



# EPI Newsletter

## Expanded Program on Immunization in the Americas

### EPI in Cuba

#### Immunization Gets Top Priority

Cuba is developing a new plan of action to correct some of the problems remaining with its immunization program. The previous "chronogram for action," (see following article) elaborated by the PAHO/Health Ministry multidisciplinary group which evaluated the country's immunization activities in June 1981, was fully implemented by May 1982. The new plan, scheduled for implementation in a few months, includes:

- Coordination of activities with community organizations in order to achieve the elimination of measles from the country in the next two years.
- Identification of funds for the purchase of cold boxes and thermoses to handle vaccines at the local level.
- Coordination with the Education Ministry to require presentation of a vaccination certificate for entrance to primary and secondary schools.
- Introduction of rubella and mumps vaccine in the national vaccination schedule.
- Establishment of quarterly program evaluations at the central level to be carried out by the Division of Epidemiology and polyclinics; inclusion of immunization evaluation at the provincial level, within the general activities aimed at decreasing infant mortality.
- Creation of a national multidisciplinary commission to analyze all aspects related to the national immunization schedule, including statistical data, control methods and general program norms.

Source: Epidemiology Division, Ministry of Health, Cuba.

#### Program Evaluation

An evaluation of Cuban immunization activities at the national, provincial and local levels was undertaken by a multidisciplinary group from the Ministry of Health and PAHO between 25 May and 6 June 1981. The evaluation focused on the current status of the EPI in Cuba and was based primarily on an examination of available documents and reports, and observation of immunization-

related practices at the health centers. The group concluded its work by presenting a summary report defining program objectives, problems and recommendations, together with a chronogram of activities to be implemented by the Ministry of Health.

In general, the team confirmed that Cuba has made impressive progress in the control of most of the vaccine-preventable diseases. Some of the factors contributing to its successes are the presence of a single, unified health system; the active involvement of community organizations in promoting immunization activities; the high priority given to immunization activities; the existence of well staffed statistical services; a practical system for local health planning, and a system of supervision and evaluation involving frequent visits by different programs.

#### Infrastructure

Most immunizations are delivered by the local health areas (polyclinics, hospitals or rural health posts). The municipal health authorities are in charge of planning, supervising, and supplying the health areas in the municipality. Provincial-level administrative functions include planning, programming, evaluation, supervision and vaccine distribution. The national-level authorities are responsible for setting priorities and goals, establishing norms, carrying out epidemiologic surveillance, and evaluating vaccination activities.

#### Coverage

The central health system keeps good immunization records of the population which permits the evaluation of vaccination coverage in the country (Table 1). BCG vaccine is given to newborns in the hospitals, where 99 per-

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**TABLE 1. Coverage of children under 1 year of age (estimated population: 136,900) with EPI vaccines. Cuba, 1980.**

Vaccine (dose)	Coverage (%)
DTP (first)	78
DTP (third)	67
Poliomyelitis (first)	100
Poliomyelitis (second)	100
Measles	48
BCC	99

cent of deliveries are made. Thus, virtually all children under 1 year of age are covered.

DPT vaccine is given in the local health centers. In 1980 coverage was 78 percent for the first dose and 67 percent for the third dose. Cuba's dropout rate from first to third dose of DPT is the lowest in Latin America.

Polio vaccine is given during semi-annual nationwide campaigns. These campaigns are highly effective and nearly 100 percent of children under 1 year of age received first and second doses of the vaccine.

Low measles immunization coverage was one of the main problems identified by the evaluation group. Since measles immunization was only started in 1974, the coverage of children under 1 year of age is not yet comparable to that obtained with the other EPI vaccines. In 1980 measles coverage was 48 percent.

#### Epidemiologic Surveillance and Information System

Cuba's epidemiologic surveillance system is one of the most reliable in Latin America. Through a daily telephone reporting system, every health care institution telephones the municipality daily with reports of epidemiologically important cases. Each municipality in turn telephones consolidated reports to the provincial centers. Finally, province-wide information is transmitted to the national level.

