EPI Newsletter

Expanded Program on Immunization in the Americas

Volume VI, Number 5 **IMMUNIZE AND PROTECT YOUR CHILD** *October 1984*

Evaluating Immunization Services

Evaluation measures progress made toward predetermined objectives. Insofar as immunization activities are concerned, the objectives currently used to evaluate progress relate to access, immunization delivery, coverage, and disease reduction.

In order to be most effective, evaluation must be carried out at each level of the program—at the operational level where services are delivered, at the district or provincial level, and at the national level. Some guidelines for program evaluation at the delivery and national levels are suggested in the tables which follow.

Delivery Level Evaluation

Weekly

Table 1 lists five questions which might serve as a basis on which to make a weekly evaluation of immunization activities.

If no major problems are identified in these five areas, there is a high probability that the immunization program is functioning effectively. When problems are identified (e.g. vaccination sessions not held, inadequate supplies of vaccine, cold chain failure), the cause needs to be identified and corrective action initiated.

TABLE 1. Weekly evaluation of immunization at delivery level

1. Were all scheduled immunization sessions held?
2. Were there sufficient vaccines to meet all needs?
3. Was the refrigerator checked on a daily basis, all temperatures recorded, and all temperatures found to be in the safe range (+4°C to +8°C)?
4. Are all infants and women of childbearing age who come to the health center, including sick children, screened for current vaccination status and provided with necessary vaccines?
5. Was each woman of childbearing age, and the guardians of each child who received immunization, informed of the need for future immunization and instructed when to return?

Monthly

At the monthly evaluation, five additional indicators are proposed (Table 2). Although other equally good indicators may be chosen, regular, systematic evaluation using a small number of measurable indicators is important to program success.

TABLE 2. Monthly evaluation of immunization at delivery level

1. What percentage of the monthly target group received DPT (first dose) this month? (Number of DPT immunizations divided by 1/12 the annual number of births times 100)
2. What percentage of children immunized with DPT (first dose) are also getting measles vaccine? (Number of measles immunizations divided by number of DPT immunizations times 100)
3. Are cases of disease occurring in immunized children? How can they be prevented?
4. Are cases of disease preventable by immunization appearing at the health center? Why? What action can be taken to prevent the occurrence of such cases in the future?
5. How can we better inform the public about the importance of and need for immunization?

National Level Evaluation

National evaluation should focus on two separate aspects of the program: subunit performance and national progress toward objectives. The first involves direct monitoring of individual unit performance through supervisory visits, or indirect monitoring through examination of monthly reports. Monitoring individual

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TABLE 3. Indicators of immunization performance from six health centers

Area	Number of sessions schedule	Number of sessions held	Vaccine sufficient	Number days temp. 4-8° over days temperature monitored	Monthly target for immunization	DPT per month	Measles per month
A	20	18	Yes	0/0	200	150	125
B	25	10	No	10/25	225	25	0
C	15	13	Yes	25/26	200	50	10
D	30	30	Yes	24/25	200	175	185
E	15	14	Yes	20/20	175	150	50
F	18	17	Yes	15/15	300	280	260

units allows identification of those units not functioning at satisfactory levels which need special supervisory attention. Table 3 summarizes selected critical indicators from six health center reports.

Although Health Center A may not have a cold chain problem, the lack of temperature data mandates an early check to determine if the problem is one of monitoring or one of equipment malfunction. Health Centers B and C are performing poorly, B from failure to hold scheduled immunization sessions and/or lack of vaccine, and C because of low coverage. Health Centers D and F are, according to these indicators, functioning well. Health Center E has good coverage with DPT (first dose), but is failing with measles immunization at 9 months. This is almost always a communications problem—a failure to inform mothers and communities of the need for immunization at 9 months and to give instructions when to return.

