

# EPI Newsletter

## Expanded Program on Immunization in the Americas

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IMMUNIZE AND PROTECT YOUR CHILD

August 1981

### Multidisciplinary EPI Evaluation: Bolivia

Following Colombia's national EPI evaluation in November 1980, Bolivia became the second country in the Region of the Americas to carry out a multidisciplinary study of its immunization program. From 8 to 19 December 1980, an evaluation team studied Bolivia's Expanded Program on Immunization in order to identify its greatest strengths and weaknesses, and to make a list of recommendations for improving each component of the program. The methodology used for this evaluation was described in *EPI Newsletter*, Vol. III, No. 3, "Multidisciplinary EPI Evaluation."

The major achievements, problems and recommendations identified by the EPI evaluation team in Bolivia are described below.

#### Accomplishments

As a result of the accomplishments enumerated below, it can generally be said that the operational level now has the motivation, information and means to undertake measures for the protection of children against the EPI target diseases.

#### Programming

A good programming system has been implemented at the central level and in the "take-off areas" (one demonstration area was chosen for each Health Unit and designated a "take-off area"); this system is also being extended to other areas.

#### Cold chain

The cold chain is being implemented at the central and regional levels and partly at the operational level; refrigerators, insulated containers and thermometers have been distributed in accordance with the needs of the program. The staff has been observed to be more conscientious, as attested by the fact that refrigerator temperatures are being registered daily.

#### Delivery of biologicals

The system for the acceptance, storage and distribution of biologicals is functioning well from the central down to the operational level.

Throughout 1980 stocks of all vaccines except BCG were sufficient at all levels.

#### Training

In collaboration with the Division of Maternal and Child Health, the EPI Manual of Operations has been

published in an edition of 5,000 copies, of which 2,000 have already been distributed at the different levels.

Following the national EPI workshop in June 1979, which was attended by 82 professionals, similar workshops have been held in all Health Units, in which 355 health personnel of all levels have participated.

Good motivation and an understanding of EPI norms have been found at all levels.

#### Information system and epidemiological surveillance

An information system has been implemented that can promptly deliver to the central level the data on immunizations performed at the operational level.

An epidemiological surveillance system suitable for investigating outbreaks of communicable diseases is being developed.

#### Promotion

The EPI has published a variety of educational materials, including 180,000 booklets, 1,000 flip charts, 55 sets of slides, and 1,500 posters on vaccination, and has distributed them to the operational levels.

In most take-off areas visited it was found that efforts were being made to promote immunizations in the community.

#### Supervision

In some areas the frequency of supervisory visits to the various levels was found to have increased, both for the EPI and for other health programs.

#### Funding

Funding for the EPI has been obtained from USAID in the amounts of \$b. 6,000,000 in 1979, \$b. 8,000,000 in 1980, and \$b. 13,000,000 for 1981, under Title III of P.L. 480. It should be emphasized that these funds have made possible the launching and implementation of the EPI.

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### *Coordination*

Good coordination has been achieved with the Division of Maternal and Child Health in the early phases of program implementation.

### *Administration*

An efficient administration and management of the program has been established at the central level.

### *Problems*

It should be mentioned that, in recent years, complete immunization coverage of children under 1 year of age has been less than 15 percent; moreover, tetanus toxoid is not administered to pregnant women in areas where neonatal tetanus is endemic.

### *Programming*

- The operational level has no role in programming, and does not know either the population in its area of influence or the number of children to be vaccinated.

- In some establishments visited, the only vaccination strategy is to attend spontaneous demand which, together with scant promotional work, could account for the low coverages.

- In areas where the strategy of vaccination by quarters is followed, there is no system for seeking out the unvaccinated, nor is any vaccination offered during the intervening periods. Moreover, there is no screening system to ensure completion of the vaccine series.

- Vaccination norms do not provide for the administration of tetanus toxoid to pregnant women.

### *Cold chain*

- At the central level, the Vaccine Bank does not own its own premises, and the program personnel do not enjoy free access to them. As a result, temperature readings are not taken daily.

