were detected in San Martín, Chaco Province, the first one with onset in the last week of December 1982. Intense outbreak investigation and containment measures were immediately instituted by provincial health authorities, aided by a team of central-level epidemiologists, and an additional eight cases were detected, seven in the same area and one in Salta Province.

FIGURE 1. Provinces reporting poliomyelitis cases. Argentina, January - October 1982.



 Provinces reporting polio cases

The date of onset for the last detected case was 17 January 1983. Seventy-eight percent of the cases occurred in children less than 3 years old; only three cases had a history of complete immunization. Two deaths were reported in the outbreak.

Laboratory confirmation of the 14 cases is being con-

TABLE 1. Data on reported poliomyelitis cases. Argentina, October 1982.

Age	Sex	Date of onset	Vaccination history	Province	Laboratory confirmation
14 months	F	Sept. 1982	3 doses	Salta	Type I
7 months	F	Sept. 1982	1 dose	Chaco	Type II
4 years	F	Sept. 1982	0 doses	Chaco	Type I

ducted by the Malbrán Institute in Buenos Aires. Three cases have already been confirmed as poliovirus type I. Further details on the cases are given in Tables 2, 3 and 4.

Immunization coverage for Chaco Province is about 55 percent, and between 30 and 45 percent in San Martín.

**TABLE 2. Number of poliomyelitis cases and deaths, by week of onset. Argentina, Dec. 1982 - Jan. 1983**

Year	Week of onset	Number of cases	Number of deaths
1982	Week 52	4	1
1983	Week 1	3	1
1983	Week 2	3	—
1983	Week 3	4	—

— None

**TABLE 3. Number of poliomyelitis cases, by age group. Argentina, Dec. 1982 - Jan. 1983**

Age group	Number of cases	Cumulative percent
Less than 1 year	2	14
1 year	5	50
2 years	4	78
3 years and older	3	100

**TABLE 4. Number of poliomyelitis cases, by vaccination history. Argentina, Dec. 1982 - Jan. 1983**

Number of doses	Number of cases	Percent
None	3	21
One	6	43
Two	2	14
Three or more	3	21

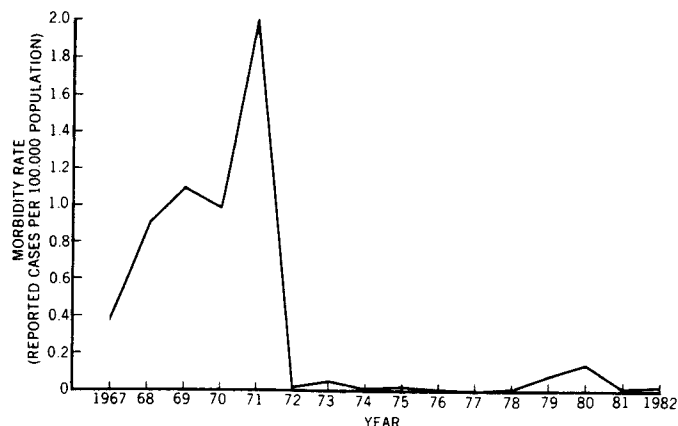
**Source:** Ministry of Public Health and Social Welfare, Argentina.

**Editorial note:** Argentina has one of the better national immunization programs in the Region of the Americas. Nationwide, the coverage of children under 1 year with poliomyelitis vaccine is about 80-90 percent. This high coverage has been achieved through routine delivery of immunizations by all health facilities in the country, supplemented by three yearly intensification phases directed to all children under 3 years of age.

The last major polio outbreak in Argentina occurred in 1971, when over 500 cases were reported; the strategy outlined above was instituted at that time. The impact of this strategy on disease reduction was dramatic, as can be seen in Figure 2. From 1972 to 1978 fewer than 12 cases were reported yearly. In 1979 and 1980 the country reported 22 and 41 cases, respectively, and no cases were reported in 1981. The largest outbreak in this period was in the Province of Tucumán, also in the northern part of the country, which reported 32 of the 41 cases that occurred in 1980.

Poliomyelitis surveillance activities are well developed and coordinated throughout the country, with two insti-

**FIGURE 2. Poliomyelitis morbidity rates. Argentina, 1967-1982.**



tutes providing laboratory support—the National Microbiology Institute of Buenos Aires (Malbrán) and the Virology Institute in Córdoba. Between 1978 and 1980 these institutes investigated 104 suspected cases, of which 53 were confirmed. Type I poliovirus was isolated in 39 cases, type II in two cases, and type III in one case.