In evaluating national progress toward objectives, five areas should be monitored:

1. **Strategies**. Are current immunization strategies adequate to ensure that coverage and disease reduction targets are achieved? Can current strategies be improved?
2. **Training**. Do immunization staff members have sufficient skills to carry out their assigned tasks effectively? Is there a regular program of continuing education, information feedback, and teaching during supervisory visits?
3. **Logistics**. Is the cold chain functioning? Do all units have sufficient vaccine to meet their needs? Are there enough needles and syringes, or are multiple children being injected with the same needle?
4. **Coverage**. Are vaccination coverage targets being met? Are infants being immunized prior to the time of disease risk?
5. **Disease reduction**. The single weakest component of evaluation, and by far the most important one, is that of disease reduction. Immunization is frequently ineffective, perhaps because of poor understanding of disease epidemiology, use of the wrong target age for immunization, or administration of impotent vaccine due to cold chain failure. Progress in accurately defining the target population, improving the cold chain, and using a more heat-stable measles vaccine has significantly improved vaccine delivery.

Techniques are available to evaluate three of the EPI diseases: neonatal tetanus, measles, and poliomyelitis.

TABLE 4. Indicators of progress towards objectives

Indicator	Method of measurement
Access	— DPT (first dose) as measured by coverage survey — DPT (first dose, annual total) divided by estimated births times 100
Immunization	— Vaccinations reported on monthly reports
Percent immunization by 12 months of age	— Coverage survey
Percent births protected by 2 doses of tetanus toxoid	— Coverage survey
Neonatal tetanus incidence	— Retrospective surveys 1981, 1985, 1989
Measles morbidity	— National reporting and sentinel surveillance
Poliomyelitis lameness	— Lameness surveys and sentinel surveillance

Four types of data are used in these evaluations:

1. Data on the pre-immunization status of a population: morbidity, mortality, and/or disability.
2. Epidemiologic data identifying the population at risk.
3. Data on vaccination coverage.
4. Data on vaccine effectiveness and changes in disease occurrence.

Evaluating the impact of diphtheria toxoid, pertussis vaccine, and especially the protective effect of BCG is more difficult.

Program Indicators

An important step in national evaluation is the selection of a few critical indicators, which can be quantified and measured to monitor progress toward established objectives. Table 4 identifies selected indicators and possible methods of measurement.

The use of quantitative indicators by supervisors and program managers will permit decision makers to document progress and identify problems. If the desired outcomes are not being achieved, then new strategies to improve program effectiveness can be implemented.

It is important to remember that personnel responsible for immunization at different levels should not be given a cumbersome methodology which requires asking more questions than are really necessary, or questions which are time-consuming and difficult to understand. In order to monitor progress and identify problems on a routine basis, clear simple questions should be developed which will permit information to be collected on key program processes and/or outcomes.

Evaluation measures progress toward specific, quantitative objectives. When objectives are achieved, health staff and political supporters need to be informed of that progress. When objectives are not met, the causes need to be identified and solutions implemented. This process of problem identification and solution is essential to continued development of immunization programs.

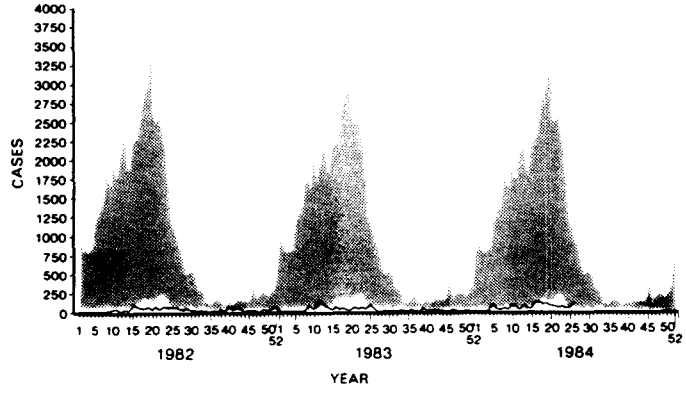
Source: Stanley O. Foster, MD. International Health Program Office, Centers for Disease Control, Atlanta, Georgia.