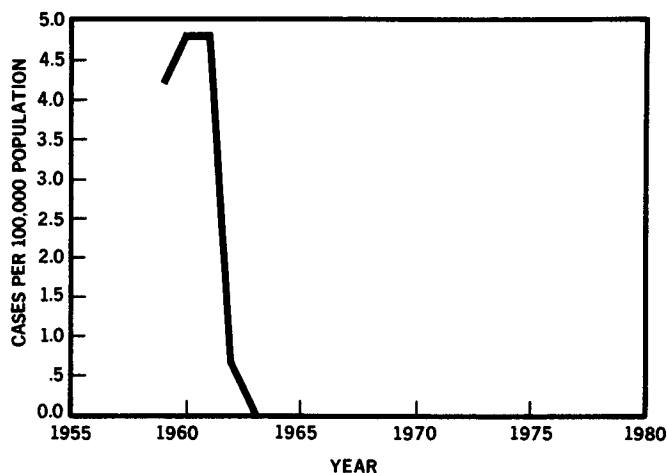
Quarterly and yearly reports are prepared at each administrative level (municipal, provincial and national) which provide detailed morbidity information.

The group found that the Cuban health system has been very effective in reducing morbidity and mortality from the EPI diseases. The reported incidence of polio fell from around 300 cases per year in 1959-61 to 0 cases in 1965-80, with one case reported in 1970-73 and one in 1979 (Figure 1). These cases were in children under 1 year of age who had not been vaccinated in the nationwide polio immunization campaigns.

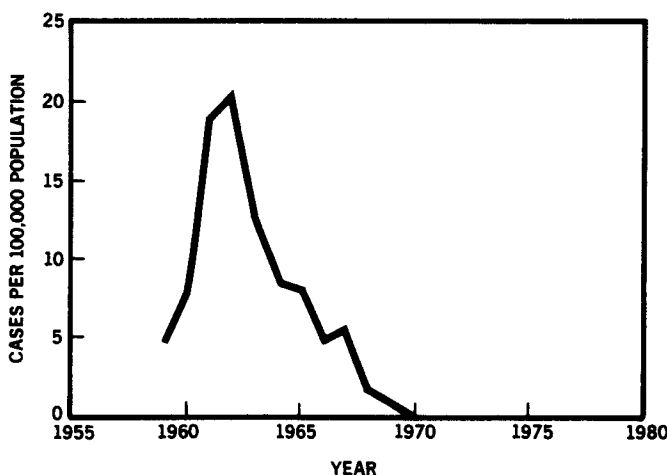
Diphtheria, which in 1962 occurred at a rate of 20.5 cases per 100,000 population, has not been reported in the last 10 years (Figure 2).

The last case of neonatal tetanus was reported in 1971 (Figure 3). A study of 678 tetanus cases which occurred between 1970 and 1978 showed that 37 percent of them occurred among persons above 65 years of age; 30 percent of all tetanus cases stemmed from injections administered aseptically.

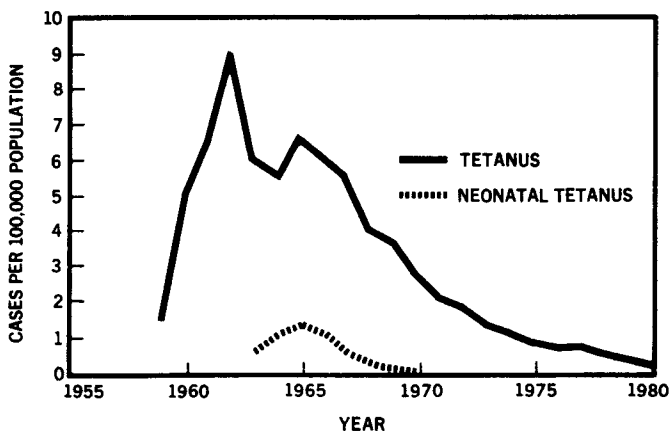
**FIGURE 1. Reported cases of paralytic poliomyelitis, per 100,000 population. Cuba, 1959-80.**



**FIGURE 2. Reported cases of diphtheria, per 100,000 population. Cuba, 1959-80.**



**FIGURE 3. Reported cases of tetanus and neonatal tetanus, per 100,000 population. Cuba, 1959-80.**



Both whooping cough and tuberculosis have shown decreasing mortality and morbidity in the last decade (Figures 4 and 5).