- The specially trained cold-chain technician is no longer employed in that capacity, and the Central Vaccine Warehouse has no one in charge who is trained to act in an emergency.

- At the operational level there are facilities where the cold chain has not been implemented due to lack of equipment.

- In some areas visited, an understanding of the norms for the preservation of vaccines and daily temperature readings has been found to be lacking.

### *Supplies and biologicals*

- It was found that BCG was the only vaccine not supplied in sufficient quantity during 1980.

- At many establishments, syringes and hypodermic needles are in short supply.

### *Training*

Since the EPI training program was only begun in 1980, it has not been possible to train all the operational personnel. This problem is being aggravated by frequent transfers of trained personnel.

### *Immunization information system and epidemiological surveillance*

- Health establishments frequently do not have copies of their own EPI-8 forms (monthly immunization reports) or morbidity reports.

- No health establishment visited kept any cumulative data for the year.

- The Health Units do not oversee compliance by the operational units with the reporting requirements, nor do they have any system for following up on establishments which fail to submit reports.

- Some 20 percent of the health establishments do not send in weekly morbidity reports.

### *Community promotion and participation*

- It has been found that about 70 percent of the children under 1 year of age who were given the first dose of polio and DPT vaccines did not receive their third dose.

- There is resistance to immunizations and high drop-out rates in communities that are highly traditional or of low sociocultural level.

- Coordination between the EPI and the Division of National Health Education is poor.

- Although the EPI priority target is children under 1 year of age, it is found that a significant number of children older than 1 year are being vaccinated.

### *Supervision*

- While the frequency of supervision has increased, it has not yet reached optimum levels, and timetables are not met.

- There are no norms for supervision and, as a rule, written reports are not left in the supervised establishment.

- There is no supervision of EPI nursing personnel in rural areas.

- The only person available at the central level for supervision of the EPI throughout the country is the Program Manager.

### *Resources*

- Office space for the EPI is insufficient.

- There is a marked shortage of transportation facilities both for vaccination and for supervision.

- The budget for travel expenses is insufficient to cover all the supervisory travel.

### *Coordination*

- In general, the health services of the paragonmental and private institutions do not perform vaccinations.

- Intra- and extra-institutional coordination is inadequate.

### *Administration*

- Customs formalities are complex and cumbersome, and can delay the receipt of imported materials for as long as several months.

- In most Health Units, the number of hours prescribed in the General Labor Law are not worked in full.

## Recommendations

### *Programming, strategies and operational aspects*

- Personnel at the operational level should participate in programming so that they know the population in their area of influence and the number of children to be vaccinated.
- It is recommended that a single programming system be implemented in the several divisions of the Ministry of Public Health and Welfare (MPSSP).
- Establishments providing vaccinations on demand must endeavor to reach out into the field to extend their coverages, and should establish an active follow-up procedure to reduce dropouts between the first and third doses.
- In areas following the strategy of vaccination by quarters, a system must be set up so that vaccinations are provided during the periods between quarters.
- Each child should be provided with his own vaccination card at the time of his first vaccination.
- In the first phase of EPI implementation, the more densely populated areas must be made the first priority, with the more scattered populations to be covered subsequently.

### *Cold chain*

- The physical premises of the Vaccine Bank at the central level should be remodeled, and the EPI personnel should be allowed free access to it to take daily temperature readings.
- There must be specially trained cold-chain personnel to oversee and maintain equipment at the central and regional levels.
- Implementation of the cold chain at the operational level must be progressively completed.

### *Supplies and biologicals*

- The EPI should take responsibility for supplying BCG vaccine for children under 3 years of age.
- Adequate supplies of syringes and needles must be reliably provided for the operational level.

### *Training*

- The operational staff must be given an improved understanding of EPI norms by means of: a) new regional workshops for personnel not yet trained, b) continuing education, and c) the preparation of a simplified EPI manual for use at the local level.
- The Department of Human resources of the MPSSP should include information on the EPI in all its training programs.