Measles in the United States, First 26 weeks, 1984

During the first 26 weeks of 1984, a provisional total of 1,759 measles cases was reported in the United States (incidence rate 0.8 per 100,000 population) (Figure 1). This represents a 60.6% increase from the 1,095 cases reported during the same period in 1983 (0.5/100,000). A total of 1,234 cases (70.2%) was reported from four states -Michigan (430), Texas (377), California (267), and Illinois (160). Nine states (New Mexico, Michigan, Hawaii, New Hampshire, Texas, Washington, Utah, Illinois, California) and New York City had incidence rates of 1/100,000 population or higher.

Although the overall incidence rate increased, the number of states reporting measles decreased during the first 26 weeks of 1984, compared with the same period of 1983. Twenty-four states reported no measles cases (indigenous or imported), compared with 22 states and the District of Columbia during the same period in 1983. In 1984, 80 (2.5%) of the nation's 3,139 counties reported measles cases during the first 26 weeks, compared with 95 (3.0%) during the same period in 1983 (Table 1).

FIGURE 1. Reported measles cases*, United States, 1982-1984



* Solid line represents reported cases, shaded area represents maximum and minimum weekly values during 5-year period, 1977 - 1981.

TABLE 1. Geographic distribution and incidence rates* of measles cases, United States, first 26 weeks, 1983 and 1984

	1983	1984
No. cases	1,095	1,759
Incidence rate+	0.5	0.8
States without measles	22	24
Counties without measles	3,044 (97.0%)	3,059 (97.5%)

*Provisional
+ Per 100,000 population

One hundred seventy-five cases (9.9%) were associated with international or out-of-state importations—an average of 6.7 cases per week—compared with 174 cases during the same period in 1983 (1).

During the first 26 weeks, detailed information was provided to the Division of Immunization, CDC, on 1,765 cases. The difference between this number and the 1,759 cases reported to the MMWR reflect delays in reporting. Of 1,765 cases, 1,723 (97.6%) met the standard clinical case definition for measles,§ and 721 (40.8%) were serologically confirmed.

Among most of the measles patients, onset of rash occurred from week 9 through week 15, peaking at week 11 (130 cases) (Figure 2).

Age characteristics of reported cases changed from 1983 to 1984 (Table 2). In 1983, the highest incidence rates were reported for preschoolers. In contrast, the rates for the first 26 weeks of 1984 were greatest for children 10 years to 14 years of age who experienced a more than twofold increase in incidence rates, compared with all of 1983. Of the 351 preschoolers who had measles in 1984, 92 (26.2%) were under 12 months of age; 68 (19.4%) were 12-14 months of age; 18 (5.1%) were 15 months; and 173 (49.3%) were 16 months to 4 years of age. Persons 12-14 months of age accounted for 3.9% of the 1,765 cases.

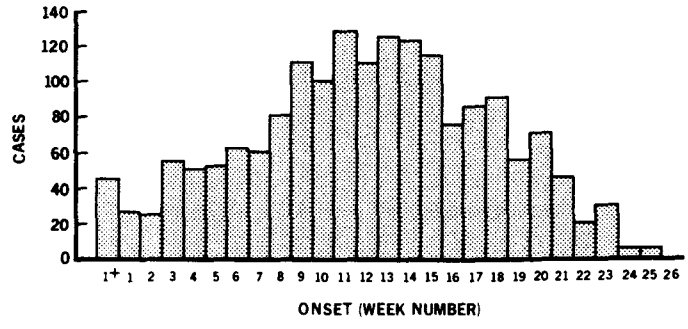
TABLE 2. Age distribution and estimated incidence rates* of measles cases+, United States, 1983 and first 26 weeks, 1984