FIGURE 4. Reported cases of whooping cough, per 100,000 population. Cuba, 1959-80.

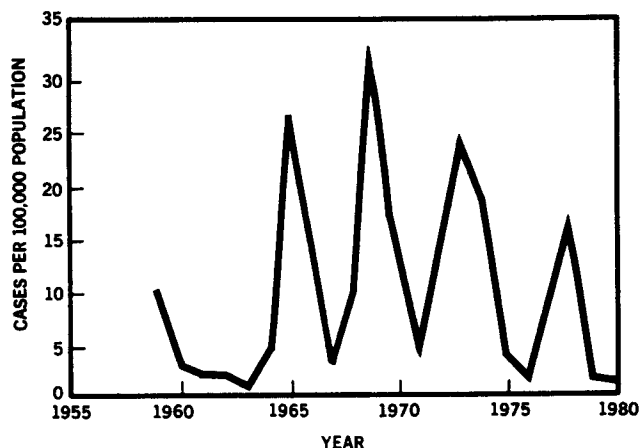
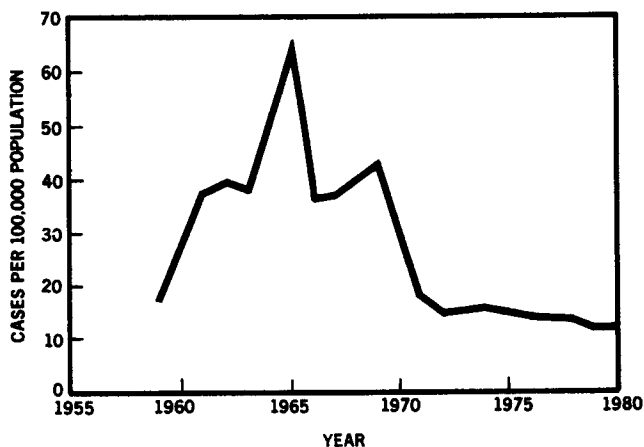
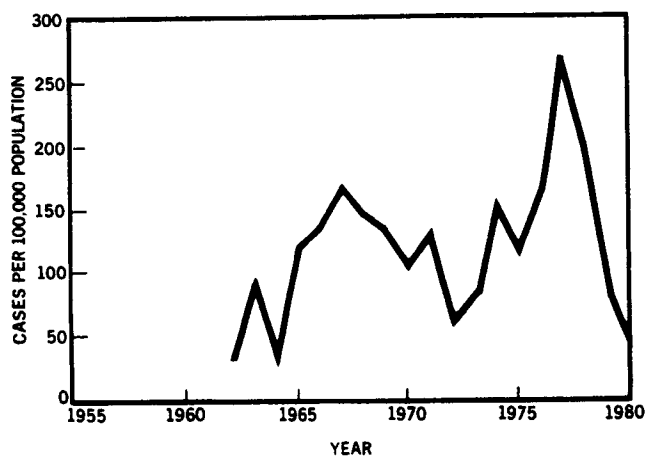


FIGURE 5. Reported cases of tuberculosis, per 100,000 population. Cuba, 1959-80.



Although there has been a marked decrease in measles mortality since measles immunization was begun in 1974, the morbidity of this disease continues to be relatively high (Figure 6), underlining the need to increase measles vaccine coverage.

FIGURE 6. Reported cases of measles, per 100,000 population. Cuba, 1959-80.



## The Cold Chain

Evaluation of the cold chain showed it to be functioning effectively. The vaccines are stored in a refrigerated central warehouse which registered an internal temperature of  $+6^{\circ}\text{C}$  when inspected. The inventory system is well organized and guarantees that no outdated vaccines are sent on to the provinces. Refrigerated trucks are used to transport the vaccines to the provinces where they are kept in refrigerated rooms, only some of which have thermometers.

The weakest link in the cold chain is at the local level, due to the use of poorly insulated cold boxes. Despite this problem, the health centers visited had sufficient amounts of vaccine. All refrigerators used for vaccine storage are serviced regularly to ensure their proper maintenance.