### *Information systems and epidemiological surveillance*

- The EPI-8 form must be revised to group together children over 3 years of age and should include cumulative figures for each age group.
- Copies of all reports should be available in all health establishments.
- The Health Units should verify that reports are received and sent out on time.

- A report on immunization activities should be published and circulated down to the operational level every six months.

- The tabulation, consolidation and analysis of epidemiological surveillance data at the regional and national levels should be streamlined and provision made for feedback to the operational level.

### *Promotion*

- A study should be made of the causes for dropout from the program between the first and third doses of DPT/polio.
- Vaccination at the community level should be promoted using every appropriate technique in close coordination with the Division of National Health Education.
- There should be more emphasis on the vaccination of children under 1 year of age.

### *Supervision*

- At the central level of the EPI there should be enough personnel to improve the currently limited supervisory capability.
- A manual on supervision should be prepared and emphasis placed on the need to leave reports at all levels supervised.
- Supervision should be extended to EPI nursing activities in rural areas.
- The staff of the Maternal and Child Health Division should include aspects of EPI supervision in their routine supervisory visits.
- PAHO should be asked to have one of its permanent consultants give part of his/her time to support implementation of the EPI.

### *Resources*

- Adequate premises should be provided for the EPI offices.
- The EPI should be provided with appropriate transportation for purposes of vaccination and supervision.
- Adequate travel funds should be provided for EPI supervision. The present system of providing a fixed amount for travel regardless of whether any trips are taken is a deterrent to travel: it should be replaced by the payment of per diem rates based on the trips a person has actually made.

### *Coordination*

- Non-MPSSP institutions with health services should be encouraged to perform vaccination services.
- Intra- and extra-institutional coordination should be promoted through periodic informational meetings, particularly with the Divisions of Maternal and Child Health, Health Education, Nursing, and Manpower.
- Since teachers can play an important role in promoting vaccination, activities to make them aware of the EPI objectives should be coordinated with the Ministry of Education.

### *Administration*

- Health personnel should be required to keep to the official daily work schedule.

- Customs formalities should be streamlined as much as possible, in coordination with the appropriate agencies.

- The national EPI evaluation team should hold quarterly meetings to determine the progress made in implementing these recommendations. These meetings will be promoted and coordinated by the EPI Program Manager.

- A new evaluation of the EPI in Bolivia should be made in the first quarter of 1982.

### The evaluation team

The team was made up of nine persons from the Ministry of Public Health and Welfare, three officials from PAHO/WHO, and one observer from Argentina. All members of the team devoted their fulltime efforts to the EPI evaluation for two weeks.

On completion of the evaluation, the team drew up a timetable outlining the steps to be taken in order to implement their recommendations.

The complete report on the EPI evaluation in Bolivia may be obtained from:

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 Jefe, Programa Ampliado de Inmunización  
 Ministerio de Previsión Social y Salud Pública  
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### Poliomyelitis: Colombia, 1981

During the period 1 January through 9 July 1981, the Divisions of Epidemiology and Statistics of the Ministry of Health in Bogotá received reports of 272 cases of poliomyelitis, including 18 deaths (case-fatality ratio of 6.6 percent), among residents of 14 of the 31 Sectional Health Services (departments, territories and special district). Figure 1 shows the geographic distribution of the reported cases. One hundred forty-six (54 percent) of the cases were associated with an epidemic occurring in the department of Atlántico.

The first notification of probable epidemic activity of poliomyelitis in Atlántico was in mid-May, coincident with a large epidemic of gastroenteritis following unusually heavy rains during the month. As of 2 July 1981, there were reports of 146 cases of poliomyelitis in residents of Atlántico, of which all but three (97.9 percent) were residents of the city of Barranquilla. There were 14 deaths reported (case-fatality ratio of 9.6 percent). Cases were reported from all areas of the city, with a predominance from the outlying neighborhoods.

Figure 2 shows the number of cases, by week of admission to the hospital. Dates of onset of illness were not available for all cases, but in the 18 cases where dates were available, the mean interval between date of onset of symptoms and date of admission to the hospital was 7.3 days (range 2-21 days,  $\pm 6.15$ ). The male:female ratio was 1.1:1.