Age group	1983 (52 weeks)[a]			1984 (26 weeks)[b]		
	No.	%	Rate	No.	%	Rate
0-4 yrs.	451	31.5	2.6	351	19.9	2.0
5-9 yrs.	160	11.2	1.0	201	11.4	1.3
10-14 yrs.	195	13.6	1.1	515	29.2	2.9
15-19 yrs.	382	26.7	2.1	470	26.6	2.4
20-24 yrs.	163	11.4	0.8	137	7.8	0.6
≥25 yrs.	80	5.6	0.1	91	5.1	0.1
Total age known	1,431	95.6	-	1,765	100.0	-
Total age unknown	66	4.4	-	-	-	-
TOTAL	1,497	100.0	0.6	1,765	100.0	0.8

*Cases per 100,000 population extrapolating cases with known age to total reported cases.
+Provisional data.
[a]Total cases reported to the MMWR in 1983.
[b]Total cases reported to CDC's Division of Immunization during the first 26 weeks of 1984.

§ Fever (38.3°C [101°F] or higher, if measured), generalized rash of 3 days' or longer duration, and at least one of the following: cough, coryza, conjunctivitis.

FIGURE 2. Reported measles cases, by week of rash onset*, United States, first 26 weeks, 1984



*No dates of rash onset reported for seven patients
+ Rash onset in 1983.

Of the 1,765 persons with measles, 911 (51.6%) had been vaccinated; 776 (44.0%) had been vaccinated on or after the first birthday; and 135 (7.6%) had been vaccinated before the first birthday (Table 3). A total of 854 (48.4%) persons were either unvaccinated or of unknown vaccination status. Prior physician-diagnosed measles in the absence of vaccination was reported for 21 (1.2%) persons.

Of the 1,765 cases, 610 (34.6%) were classified as preventable§ (1) (Table 4). The highest proportion of preventable cases occurred among persons who were not of school age. More than 70% of the cases among children 16 months to 4 years and adults 20-24 years were preventable. Although more than half of the preventable cases occurred among persons 5-19 years of age, only 29.5% of cases occurring in that age group were considered preventable. The proportion of preventable cases in this age group increased progressively with increasing age.

Of the 1,155 persons who had nonpreventable measles, 178 (15.4%) were too young for routine vaccination (15 months of age or under). Fifty-seven (4.9%) were born before 1957; vaccination is not ordinarily recommended for this group. Of the 920 persons 16 months to 27 years of age who acquired measles, 775 (84.2%) had been vaccinated on or after the first birthday; 18 (2.0%) had prior physician-diagnosed measles; 32 (3.5%) had international importations and were not U.S. citizens; and 41 (4.5%) had exemptions under state law. In addition, 54 (5.9%) persons — recruits at Great Lakes Naval Training Station — were considered immune because they had positive results to an indirect immunoperoxidase assay for measles antibody before their illnesses (Table 5).

§ A case is considered preventable if measles occurs in a U.S. citizen: (1) at least 16 months of age, (2) born after 1956, (3) lacking adequate evidence of immunity to measles (documented receipt of live measles vaccine on or after the first birthday and at least 2 weeks before onset of illness, or a physician-diagnosed measles or laboratory evidence of immunity), (4) without a medical contraindication to receiving vaccine, and (5) with no religious or philosophic exemption under state law.

TABLE 3. Age at most recent measles vaccination, United States, first 26 weeks, 1984*

Age at vaccination	Measles cases	
	No.	%
<12 months	135	7.6
12-14 months	255	14.4
15 months	34	1.9
16 months-4 years	303	17.2
5-9 years	139	7.9
10-14 years	32	1.8
15-19 years	8	0.5
≥20 years	2	0.1
>12 months†	3	0.2
Unvaccinated or unknown	854	48.4
Total	1,765	100.0

*Provisional data.
†Unknown age at vaccination, definitely older than 12 months.