Of the 53 confirmed cases for that period, 21 percent had not been vaccinated, 47 percent had received one or two doses, 23 percent had received three or more doses and 9 percent had unknown vaccination history. Ninety-two percent of these cases occurred in children under 3 years of age and 77 percent in children under 2 years.

Argentina's current polio situation illustrates the fact that, despite high immunization coverage nationally, some areas of the country where the coverage is below the national average are still at risk of polio outbreaks. Chaco, for example, has one of the lowest provincial coverage rates in the country. Argentina's sensitive surveillance system, on the other hand, has proven to be of paramount importance for the early detection of outbreaks and prompt institution of control measures.

## 1981 Vaccination Coverage in the Americas

The table on page 5 shows the 1981 vaccination coverages in children under 1 year and pregnant women, and the dropout rates for multidose vaccines. In most countries the levels of immunization in children under 1 year either remained the same or changed only slightly when compared with coverages for 1978, 1979 and 1980 (see *EPI Newsletters* II-1, II-6 and III-5). Furthermore, dropout rates for multidose vaccines remain very high.

Also of great concern is the low tetanus toxoid coverage in pregnant women. TT vaccination is necessary to protect the newborn against neonatal tetanus, yet most countries do not collect coverage data for this vaccine. In those few countries where such information is available, coverages are generally below 10 percent.

**Vaccination Coverage in Children under 1 Year and Pregnant Women, by Vaccine Type and Dose, Including Dropout Rates. Region of the Americas, 1981.**

Sub-Region and Country	Pop. under 1 year	Coverage (%) in children under 1 year of age							Coverage (%) in pregnant women			
		DPT 1st dose	DPT 3rd dose	Dropout 1st/3rd dose	POLIO 1st dose	POLIO 3rd dose	Dropout 1st/3rd dose	MEASLES	BCG	TT 1st dose	TT 2nd dose	Dropout 1st/2nd dose
<b>NORTHERN AMERICA</b>												
Canada	...											
U.S.A.	3,165,121											
<b>CARIBBEAN<sup>a</sup></b>												
Antigua and Barbuda	1,500	...	79.0	...	...	47.0	...	...	...	...	...	...
Bahamas	5,506	...	55.0	...	...	53.0	...	...	...	...	...	...
Barbados	4,200	...	58.9	...	...	55.0	...	...	...	...	...	...
Belize	5,301	...	50.0	...	...	51.0	...	28.7	54.3	...	...	...
Cuba	134,025	...	99.9	...	...	...	...	56.3	98.7	...	...	...
Dominica	1,722	...	93.0	...	...	93.0	...	...	...	...	...	...
Dominican Republic <sup>b</sup>	191,337	59.1	26.9	54.5	84.1	42.4	49.6	17.4	33.8	36.2	25.5	29.6
Grenada	2,510	...	43.0	...	...	41.0	...	...	...	...	...	...
Haiti	221,001	...	...	...	...	...	...	...	...	...	...	...
Jamaica	57,461	...	39.4	...	...	37.0	...	...	...	...	...	...
Saint Lucia	4,000	...	63.6	...	...	65.3	...	...	...	...	...	...
St. Vincent and the Grenadines	3,000	...	32.0	...	...	33.0	...	...	...	...	...	...
Trinidad and Tobago	26,300	...	51.9	...	...	45.5	...	...	...	...	...	...
<b>CONTINENTAL MIDDLE AMERICA</b>												
Costa Rica	70,960	96.3	84.4	12.4	97.6	86.5	11.4	52.0	82.3	...	...	...
El Salvador	198,168	54.2	52.2 <sup>c</sup>	...	50.4	47.1 <sup>c</sup>	...	57.8	54.6	...	...	...
Guatemala	288,133	65.7	...	...	66.3	...	...	...	30.3	...	...	...
Honduras <sup>b</sup>	160,479	64.0	36.0	43.8	64.0	37.0	42.2	35.0	42.0	17.5	10.9	37.8
Mexico	2,955,938	13.0	9.6	26.2	44.2	31.4	29.0	11.6	12.9	...	...	...
Nicaragua	150,938	47.4	17.7	62.7	64.1	18.3	71.5	15.2	50.3	...	...	...
Panama	54,846	79.5	48.5	39.0	82.4	49.7	39.7	52.2	76.2	...	...	...
<b>TROPICAL SOUTH AMERICA</b>												
Bolivia	227,325	34.7	9.7	72.1	36.4	10.4	71.5	14.3	...	...	...	...
Brazil	3,717,032	...	53.3	...	100.0 <sup>d</sup>	100.0 <sup>c,d</sup>	...	72.0	...	...	...	...
Colombia <sup>b</sup>	778,000	57.1	20.0	65.0	62.4	22.2	65.0	25.5	56.7	10.2	5.9	43.0
Ecuador <sup>b</sup>	298,574	45.1	18.0	60.1	43.7	18.6	57.4	21.9	57.3	11.7	3.7	68.4
Guyana	24,000	...	45.0	...	...	40.0	...	...	...	...	...	...
Paraguay	110,475	...	27.5	...	...	26.1	...	25.1	25.1	10.2	5.9	42.2
Peru	677,339	43.6	16.9	61.3	42.3	16.5	61.0	23.3	55.8	7.1	3.5	50.8
Suriname	10,000	...	35.1	...	...	32.5	...	...	...	...	...	...
Venezuela <sup>e</sup>	522,863	...	...	...	...	...	...	...	...	...	...	...
<b>TEMPERATE SOUTH AMERICA</b>												
Argentina	724,000	70.7	44.5	37.1	...	89.0	...	65.1	58.5	...	...	...
Chile	257,568	99.2	90.6	8.7	96.9	89.8 <sup>c</sup>	7.4	88.7	98.1	...	...	...
Uruguay <sup>b</sup>	53,923	88.0	55.0	37.5	84.0	58.0	31.0	90.0	74.0	30.0	18.0	40.0