Cases ranged in age from 45 days to 11 years. Table 1 shows the age distribution and age-specific attack rates of the cases. While 89.5 percent of the cases occurred in individuals less than 3 years of age, the age group most affected was children between 6-11 months of age (attack rate 26.70/10,000 population).

FIGURE 1. Geographic distribution of 272 reported cases of poliomyelitis, by Sectional Health Service. Colombia, 1 January-9 July 1981.

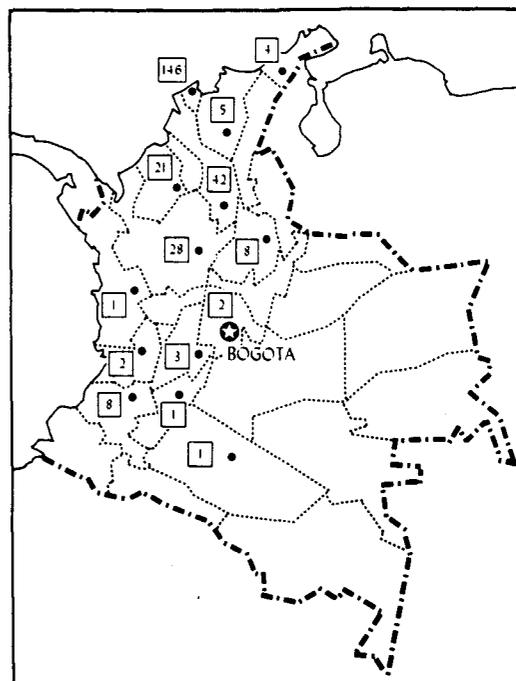
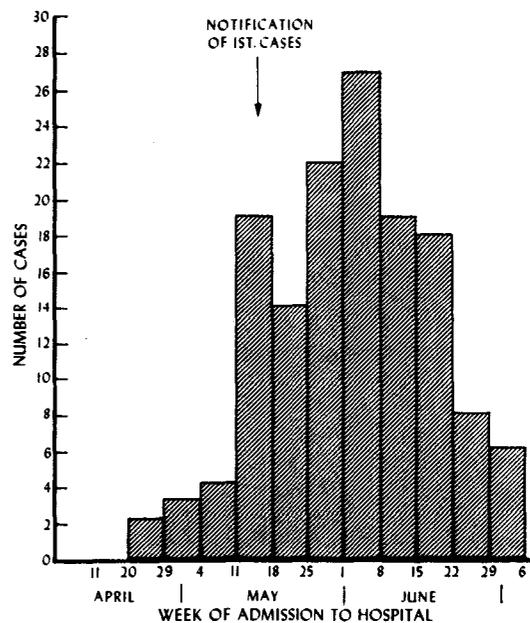


FIGURE 2. Number of cases of poliomyelitis, by week of admission to hospital. Atlántico, Colombia, 1981 (as of 2 July 1981).



Of the 142 cases for which immunization histories were known, 133 (93.7 percent) had never received polio vaccine; five (3.5 percent) had received their first dose of polio vaccine within 10 days preceding onset of their symptoms; two (1.4 percent) had a history of receiving two doses of polio vaccine, and two (1.4 percent) had a history of receiving three doses of vaccine.

**TABLE 1. Age distribution and age-specific attack rates per 10,000 population of 142 reported cases of poliomyelitis among residents of Atlántico, Colombia, 1981.**

Age	No. of cases	% of total cases	Attack rate per 100,000 population <sup>a</sup>	
less than 6 months	8	5.6	4.85	15.78
6-11 months	44	31.0	26.70 <sup>b</sup>	
1 year	61	43.0	19.09	0.25 <sup>c</sup>
2 years	14	9.9	4.52	
3 years	7	4.9	2.26	
4 years	3	2.1		
5-14 years	5	3.5		
Total	142	100.0	3.14 <sup>d</sup>	

<sup>a</sup>Populations used were the 1981 projections of the National Department of Planning, based on the 1973 census.