TABLE 4. Age distribution and preventability of measles cases, United States, first 26 weeks, 1984*

Age group	No. cases	No. preventable (%)	No. nonpreventable (%)
≤15 mos.	178	0 (0%)	178 (100.0%)
16 mos.-4 yrs.	173	127 (73.4%)	46 (26.6%)
5-9 yrs.	201	43 (21.4%)	158 (78.6%)
10-14 yrs.	515	137 (26.6%)	378 (73.4%)
15-19 yrs.	470	170 (36.2%)	300 (63.8%)
20-24 yrs.	137	106 (77.4%)	31 (22.6%)
25-29 yrs.	51	27 (52.9%)	24 (47.0%)
≥30 yrs.	40	0 (0%)	40 (100.0%)
Total	1,765	610 (34.6%)	1,155 (65.4%)

*Provisional data.

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Expanded Program on Immunization in the Americas

Maternal and Child Health Program

Your articles, suggestions and comments are welcome

TABLE 5. Reasons measles cases were classified as nonpreventable, United States, first 26 weeks, 1984*

Causes of nonpreventability		No. cases (%)	Total cases (%)†
1. Persons <16 months of age (too young for routine vaccination)		178 (15.4%)	(10.1%)
2. Born before 1957 (vaccination is not routinely recommeded)		57 (4.9%)	(3.2%)
3. Persons 16 months-27 years		920 (79.7%)	(52.1%)
a. Adequately vaccinated (on or after the first birthday)	775 (84.2%)[a]		
b. Prior physician diagnosis	18 (2.0%)		
c. International importations (non-U.S. cititizens)	32 (3.5%)		
d. Exemptions	41 (4.5%)		
1. Medical	4 (10%)		
2. Religious	16 (39%)		
3. Philosophic	16 (39%)		
4. Nonspecified exemptions	5 (12%)		
e. Laboratory evidence of immunity	54 (5.9%)		
Total		1,155 (100.0%)	(65.4%)

*Provisional data.
†1,765 cases.
[a]Does not include one adequately vaccinated person who was born before 1957.

Reported by N El-Tantawy, MD, Emory University School of Medicine, Atlanta, Georgia; Div. of Immunization, Center for Prevention Svcs, CDC.

Editorial Note: Although the number of reported measles cases has increased in 1984, compared with the same period in 1983, it is still far below the number in the prevaccine era (1950-1962), when an average of over 525,000 cases was reported annually. Despite the increased occurrence of measles during the first 26 weeks of 1984 over all of 1983, the geographic distribution of measles is more restricted and focal.

A total of 43.9% of the persons who had measles in 1984 had been adequately vaccinated. This is within expected limits, given the high vaccine coverage in the United States (2). Since 1980, over 95% of kindergarten and first-

grade students have had evidence of measles immunity. Higher coverage will be associated with higher proportions of persons who are vaccinated. Recent epidemiologic evaluations have shown a measles vaccine efficacy of 90% or higher. The increased occurrence of measles in 1984 does not appear to be due to poor vaccine efficacy.

Greater emphasis needs to be placed on ensuring that persons 10-14 years old and 15-19 years old have evidence of measles immunity (3). Enactment and vigorous enforcement of regulations requiring all students in grades kindergarten through 12 to have evidence of immunity is an important means of ensuring high levels of measles immunity (2).

Further efforts need to be made in preschool-and post-school-aged groups. Over 70% of the cases among young adults (20-24 years old) and preschoolers (16 months to 4 years old) were preventable. Every opportunity should be taken to vaccinate susceptible children against measles. Many colleges are considering regulations requiring evidence of measles immunity for matriculation (4). All institutions where young adults congregate should consider requiring evidence of measles immunity.

References

1. CDC. Classification of measles cases and categorization of measles elimination programs. MMWR 1982; 31:707-11.
2. CDC. Measles Surveillance Report No. 11, 1977-1981. September 1982.
3. ACIP. Measles prevention. MMWR 1982;31:217-24, 229-31.
4. American College Health Association. Statement of immunization policy. November 25, 1983;1-3.