(a) Data for English-speaking Caribbean countries from CAREC SAC, 83/2, Director's Report for 1982

... Data not available

(b) Data from 1982 EPI evaluations

(c) Second dose only

(d) National immunization days

(e) Three quarters only

1 198 8420

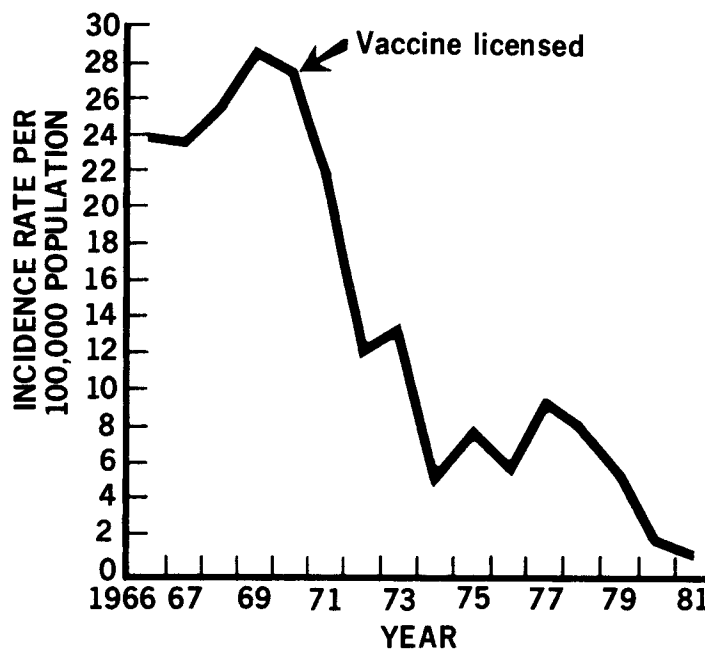
## Rubella: Experience in the United States

The 1964-65 epidemic of rubella in the United States left approximately 20,000 infants affected with the congenital rubella syndrome (CRS), caused an estimated 30,000 stillbirths, and resulted in an estimated 5,000 therapeutic abortions. The cost to the U.S. economy was about \$1.5 billion.

In 1969 three rubella vaccines were licensed and a national rubella immunization program was developed to distribute and administer vaccine. Since 1969 rubella vaccine has been used widely and more than 100 million doses have been distributed. Currently, only the RA 27/3 strain of rubella virus vaccine is distributed in the U.S. RA 27/3 was licensed in 1979 and has replaced the earlier rubella vaccines.