<sup>b</sup>Population used assumes that 50 percent of the population less than 1 year old is less than 6 months old, and 50 percent is between 6-11 months old.

<sup>c</sup>Population statistics only available for the age group 4-14 years.

<sup>d</sup>Attack rate for the 0-14 year old age group.

Table 2 shows the number of doses of polio vaccine administered during the period January-May 1981 in Atlántico, by age group of vaccinee and percentage of total vaccine administered. Forty-eight percent (27,321 doses) of the polio vaccine administered during 1981 was given during the month of May, coincident with the publicity surrounding the epidemic.

Table 3 shows a comparison of coverage of the less than 1-year old population with polio vaccine in 1980 versus 1981 (through 1 June 1981). While there is an improvement in the coverage with three doses of polio vaccine, the dropout rate (percent difference between the number of children receiving their first dose of vaccine and the number of children completing the 3-dose series) has not changed.

**TABLE 2. Number of doses of polio vaccine administered, by age of vaccine recipient and percentage of total doses administered. Atlántico, Colombia, January-May 1981.**

Age	Number of doses administered	Percentage of total doses
less than 1 year	16,400	28.7
1 year	9,743	17.0
2 years	8,327	14.5
3 years	10,923	19.1
4 years and older	11,807	20.6
Total	57,240	99.9

**TABLE 3. Percent coverage of the less than 1 year old population with polio vaccine, by dose in series, and percent dropout between first and third dose in series. Atlántico, Colombia, January-December 1980 compared with January-May 1981.**

Year	Dose in series			% dropout
	First	Second	Third	
1980	36.9	24.4	15.7	57.4
1981	66.1	25.5	28.1	57.5

Intensive country-wide control measures, recommending polio immunization of all children less than 5 years old, are presently underway.

Source: Ministry of Health, Colombia.

**Editorial note:** Poliomyelitis continues to be a major health problem in many countries in the Americas. The epidemic in Atlántico, Colombia, illustrates several problems faced in the Americas in the control of poliomyelitis.

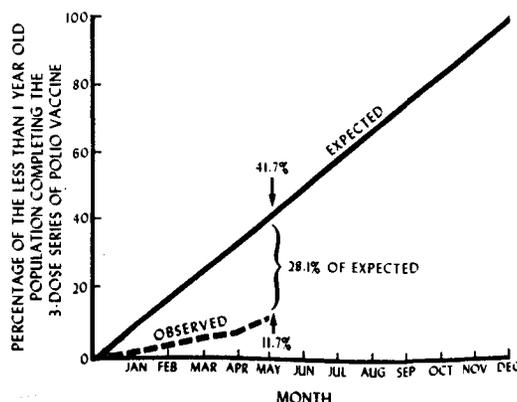
Delays in the notification of cases to health authorities lead to delays in the institution of control measures, so that by the time control measures are implemented, many children have already been infected by the poliovirus. A review of Figure 2 illustrates this point: assuming an average incubation period of 10-14 days, by the time health authorities had been notified of the first cases of polio, a minimum of 63 children were already infected with poliovirus.

Poliovirus has been occurring in Atlántico, Colombia, in epidemic cycles of two years, with the preceding epidemic years being 1977 and 1979. This is confirmed by a review of the age distribution of cases, which shows that 80 percent of the 1981 cases have occurred in individuals less than 2 years of age, who were born after the last major epidemic. Further substantiation is seen in the age-specific attack rates per 10,000 population: the age groups at highest risk are those children between 6-11 months of age, followed by children 1 year of age.

A comparison of Tables 1 and 2 shows that, while the age groups most affected are those children less than 2 years of age, only 44.2 percent of the polio vaccine administered in response to the epidemic in May 1981 was administered to this population. This probably contributed to the continued occurrence of cases in Atlántico after the institution of control measures. In addition, the high attack rate in children less than 1 year of age lends further support to the recommendation of the EPI to identify the less than 1-year old population as the target group for immunization programs.