Source: *MMWR* 33(35):495-504, September 7, 1984.

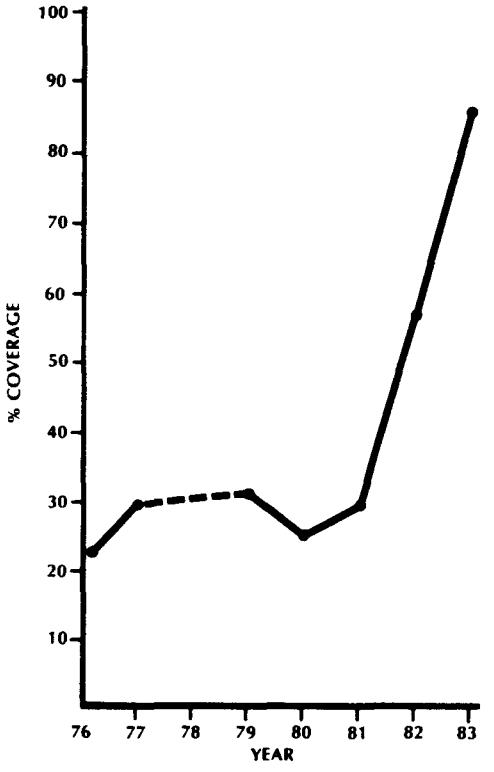
EPI in Suriname Increases Immunization Coverage

Concerted efforts by Suriname's EPI resulted in an increase of completely vaccinated children in 1983 over previous years. The coverage of children under 1 year of age with three doses of DPT and polio vaccine increased from 54 percent in 1982 to 85 percent in 1983 (See Graph 1). The increased efforts of Suriname's well-motivated staff were bolstered by the Vaccination Act proclamation.

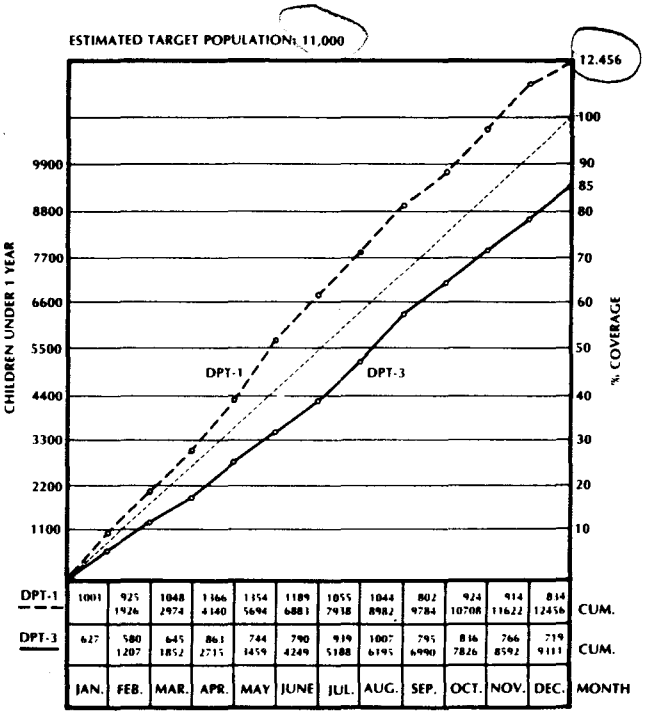
The Vaccination Act requires that all children be fully vaccinated (3 doses) against diphtheria, tetanus, whooping cough and polio before they are one year old. Children are not permitted to attend nursery or primary school without vaccination certification. The law may be enforced by penalty or fine.