## Supervision and Evaluation

Immunization activities in Cuba are supervised and evaluated as part of broader programs covering health care for children, mothers, workers, and the elderly. A variety of personnel from different divisions and directorates of the Ministry of Public Health are involved.

National-level staff make week-long visits to each province at least once a year. Teams of provincial supervisors visit each municipality twice a year, first to review the current work plan and subsequently to evaluate performance to date. Finally, The medical officer in charge of health programs in each municipality frequently reviews performance in the health areas to assure that norms are observed and targets are achieved.

## Problems and Solutions

The group identified five major problem areas in the Cuban EPI:

- lack of insulated boxes for the transport of vaccines from the provincial to lower levels;
- lack of thermometers and daily monitoring of refrigerator temperatures;
- lack of vehicles in rural areas;
- underreporting of immunizations in some places;
- relatively high measles morbidity rates and low measles immunization coverage.

Various suggestions were made to resolve these problems. The lack of materials was to be made up through increased budgetary allocations by the Ministry of Health as well as by donations from external agencies. Measles was to be combatted by increased epidemiologic activities, inter-provincial competition to stimulate the control of the disease, and a study of the feasibility of applying measles-mumps-rubella (MMR) vaccine to children in the first grade. A study of the causes of underreporting was suggested to perfect the information system. A chronogram outlining solutions to these problems was drawn up for 1981-82.

Source: Epidemiology Division, Ministry of Health, Cuba.

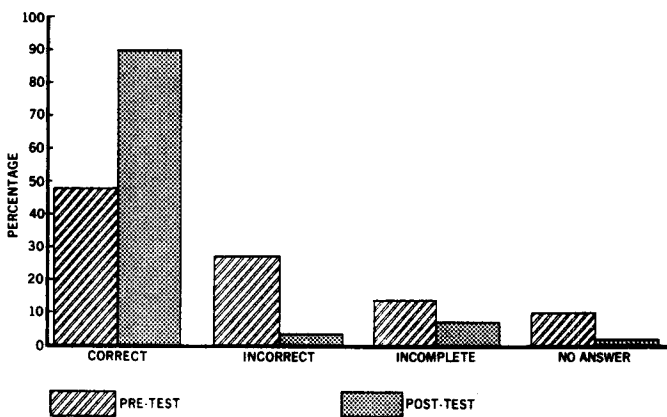
## First National EPI Course

The Epidemiology Division of the Cuban Health Ministry organized and conducted the first national EPI workshop in Cuba from 17 to 21 May 1982. This activity fulfilled one of the recommendations of the multidisciplinary EPI evaluation carried out by the Health Ministry and PAHO in June 1981.

Nineteen health officials in charge of provincial-level immunization activities attended the workshop, together with 15 epidemiology residents at the National Institute of Hygiene and Epidemiology. PAHO provided the EPI modules on Planning, Management and Evaluation which were used as the course text. Topics covered included the epidemiology of the EPI diseases, vaccines used in the program, the cold chain, programming of activities, evaluation methodologies, and the general goals and objectives of the global EPI program.

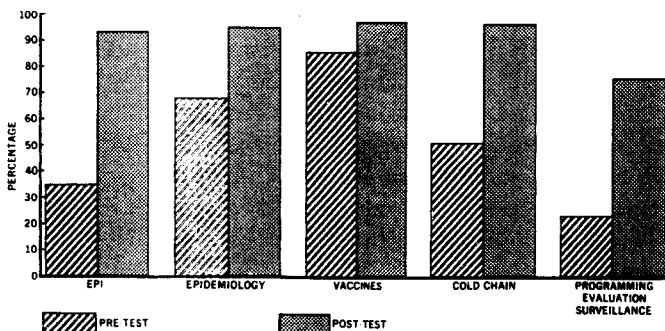
A pre- and post-test was given at the beginning and end of the workshop to evaluate the group's performance. The results are shown in Figures 1 and 2. The group's overall

FIGURE 1. Overall results of pre- and post-tests given during national EPI workshop in Cuba, 1982.



performance, measured by comparing the percentage of correct answers on the pre- and post-tests, almost doubled by the end of the workshop, reaching an average of 90 percent of correct answers. An analysis of the results by topic shows that the group was less knowledgeable at the

FIGURE 2. Results, by topic, of pre- and post-tests given during national EPI workshop in Cuba, 1982.



beginning in the areas of general EPI program objectives, the cold chain, and programming, evaluation, and surveillance. On the post-test, however, nearly 100 percent of the questions were answered correctly for all topics, except for programming, evaluation and surveillance which averaged about 80 percent.