One method of evaluating EPI performance and needs is presented in Figure 3. This figure represents a comparison of the percentage of children actually completing

**FIGURE 3. Percentage of total population less than 1 year of age observed completing a primary series of three doses of polio vaccine. Atlántico, Colombia, January-May 1981, by month, as compared with expected percentage.**



the 3-dose series of polio vaccine, with the percentage of children scheduled to complete the series. Thus, by the end of May, 41.7 percent of the population less than 1 year of age in Atlántico should have completed the 3-dose series of polio vaccine, whereas only 11.7 percent had actually completed the series.

In response to the country-wide EPI evaluation which took place in Colombia in November 1980 (see *EPI Newsletter*, Vol. III, No. 3), health authorities are intensifying measures to increase coverage with all the EPI vaccines. Considerable progress has already been made in implementing the recommendations of the evaluation team. For example, a new strategy for reaching the target population has been implemented in several states. This strategy emphasizes community education and active followup of the target population to ensure they reach the immunization centers. Preliminary results are encouraging, showing coverages of greater than 85 percent in most areas.

## The Thermostability of Different BCG Products

### Introduction

BCG is a live vaccine, and its viability is known to diminish according to both the duration and the temperature of storage. A considerable improvement in the keeping quality may be obtained by freeze-drying the vaccine. Although this procedure itself causes a certain loss of viability, the dried product keeps for many years when stored at a temperature not exceeding 6°C. Under such conditions, therefore, BCG vaccine could be considered as "storage stable." Unfortunately this increase in keeping quality has been confused with "heat-stable;" at higher temperatures the dried vaccine also gradually loses its viability, and the higher the temperature the higher the loss of viability.

Whereas in general it is possible to keep the vaccine at the required temperature in the production laboratory and at central storage centers, exposure to higher temperatures during transport and field storage may occur inadvertently or may simply be unavoidable. To illustrate what happens in such cases, the degradation curves at certain temperatures have been determined for a number of vaccines. The curves may be used to devise biochemical indicators of viability that can be packed with the vaccines. It has been suggested that repeated freezing and thawing could be deleterious to the vaccine owing to recrystallization of residual moisture. A special experiment was set up to investigate this point.

The vaccines examined in this investigation were those commonly supplied by UNICEF: from the Japan BCG Laboratory, Tokyo; Glaxo Laboratories, Greenford; and the Institut Pasteur, Dakar; as well as the product from the Statens Serum Institut, Copenhagen.

### Results

As was expected, there were slight differences between the counts for the different batches of each product, but these differences were not related to ampoule size. Moreover, the degradation curves for the different batches of each product were very similar.

For practical guidance, smooth curves have been con-

structed showing for each storage temperature and duration the percentage of particles culturable as compared with storage at 2-6°C. These are shown in Figures 1 and 2.<sup>1</sup> At this temperature there is indeed no loss of viability, and at 13-15°C the loss is only very slight in the course of time. At 23°C the loss of viability is significant for all products, and it should be noticed that it is steepest at the beginning of the observation period. At 30°C and 37°C degradation starts off very rapidly; for the vaccine of the Japan BCG Laboratory it is markedly less than for the other products, for which it is very similar.

As regards the storage at low temperatures, it was seen that, allowing for experimental error, the results are very similar. It was noted that freezing and thawing, unexpectedly, does not appear to influence the quality of the vaccines.

### Discussion

The results show clearly that exposure of the vaccines to high temperatures is deleterious and therefore should be avoided. The curves show that degradation is steepest at the beginning of exposure, but the present experiment does not show what happens if the temperature fluctuates.

FIGURE 1. Viability of BCG vaccine according to temperature and time of storage. Vaccine: Japan BCG Laboratory, Tokyo.