Although the 1983 coverage was high, there were a number of children under 1 who received first doses of DPT and polio, but did not return for the two subsequent doses before their first birthday (See Graph 2). This

GRAPH 1. Coverage with DPT and polio (3rd dose) in children under 1 year, Suriname, 1976-1983



GRAPH 2. Coverage with DPT (first and third dose) in children under 1 year, Suriname, 1983



Reported Cases of EPI Diseases

Number of reported cases of measles, poliomyelitis, tetanus, diphtheria and whooping cough, from 1 January 1984 to date of last report, and for same epidemiological period in 1983, by country

Subregion and Country	Date of last report	Measles		Poliomyelitis		Tetanus				Diphtheria		Whooping Cough	
						Non-neonatorum		Neonatorum					
		1984	1983	1984	1983	1984	1983	1984	1983	1984	1983	1984	1983
NORTHERN AMERICA													
Canada	11 Aug.	3,439	565	—	—	1[a]	1	...	...	2	9	662	1,193
United States	06 Oct.	2,331	1,280	3	4	47	63	...	...	1	3	1,764	1,866
CARIBBEAN													
Antigua and Barbuda	15 Sep.	1	3	...	—	—	1	—	—	—	—	—	—
Bahamas	13 Oct.	33	2,846	—	—	1	—	—	—	—	—	—	8
Barbados	14 Jul.	3	3	—	—	2	5	—	—	—	—	—	—
Cuba	23 Jun.	2,436	2,038	—	—	5	11	—	—	—	—	51	192
Dominica	29 Sep.	35	1	—	—	—	1	—	1	—	2	1	11
Dominican Republic	16 Jun.	2,115	1,440	—	7	42	49	1	11	71[b]	41	88	151
Grenada	13 Oct.	8	268	—	—	—	—	—	—	—	—	—	—
Haiti	*	...	...	...	...	...	...	...	...	...	...	...	...
Jamaica	22 Sep.	221	...	—	...	2	...	1	...	5	...	26	...
Saint Lucia	01 Sep.	12	58	—	—	1	1	...	...	—	—	—	—
St. Christopher-Nevis	15 Sep.	2	556	—	—	1	—	—	—	—	—	—	—
St. Vincent and the Grenadines	03 Mar.	4	25	...	...	...	...	...	...	...	...	...	...
Trinidad and Tobago	01 Sep.	3,294	1,846	—	—	12	11	—	—	—	—	—	—
CONTINENTAL MIDDLE AMERICA													
Belize	06 Oct.	—	10	...	...	—	1	—	—	—	—	1	1
Costa Rica	11 Aug.	3	11	—	—	4	2	—	1	—	—	104	22
El Salvador	11 Aug.	3,018	1,453	11	54	43	31	27	22	10	11	292	311
Guatemala	31 Mar.	868	867	5	31	28	30	...	...	2	6	450	297
Honduras	22 Sep.	1,485	984	35	3	12	20	13	—	—	—	383	405
Mexico	*	...	...	...	...	...	...	...	...	...	...	...	...
Nicaragua	30 Jul	106	...	—	...	...	...	...	...	—	...	32	...
Panama	31 Aug.	285	481	—	—	4	4	3	9	—	—	118	126
TROPICAL SOUTH AMERICA													
Bolivia	21 Aug	...	...	...	...	...	...	...	...	19	46	...	...
Brazil	19 May	17,951	13,958	2	19	874	784	230	340	1,340	1,398	7,235	12,858
Colombia	*	...	...	...	...	...	...	...	...	...	...	...	...
Ecuador	16 Jun.	4,188	546	—	5	43	32	21	35	62	8	195	502
Guyana	21 Apr.	45	—	—	—	4	—	...	...	—	—	—	—
Paraguay	15 Sep.	472	648	—	9	54	46	60	95	8	3	391	174
Peru	22 Sep.	2,406	...	63	...	189	...	4	...	42	...	2,236	...
Suriname	19 May	16	9	—	—	2	...	...	...	—	1	—	—
Venezuela	04 Aug.	5,714	...	—	...	...	...	...	...	1	...	814	...
TEMPERATE SOUTH AMERICA													
Argentina	07 Jul.	4,164	775	2	—	100	77	...	...	8	22	6,852	1,027
Chile	29 Sep.	2,816	3,692	—	—	19	22	...	...	103	67	537	105
Uruguay	28 Aug.	5	6	—	—	7	1	—	...	—	...	60	183