Following this national workshop, the Ministry of Public Health is already planning to train nearly 1,000 health professionals at the various levels of the health system within the next 12 months.

Source: Division of Epidemiology, Ministry of Health, Cuba.

## Polio Surveillance Jamaica

On 1 June 1982 the Jamaican Ministry of Health informed PAHO of 18 suspected cases of poliomyelitis in St. James Parish, Montego Bay area. As of 25 June a total of 54 cases, including one death, had been reported. The date of onset for the first reported case was 14 March. Laboratory tests showed the presence of poliovirus type 1 in seven cases. Serological testing of one additional suspected case also confirmed that poliovirus type 1 was involved.

The 54 cases are broken down by age in Table 1.

TABLE 1. Number of reported poliomyelitis cases, by age group. Jamaica, March-June 1982.

Age group	Number of cases
0-4 years	30
5-9 years	12
10-14 years	3
15-19 years	4
20 years and older	5

Vaccination histories are known for 37 of the 54 cases (Table 2).

TABLE 2. Vaccination histories of reported poliomyelitis cases. Jamaica, March-June 1982.

Vaccination history	Number of cases
0 doses	29
1 dose	3
2 doses	2
3 doses	3
Unknown	17

The Ministry of Health reports that as of 16 June, 80 percent of the population under 15 years of age had received one dose of TOPV. Plans for the second phase of the vaccination program have already been made, and two million doses of TOPV are currently in stock for administration of the second dose.

Source: Ministry of Health, Jamaica.

**Editorial note:** The Jamaican Ministry of Health responded immediately to the polio outbreak by instituting the necessary control measures. Collaboration in the control effort was requested from both PAHO, which arranged for the visits of a consultant and the EPI technical officer for the Caribbean, and the Centers for Disease Control (Atlanta, Georgia), which sent a virologist to assist the Ministry in identifying the poliovirus. In addition, the EPI Revolving Fund rapidly fulfilled the Jamaican request for an emergency supply of 500,000 doses of polio vaccine by securing a loan from the Colombian Ministry of Health.

## Dominican Republic

The Dominican Republic's Secretariat of Public Health has reported a total of 93 suspected cases of paralytic poliomyelitis for the period January–May 1982. Most of the cases were reported from Health Regions 0 (43 percent), II (13 percent), III (14 percent) and V (27 percent).

A breakdown by month of onset is given in Table 1.

TABLE 1. Number of reported poliomyelitis cases, by month of onset. Dominican Republic, January–May 1982.

Month of onset	Number of cases
January	17
February	30
March	14
April	26
May	6

Control measures to contain the outbreak appear to be taking effect, as indicated by the low number of cases reported for May compared to previous months.

Source: State Secretariat of Public Health, Dominican Republic.

## Uruguay Approves Immunization Law

Uruguay has approved legislation requiring immunization against the major vaccine-preventable diseases in view of their serious social and economic consequences. The new law, which takes effect 1 July 1982, establishes a national vaccination plan which makes vaccination obligatory against diphtheria, mumps, whooping cough, poliomyelitis, rubella, measles, tetanus, and tuberculosis.

A new vaccination schedule certificate will be created in order to monitor compliance with the plan. It will supplement the currently used vaccination cards which are issued separately for each vaccine administered and indicate the date of the next required dose according to a person's age.

The new certificate will be issued only at vaccination

posts officially recognized by the Ministry of Health, on presentation of the appropriate vaccination cards. It will constitute official confirmation that a person has received all immunizations required for his/her age and will expire on the date the next vaccination is required.

The certificate will be obligatory for: (1) all children under 6 years of age for payment of the national family allowance ("*asignación familiar*"), (2) children of all ages for admission to public and private schools, (3) all persons who obtain or renew their national identity cards, (4) all persons who obtain any type of health card.