Use of vaccine has led to a dramatic decline in reported cases of rubella. Compared to the 57,686 cases reported in 1969, the 2,077 cases reported in 1981 represent a 96% decrease and an all-time low of reported cases of rubella (Figure 1). No major epidemics have occurred since 1964 and the previously noted six to nine-year cycles of peak rubella activity have been interrupted (Figure 2).

FIGURE 1. Reported rubella incidence rate per 100,000 population, by year of report. United States, 1966-1981\*



\* 1981 provisional data

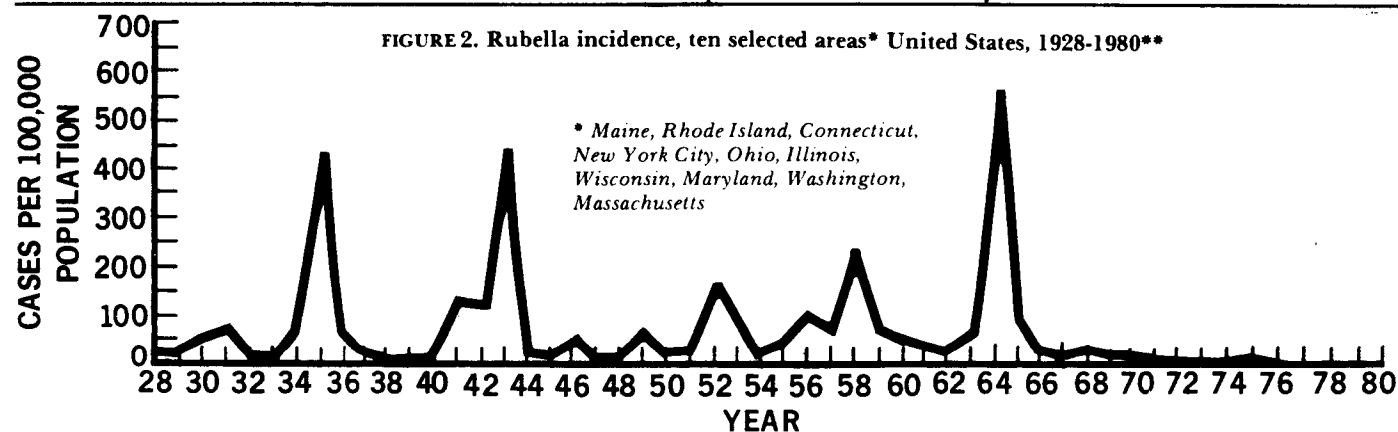


FIGURE 2. Rubella incidence, ten selected areas\* United States, 1928-1980\*\*

\*\* Preliminary data (MMWR Weekly Report 29:52, 9 January 1981)

Initial efforts in the U.S. program were directed towards vaccinating young children of school age since it was thought that the primary transmission of rubella occurred in schools and that school-age children infected their siblings and susceptible women of childbearing age. The initial goal of the U.S. program was, therefore, to reduce the transmission of rubella through vaccination of young school-age and pre-school children 1 year of age and older. This has been achieved, and rubella immunization levels of U.S. school children in kindergarten through first grade in 1981-82 are now greater than 96 percent. This level of vaccine coverage has been achieved because of wide vaccine availability in combination with the U.S. Childhood Immunization Initiative launched in 1977 supported by strong federal funding, and school immunization laws requiring proof of immunization or exemption from

immunization for school entry. Rubella vaccination is required at school entry in all 50 states and the District of Columbia. In 38 states these laws apply to children in kindergarten through grade 12, but in many cases the requirement is waived for females 12 years or older.

Use of rubella vaccine has led not only to a substantial decline in the overall level of the disease but also to a change in the age distribution of those affected. Prior to vaccine licensure, the highest incidence rates were reported in young school-age children.<sup>(1,2)</sup> Since vaccine licensure, the incidence rate of rubella has declined in all

(1) Centers for Disease Control: Rubella Surveillance Report No. 1, June 1969, Atlanta, Georgia.

(2) Preblud SR, Serdula MK, Frank JA, et al. Rubella vaccination in the United States: A ten-year review. *Epidemiologic Reviews* 2:171-194, 1980.