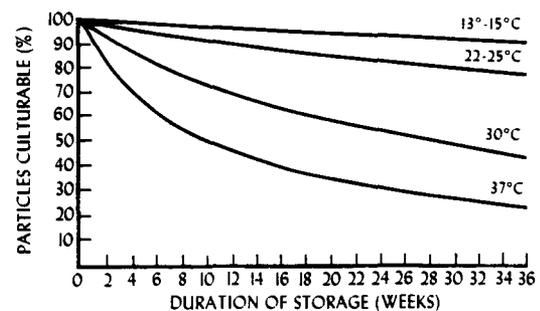
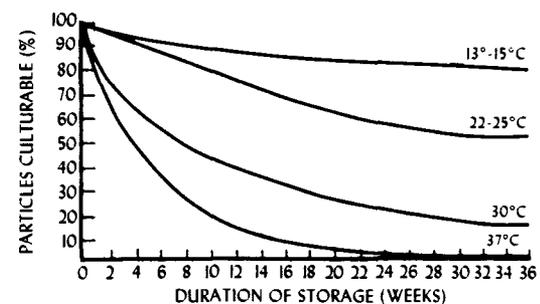


FIGURE 2. Viability of BCG vaccine according to temperature and time of storage. Vaccine: Glaxo Laboratories, Greenford.



<sup>1</sup>The detailed counts are available upon request from the Chief, Tuberculosis and Respiratory Infections Unit, Division of Communicable Diseases, WHO, Geneva. Graphs for Danish and Dakar vaccines have not been reproduced from the original article. Curves are similar to those for Glaxo vaccine.

**NUMBER OF REPORTED CASES OF MEASLES, POLIOMYELITIS, TETANUS, DIPHTHERIA AND WHOOPING COUGH. 1981 AND 1980, BY COUNTRY AND DATE OF LAST REPORT.**

COUNTRY	DATE OF LAST REPORT	MEASLES		POLIOMYELITIS		TETANUS		DIPHTHERIA		WHOOPING COUGH	
		1981	1980	1981	1980	1981	1980	1981	1980	1981	1980
ARGENTINA	18 Jul. 81	5647	2221	...	31	113	116	38	45	9037	11917
BAHAMAS	08 Aug. 81	31	432	—	—	2	3	—	—	7	11
BARBADOS	01 Aug. 81	—	25	—	—	6	8	7	3	3	—
BOLIVIA	31 Jan. 81	353	159	3	—	12	11	2	7	286	111
BRAZIL	09 May 81	17107	21637	69	931	856	1022	1257	1583	12931	14607
CANADA	11 Jul. 81	1786	11564	—	—	1 <sup>a</sup>	1	3	37	1118	1145
CHILE	20 Jun. 81	1307	1959	...	—	8	9	111	109	1470	478
COLOMBIA	18 May 81	6507	3106	82	45	192	231	54	148	1832	2893
COSTA RICA	20 Jun. 81	79	616	—	—	5	5	—	—	113	453
CUBA	23 May 81	3488	2227	—	—	12	4	—	—	65	39
DOMINICA	04 Jul. 81	—	—	—	—	—	2	—	—	1	1
DOMINICAN REP	31 Aug. 80 <sup>b</sup>	...	7306	...	81	...	74	...	150	...	255
ECUADOR	28 Feb. 81	1150	413	6	—	19	15	3	1	62	234
EL SALVADOR	04 Jul. 81	5394	1220	31	3	77	39	1	—	1125	276
GRENADA	25 Jul. 81	8	49	—	—	1	—	—	1	—	30
GUATEMALA	18 Apr. 81	1015	1093	12	18	22	30	14	1	371	431
GUYANA	06 Jun. 81	19	358	...	...	...	9	—	1	8 <sup>c</sup>	...
HAITI	11 Jul. 81	493	198	— <sup>d</sup>	6	21	233	1	29	57 <sup>d</sup>	307
HONDURAS	01 Aug. 81	2216	2845	10	3	13	16	—	1	716	1372
JAMAICA	23 May 81	3329	15	—	—	3	2	3	4	10	21
MEXICO	28 Feb. 81	2687	3686	28	149	71	83	—	—	836	609
NICARAGUA		...	...	...	...	...	...	...	...	...	...
PANAMA	30 May 81	1030	1029	—	—	16	16	—	—	60	327
PARAGUAY	13 Jun. 81	255	214	6	6	72	75	3	2	236	510
PERU	04 Jul. 81	5871	3396	310	58	274	95	811	80	6369	1831
SAINT LUCIA	13 Jun. 81	56	23	— <sup>e</sup>	—	1 <sup>e</sup>	—	—	—	328 <sup>e</sup>	23
ST. VINCENT	09 May 81	—	227	—	—	—	—	—	—	1 <sup>f</sup>	17
SURINAME	20 Jun. 81	688	2	—	—	...	...	1	—	...	...
TRINIDAD & TOBAGO	18 Jul. 81	3149	192	—	—	9	14	3	—	7	4
U.S.A.	01 Aug. 81	2514	12434	1 <sup>g</sup>	6 <sup>h</sup>	34	45	3	2	596	757
URUGUAY	02 May 81	342	61	—	—	5	4	—	—	114	103
VENEZUELA	27 Jun. 81	10817	4817	—	—	...	...	4	8	1788	921