Persons who are excused from vaccination for medical reasons will be issued a document to that effect by the attending physician, and this document can be exchanged for the vaccination certificate at a vaccination post.

Source: Ministry of Health, Uruguay.

## Evaluation of BCG Vaccination Programs

Following the disappointing first results of the Tuberculosis Prevention Trial in south India, a WHO Study Group<sup>1</sup> recommended that BCG vaccination should be continued, especially in young children, but that its effectiveness should be studied without delay. BCG vaccination of infants having been practiced for many years in the Western Pacific Region, the Regional Office arranged for a consultant to visit several countries to collect data on the effectiveness of BCG vaccination in routine programs. The findings appear of general interest because they provide some information on the effectiveness of BCG vaccination and illustrate several relatively simple methods of obtaining such information from national programs. In addition, the studies demonstrate the advantage for evaluation purposes of systematically recording the vaccination status in cases of tuberculosis.

All countries visited were able to produce morbidity and mortality statistics on tuberculosis. Invariably these showed a decrease in tuberculosis in children, especially of tuberculous meningitis, but even when this decrease is larger than that in adults it cannot be ascribed to the effect of BCG vaccination. Any reduction in the risk of infection that might have resulted from improved living conditions or of tuberculosis case-finding and treatment measures would be reflected in the incidence of tuberculosis, and in particular in the lower (uninfected) age groups. Data of this kind are therefore not reported here; some special studies that allow the effectiveness of BCG to be evaluated in a quantitative manner are considered below.

<sup>1</sup>BCG Vaccination Policies, Report of a WHO Study Group, WHO Technical Report Series 652, Geneva, 1980.



In Malaysia<sup>1</sup> notifications of cases of tuberculosis were available for a number of years. The data were recorded separately for children with a BCG scar and for those without. In addition, the vaccination coverage had been determined in a national survey, in 1976-1977, so that the numbers of vaccinated and unvaccinated persons in the age group 0-19 years could be estimated.

These data suggest that the protective effect of BCG vaccination was some 60 percent (Table 1). It should be noted that this percentage applies to the year of observation. Most children had been vaccinated when they were under 1 year of age. Sputum-positive pulmonary tuberculosis is rarely found in young children, and although re-vaccination at school age was also given, the effect observed is mainly a long-term one.

TABLE 1. BCG coverage, number of tuberculosis cases and rates per 100,000 population in persons 0-19 years. Malaysia, 1977-79.

Year	Population aged 0-19 years (in thousands)		Number of cases confirmed bacteriologically		Rate per 100,000 population	
	With BCG scar	Without BCG scar	With BCG scar	Without BCG scar	With BCG scar	Without BCG scar
	1977	4,733	997	137	66	2.9
1978	4,971	877	166	82	3.3	9.4
1979	5,215	751	193	76	3.7	10.1
Total	14,919	2,625	496	224	3.3	8.5

$$\text{Protective effect} = (8.5 - 3.3)/8.5 = 61.2\%$$

As regards the effectiveness of BCG vaccination of young children, observations of cases of tuberculous meningitis admitted to Government hospitals in Malaysia in 1976-1978 are relevant. Of 20 cases in the 0-14 year age group, nine had a BCG scar and 11 did not. The vaccination coverage in this age group was 83 percent. The data are therefore suggestive of a protective effect of over 80 percent.

In Singapore a study was carried out in 1976 using notifications of tuberculosis in children attending primary and secondary schools. In both groups the vaccination coverage was known, so that the vaccinated and unvaccinated populations could be estimated.

Vaccination predominantly given to the newborn would therefore appear to have had a protective effect of over 85 percent at primary school age and of some 73 percent at secondary school age (Table 2).

In the Republic of Korea, 53 children treated for tuberculosis in a large hospital were examined. Most of them were in the 0-4 year age group and only seven had a BCG scar. From data of a survey carried out in 1976, the vaccination coverage in the corresponding population could be estimated to be about 60 percent. The protective effect

of BCG vaccination, therefore, appears to have been in the order of 90 percent.