## Reported Cases of EPI Diseases

Number of reported cases of measles, poliomyelitis, tetanus, diphtheria and whooping cough, from 1 January 1982 to date of last report, and for same epidemiological period in 1981, by country

Sub-Region and Country	Date of last report	Measles		Poliomyelitis		Tetanus				Diphtheria		Whooping Cough	
						Non-neonatorum		Neonatorum					
		1982	1981	1982	1981	1982	1981	1982	1981	1982	1981	1982	1981
<b>NORTHERN AMERICA</b>													
Canada	25 Dec.	1,034	2,285	—	—	10	1	...	...	12	8	2,304	2,566
United States	31 Dec.	1,697	3,012	7	7	81	60	...	...	3	4	1,784	1,253
<b>CARIBBEAN</b>													
Antigua and Barbuda	23 Oct.	—	247	—	—	—	1	—	—	—	—	—	—
Bahamas	31 Dec.	50	45	—	—	2	—	—	2	—	—	8	8
Barbados	31 Dec.	6	1	—	—	5	7	—	—	2	9	12	12
Belize	28 Dec.	6	186	...	...	4	3	3	2	4	...	...	59
Cuba	31 Dec.	23,408	18,487	—	—	18	22	—	—	—	—	915	379
Dominica	27 Nov.	2	26	—	—	—	—	—	—	—	—	6	6
Dominican Republic	30 Sep.	2,408	1,816	165	53	62	70	5	6	86	102	166	148
Grenada	31 Dec.	1,713	9	—	—	3	3	—	—	—	—	—	—
Haiti	30 Jun.	245	493	3	—	76	13	10	4	8	1	431	57
Jamaica	31 Dec.	2,800	5,588	58	—	11	8	—	3	16	9	354	12
Saint Lucia	30 Oct.	1,211	123	—	—	6	3	...	...	—	—	8	467
Saint Vincent and the Grenadines	25 Dec.	757	12	—	—	—	—	—	—	—	—	—	1
Trinidad and Tobago	27 Nov.	1,187	3,529	—	—	11	13	—	—	2	3	1	9
<b>CONTINENTAL MIDDLE AMERICA</b>													
Costa Rica	31 Dec.	167	170	—	—	15	11	2	—	—	—	62	168
El Salvador	31 Dec.	3,651	12,546	16	52	46	34	92	88	22	1	1,754	3,911
Guatemala	18 Dec.	3,973	3,340	34	41	85	73	...	...	14	17	1,532	1,187
Honduras	31 Dec.	2,446	5,857	8	18	29	23	2	1	—	—	1,424	1,812
Mexico	10 Apr.	4,104	11,136 <sup>a</sup>	57 <sup>b</sup>	186 <sup>a</sup>	130	359 <sup>a</sup>	...	...	...	1 <sup>a</sup>	816	3,977 <sup>a</sup>
Nicaragua	...	...	...	...	...	...	...	...	...	...	...	...	...
Panama	31 Dec.	4,014	4,322	—	—	5	20	19	23	—	1	82	101
<b>TROPICAL SOUTH AMERICA</b>													
Bolivia	30 Jan.	117	353	—	3	13	12	...	...	2	2	171	286
Brazil	11 Sep.	22,117	42,894	25	98	1,747	2,023	...	...	2,579	2,962	35,720	28,706
Colombia	18 May	4,393	6,507	27	82	273	192	...	...	40	54	2,483	1,832
Ecuador	3 Apr.	391	1,606	3	7	9	21	10	7	3	4	468	133
Guyana	21 Aug.	36	19	—	—	2 <sup>c</sup>	5 <sup>c</sup>	...	...	—	—	— <sup>c</sup>	35
Paraguay	31 Dec.	814	622	71	60	73	89	121	99	14	6	546	622
Peru	4 Dec.	2,049	4,605	138	133	55	202	...	...	6	56	1,453	4,825
Suriname	10 Oct.	33	705	1	—	...	...	...	...	3	2	12	...
Venezuela	31 Dec.	12,312	28,207	18	18	...	...	...	...	4	6	2,986	3,683
<b>TEMPERATE SOUTH AMERICA</b>													
Argentina	25 Sep.	2,250	7,949	3 <sup>d</sup>	...	...	138	...	...	28	46	4,347	12,636
Chile	31 Dec.	9,522	6,802	—	...	34	20	...	...	136	201	394	2,070
Uruguay	31 Dec.	150	13,601	—	—	16	10	1	2	—	—	599	467