<sup>a</sup>16 May 1981

<sup>b</sup>Data not available for 1981. Data for 1980 through last epidemiological week in August.

<sup>c</sup>31 January 1981

<sup>d</sup>27 June 1981

<sup>e</sup>06 June 1981

<sup>f</sup>25 April 1981

<sup>g</sup>1 paralytic case

<sup>h</sup>4 paralytic cases

— No cases

... Data not available

tuates, i.e. whether degradation would be as steep if the vaccine were exposed for a second time to a high temperature. Experience seems to indicate that this is not the case, and that the effects of different exposures are simply additive.

The crucial question, which obviously is not answered by this study, is how much loss of viability is permissible before the vaccine should be discarded. From studies on BCG-induced tuberculin sensitivity it is known that the response to vaccination is dose-dependent. Which dose is needed to give maximum protection, however, is not known, and for this reason it is always attempted to give the highest dose that is tolerated. The vaccines have been calibrated accordingly. Loss of viability has an effect similar to reducing the dosage in terms of post-vaccination tuberculin sensitivity (what this means in terms of protection is not known) but not in terms of the lesion produced. Thus loss of viability cannot be compensated for by giving a higher dose, and certainly any vaccine that may have lost as much as, say, 50 percent of its viability should be discarded (or reexamined for viability; see document WHO/TB/Technical Guide/77.8). In this connection, one should keep in mind that a certain reduction in the number of culturable particles may correspond to a much higher reduction in the number of live bacilli, a particle presumably being culturable as long as a single bacillus in it is live.

Source: K. Bunch-Christensen, Chief, BCG Department, Statens Serum Institut, Copenhagen (WHO Collaborating Center for BCG Vaccine). Document WHO/TB/81.118 (WHO Geneva, 1981).

## Regional Meeting for EPI Program Managers From English-speaking Countries: Jamaica, 14-18 September 1981

Following the regional EPI meeting for Spanish-speaking countries held in Quito, Ecuador, from 18 to 22 May 1981 (see *EPI Newsletter*, Vol. III, No. 3), a similar meeting for English-speaking countries is being planned for 14-18 September in Kingston, Jamaica. The EPI Program Managers and other national health authorities from each of the 18 English-speaking countries in the Caribbean and Suriname have been invited to attend the 5-day meeting.

The purpose of the meeting is to give participants an opportunity to evaluate the progress being made in implementing the EPI in each of their countries, to identify major problem areas and to propose better ways of implementing immunization programs within the strategy of primary health care. The meeting is being cosponsored by the Pan American Health Organization and the American Public Health Association.

## EPI Courses in Bolivia

Two local EPI courses have recently taken place in Bolivia. One workshop was held from 1 to 4 July 1981 in the city of Santa Cruz, and was attended by 47 nurses and vaccinators and 6 monitors. Another EPI workshop took place in the city of Trinidad, Department of Beni, from 9 to 10 July 1981. Thirty-eight nursing auxiliaries and vaccinators and 4 monitors participated in the latter workshop.

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