TABLE 2. Number of tuberculosis cases and rates per 100,000 population, by BCG vaccination status in school children. Singapore, 1974.

Vaccination status	New cases	Total population	Rate per 100,000 population
Primary school (6-13 years)			
Vaccinated	16	318,600	5.0
Unvaccinated	13	35,400	36.7
Secondary school (13-18 years)			
Vaccinated	41	120,750	34.0
Unvaccinated	51	40,250	126.7

Protective effect in primary school children:

$$(36.7 - 5.0)/36.7 = 86.3\%$$

Protective effect in secondary school children:

$$(126.7 - 34.0)/126.7 = 73.2\%$$

The percentages given may suggest that the protective effect in the various surveys has been estimated with a high precision. It would have been possible to determine the statistical confidence limits of the various estimates but these would have given a false impression of precision. As the data were collected retrospectively, many factors that cannot readily be appreciated may have influenced the estimation of the protective effect of BCC vaccination one way or another. Thus, the infection rates in vaccinated and unvaccinated children may have been different as a result of selection, and some of the vaccinated children may have been infected before they were vaccinated. The data presented therefore are merely compatible with BCG having had a protective effect.

The way of calculating the protective effect retrospectively is similar to that used in prospective trials. In these, protection is classically defined as the difference of the incidences in the control and the vaccinated as a proportion of the incidence in the controls, or as

$$\frac{a/n - b/m}{a/n}$$

where *a* is the number of cases observed in the controls and *b* that in the vaccinated, and *m* and *n* the total populations in the vaccinated and control groups respectively. This formula may be reduced to  $1 - b/a \cdot n/m$ , where *b/a* is the ratio of the numbers of vaccinated and unvaccinated cases, and *n/m* is the ratio of the total numbers of unvaccinated and vaccinated persons in the study. In retrospective evaluation the former ratio is easily determined in patients diagnosed, but the latter must be found in a population representative of that from which the patients emanated to achieve a degree of comparability similar to that obtained by random allocation in prospective trials. When the vaccination coverage is very high (or low) this may be difficult and selection may be hard to exclude.

<sup>1</sup>See *Wkly Epid Rec* 56 (6):45-46, 1981.

**NUMBER OF REPORTED CASES OF MEASLES, POLIOMYELITIS, TETANUS, DIPHTHERIA AND WHOOPING COUGH. 1982 AND 1981, BY COUNTRY AND DATE OF LAST REPORT.**

COUNTRY	DATE OF LAST REPORT	MEASLES		POLIOMYELITIS		TETANUS		DIPHTHERIA		WHOOPING COUGH	
		1982	1981	1982	1981	1982	1981	1982	1981	1982	1981
ARGENTINA	<sup>a</sup>	...	5,065	...	...	...	105	...	35	...	8,283
BAHAMAS	5 JUN.	11	21	—	—	—	2	—	—	4	7
BARBADOS	22 MAY	1	—	—	—	2	5	—	5	3	1
BOLIVIA	30 JAN.	117	353	—	3	13	12	2	2	171	286
BRAZIL	13 FEB.	2,523	7,028	17	18	209	336	330	360	4,549	5,280
CANADA	17 APR.	391	1,174	—	—	4	1	2	1	727	769
CHILE	<sup>a</sup>	...	1,307	...	...	...	8	...	111	...	1,470
COLOMBIA	<sup>a</sup>	...	6,507	...	82	..	192	...	54	...	1,832
COSTA RICA	8 MAY	41	61	—	—	6	3	—	—	8	119
CUBA	24 APR.	17,910	2,556	—	—	9	11	—	—	312	46
DOMINICA	1 MAY	1	—	—	—	—	—	—	—	4	1
DOMINICAN REP.	30 MAY	...	...	93	...	...	...	...	...	...	...
ECUADOR	<sup>a</sup>	...	2,889	...	9	...	39	...	6	...	320
EL SALVADOR	24 APR.	2,059	2,980	5	19	47	41	1	1	694	398
GUATEMALA	5 JUN.	241	8	—	—	2	—	—	—	—	—
GUYANA	<sup>a</sup>	...	—	...	...	...	...	...	—	...	35
HAITI	27 FEB.	122	184	1	—	30	6	8	1	71	16
HONDURAS	8 MAY	1,313	890	5	8	9	7	—	—	626	327
JAMAICA	1 MAY	950	2,663	54 <sup>b</sup>	—	3	6	3	3	80	7
MEXICO		...	...	...	...	...	...	...	...	...	...
NICARAGUA		...	...	...	...	...	...	...	...	...	...
PANAMA	1 MAY	2,314	832	—	—	6	15	—	—	13	53
PARAGUAY	1 MAY	95	216	40	3	59	54	7	2	158	195
PERU	1 MAY	498	2,603	22	161	10	147	—	203	607	2,310
SAINT LUCIA	10 APR.	59	16	—	—	1	—	—	—	—	—
ST. VINCENT AND THE GRENADINES	24 APR.	355	—	—	—	—	—	—	—	—	1
SURINAME	28 MAR.	17	596	—	—	...	...	—	1	1	...
TRINIDAD & TOBAGO	24 APR.	192	1,655	—	—	8	5	—	3	1	5
U.S.A.	12 JUN.	779	2,110	2	—	32	20	—	3	457	456
URUGUAY	3 APR.	31	258	—	—	8	5	—	—	250	99
VENEZUELA	22 MAY	5,937	7,530	—	—	...	...	2	1	702	1,385