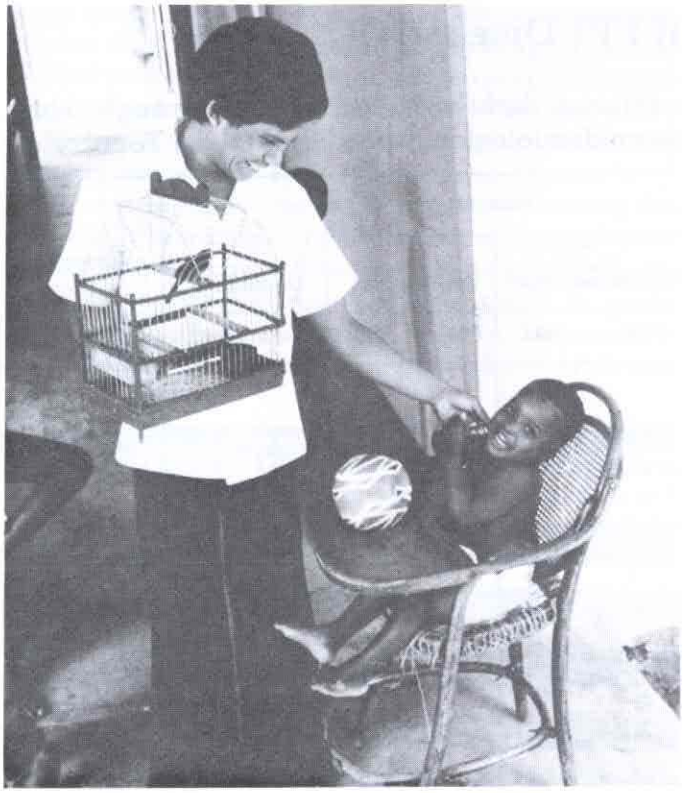
[a] 09 June

[b] 31 May

* No 1984 reports received, therefore 1983 data not shown.

— No cases

... Data not available



A health center in Suriname: A healthier childhood is likely if children are vaccinated before their first birthday. *(Photo: Julio Vizcarra Brenner, OPS)*

"dropout rate" (difference between dotted line, DPT 1 and solid line, DPT 3) varies from region to region, ranging from 1 to 66 percent. The national dropout rate is 25 percent. Though many health centers have performed well in this respect, those with high dropout rates and low vaccination coverages will receive special attention from local personnel and the Bureau of Public Health.

Suriname uses several methods to reduce the dropout rate. Some health centers have a call-up system for children who do not return to the under-fives clinic as scheduled, and others arrange home visits to attend these children.

During 1983, 12,843 children under 4 years of age were vaccinated against measles, bringing coverage in the 1-4 year age group to 55 percent. In order to improve coverage, activities are planned to motivate parents to bring their children to the under-fives clinic.

Some problems were noted in the school vaccination program when reports showed that several schools had enrolled children who were not vaccinated. Improvement will require that regional medical doctors and health workers engage the cooperation of school principals by emphasizing the importance of vaccination and reminding them that violation of the Vaccination Act can be penalized.

Suriname's 1984 EPI objectives are as follows:

- Give at least 90 percent of children third doses of DPT and polio before their first birthday.
- Decrease the dropout rate to 10 percent.
- Increase the measles vaccination coverage in the 1-4 year age group to at least 80 percent.
- Completely vaccinate, or give booster doses, to all school children from first to third grades in elementary school before October 1, 1984.

Source: Contributed by Welsly Bodha, EPI Program Manager, Suriname.

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