- (a) 31 December
- (b) 10 July
- (c) 31 March
- (d) 18 November

— No cases  
... Data not available

age groups, with the greatest decline among children 5-9 years old reflecting the initial immunization efforts to vaccinate school-age children. As a result, there was a change in the epidemiology of rubella, with peak disease occurrence shifting to the 15-19 year-old age group during the mid to late 1970's. Approximately 71 percent of reported rubella cases from 1976 through 1979 occurred in persons 15 years of age or older.<sup>(2)</sup>

The reported incidence rate of congenital rubella syndrome has not declined as markedly as that of rubella (Table 1). Because of the change in the epidemiology of rubella and the continuing occurrence of CRS, emphasis was subsequently given to vaccinating susceptible post-pubertal women. This has now resulted in a decline in the age-specific incidence rate of rubella in 19-29 year olds, and although it is too early to know with certainty, there appears to be a decline in the CRS incidence rate.

Concern about vaccinating a woman who may not know she is pregnant has impeded immunization efforts directed at pubertal and postpubertal women. Evidence gathered to date suggests that the risk of vaccine-induced malformation is very low or nonexistent.<sup>(3)</sup> Because 10-20 percent of young adults are still susceptible to rubella in the postvaccine era, outbreaks of rubella continue to be reported in settings where such persons congregate, including schools, universities, hospitals and other places of employment. Several reports of nosocomial rubella have been described and emphasis is now being given to developing guidelines for immunization of all susceptible hospital personnel.

Benefit-cost estimates of current U.S. rubella immunization practices demonstrate a ratio of 8:1 when rubella vaccine is given alone and 23:1 when it is given in combination with measles vaccine.<sup>(4)</sup>

In summary, the U.S. program has reduced transmission among young school children, eliminated the cyclic periodicity of rubella occurrence, and prevented major

<sup>(3)</sup> Preblud SR, Stetler HC, Frank JA, et al. Fetal risks associated with rubella vaccine. *JAMA* 246:1413-1417, 1981.

<sup>(4)</sup> Schoenbaum SC, Hyde JN, Bartoshesky L, et al. Benefit-cost analysis of rubella policy. *New Engl J Med* 294:306, 1976.

**TABLE 1. Reported incidence rates of acquired rubella and confirmed and compatible cases and estimated rates of reported congenital rubella syndrome (CRS). United States, 1969-1981.**

Year of birth	Acquired rubella		Congenital rubella	
	Overall incidence rate/100,000 pop.	Est. incidence rate/100,000 pop. > 15 years*	Confirmed and compatible cases**	Rate/100,000 live births
1969	28.9	N/A	62	1.7
1970	27.8	N/A	69	1.8
1971	21.9	N/A	45	1.3
1972	12.2	N/A	32	1.0
1973	13.2	8.6	30	1.0
1974	5.6	3.5	22	0.7
1975	7.8	6.4	32	1.0
1976	5.8	5.4	23	0.7
1977	9.4	8.6	29	0.9
1978	8.4	8.2	26	0.8
1979***	5.4	4.8	57	1.6
1980***	1.7	1.0	14	0.4
1981***	0.9	0.4	7	0.2

\* Cases per 100,000 population estimated by extrapolating age distribution of cases with known age to overall number of cases.

\*\* Confirmed cases are those with defects and laboratory evidence of congenital rubella infection. Compatible cases are defined as any two complications from list a) below, or one from a) and one from b), but do not have laboratory confirmation.

- a) Cataracts/congenital glaucoma (either or both count as one), congenital heart disease, loss of hearing, pigmentary retinopathy
- b) Purpura, splenomegaly, jaundice (with onset beginning 24 h. after birth), microcephaly, mental retardation, meningoencephalitis, radiolucent bone disease.

\*\*\* Provisional data

epidemics of rubella with resultant congenital rubella. It has not been as successful in reducing endemic CRS. However, with the continued aggressive use of rubella vaccine and vaccination of susceptible adolescents and women of childbearing age, it may be possible in the near future to eliminate CRS and perhaps rubella.

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Editor: Dr. Ciro de Quadros  
Assistant Editors: Mr. Peter Carrasco  
Ms. Kathryn Fitch

Contributors to this issue:  
Ms. Maureen Anderson, PAHO  
Dr. Fernando Laender, PAHO



Expanded Program on Immunization  
Division of Disease Prevention and Control  
Pan American Health Organization  
525 Twenty-third Street, N.W.  
Washington, D.C. 20037  
U.S.A.

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