<sup>a</sup>Data not available for 1982. Data for 1981 through last epidemiological week in June.  
<sup>b</sup>25 June

— No cases  
 ... Data not available

Another type of selection for which retrospective studies have been criticized is concerned with the actual findings—there may be a tendency to publish only favorable results. To overcome this to some extent, it is strongly suggested that retrospective evaluation be carried out within the framework of the WHO Exigency Program on the Evaluation of BCG vaccination. Further information on this program may be obtained from the Chief Medical Officer, Tuberculosis and Respiratory Infections, WHO, Geneva.

Source: *Wkly Epid Rec.* 57 (16):121-123, 1982. Tables adapted by National Tuberculosis Institute, Argentina.

**Editorial note:** The evaluation of a vaccination program includes both operational aspects (coverage, quality of the vaccine applied) and epidemiological aspects (impact). The indirect effect of BCG vaccination on the tuberculosis problem is small,<sup>1</sup> since most of the cases avoided in children and young adults are closed forms which are not sources of infection. However the direct effect, especially the protection conferred to vaccinated children, has been well documented.<sup>2</sup> The impact should be measured, therefore, by the reduction in the incidence and mortality of all forms of tuberculosis in children, especially meningitis in children under 5 years of age.

The preceding study shows that information on the vaccine's protective effect can be obtained under routine program conditions, using simple and low-cost techniques.

<sup>1</sup>Styblo K. Recent advances in epidemiological research in tuberculosis. *Adv Tub Res* (Karger, pub.) 20, 1980.

<sup>2</sup>WHO BCG vaccination in the newborn and young infants. *Wkly Epidem Rec* 55 (4):1-3, 1980.

This type of retrospective study should be included periodically in all countries which conduct BCG vaccination in the Region of the Americas.

## Bahamas Contributes to EPI Revolving Fund

The Government of the Bahamas has donated \$500 to the EPI Revolving Fund for the purchase of vaccines, making it the eighth country or organization to contribute to the fund's capitalization. (See *EPI Newsletter* Vol. IV, No. 1 for details.)

Increasing the fund's capitalization will facilitate the ease and speed with which participating countries can obtain vaccines and cold chain equipment.

With this most recent contribution, capitalization of the EPI Revolving Fund now stands at \$2,314,500.

## Belize Holds EPI Workshops

Belize held two EPI workshops for middle and lower level health personnel in 1981 which were coordinated by trainers who had attended the five-day national course in October 1980.

The training required two full days and was conducted separately in the district health centers of Stann Cree' (19-20 October) for 22 participants, and Toledo (22-23 October) for 19 participants. The first three modules of the five-module training package were used, emphasizing characteristics of the EPI diseases and vaccines, and the cold chain.

Source: Ministry of Health, Housing and Cooperatives, Belize, and Henry Smith, PAHO Technical Officer.

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