

# EVALUATION OF CHILE'S NATIONAL TUBERCULOSIS PROGRAM<sup>1</sup>

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*A major need of national tuberculosis programs, especially in developing countries, is to integrate anti-tuberculosis measures into general health activities, thus permitting the resources of all health sector institutions, both public and private, to be utilized in a common program. This paper presents an account of what has been done recently in Chile with that end in mind.*

## Introduction

The health measures employed by Chile's national tuberculosis program can be separated into two main categories, depending on whether they are aimed at protection or recovery of health.

At the national level, protective activities are the exclusive preserve of the National Health Service (SNS), which is responsible for BCG vaccination of newborns and revaccination of schoolchildren. While most health recovery activities (case-finding and treatment of patients) are also carried out by the SNS (which cares for insured persons and indigents), about 20 per cent of the population is covered by the Employees' National Medical Service (SERMENA), which serves other white-collar personnel, and another 10 per cent is covered by other government institutions and private medical services.

Chile's BCG vaccination program includes an initial vaccination at birth, administered in maternity hospitals and clinics by "matronas,"<sup>4</sup> and two revaccinations, one when children enter primary school at age six and the second when they graduate from it at age 14-15. These two revaccinations are administered by staff members of SNS hospitals located throughout the country.

Case-finding among respiratory symptomatics is carried out by the SNS. Urban areas with fixed X-ray equipment use this equipment, while urban areas without it and all rural areas use microscopic examination of sputum specimens. It is SNS policy to replace radiography with microscopy and to make the latter the sole SNS case-finding method employed at the national level. Some parts of Santiago are already relying entirely on the latter method. SERMENA, because of its patient care system, bases case-finding on the required annual physical examination given all those receiving its services. Other participating institutions use a variety of methods.

Treatment of cases by both SNS and SERMENA is fully supervised and is based on a regimen of streptomycin, isoniazid, and thioacetazone—though in many cases the thioacetazone is replaced with para-aminosalicylic acid. The capacity to provide other drug treatments has been centralized in certain specialized services. The current trend is toward employing ambulatory treatment from the start.

SNS has a network of tuberculosis laboratories, integrated with general laboratories, which provide nationwide coverage for purposes of microscopic diagnosis. Many of these have facilities for preparing bacterial cultures and some also have the capacity to carry out sensitivity studies. The policy in recent years has been to reduce the number of laboratories equipped to prepare cultures, to limit drug sensitivity tests to one single national reference laboratory, and to use drug sensitivity

<sup>1</sup>Slightly abridged version of the article appearing in Spanish in the *Boletín de la Oficina Sanitaria Panamericana*, Volume LXXVIII, 1975.

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testing almost solely for epidemiologic purposes. This is partly due to the fact that at one time facilities were available for conducting culture examinations and drug sensitivity tests almost everywhere in the country.

#### Evaluation of 1972 Activities

Table 1 presents the country-wide targets of the tuberculosis program for 1972.

To properly evaluate the newborn BCG vaccination program, the actual number of live births in 1972 must be used as the base, rather than the expected number of newborns. Table 2 shows the number of live births in the country and the number which took place in maternity hospitals, together with the corresponding percentage of newborns vaccinated. It is important to note that roughly 85 per cent of all births in Chile take place in the maternities of hospitals and clinics, which is where the vaccinations are administered. Overall, the figures obtained are highly encouraging, because they show vaccinations were

administered to over 75 per cent of all live-born infants in the country and over 90 per cent of those born in hospitals and clinics.

While we are satisfied quantitatively, there is no proof of the quality of the vaccinations. However, numerous improvements have been made in this regard, both through training of personnel and through introduction of the Omega syringe.

Table 3 shows the numbers of school-age children vaccinated. The average percentages vaccinated were 69 per cent of those in the first year of primary school and 89 per cent of those in the final year. This first figure appears rather low in comparison with previous years.

The numbers of microscopic and radiologic case-finding examinations performed are shown in Table 4. For Chile as a whole, the number of radiologic examinations totalled 96 per cent of the goal set for 1972. However, considered on a zone-by-zone basis this work was carried out very irregularly; while some areas made excessive use of the method

TABLE 1—Goals of Chile's national tuberculosis program and expected case rates, 1972.

Activity	SNS	SERMENA	Other institutions	Total
<i>BCG vaccinations</i>				
Newborns .....	214,615	—	—	214,615
Children entering primary school .....	296,532	—	—	296,532
Children graduating primary school .....	144,662	—	—	144,662
Total vaccinations .....	655,809	—	—	655,809
<i>Diagnostic examinations</i>				
Microscopy .....	168,746	—	—	168,746
Radiology .....	240,871	—	—	240,871
<i>Anticipated cases</i>				
Population served over age 15 .....	4,338,570	1,239,590	619,791	6,197,951
Estimated incidence per 100,000 inhabitants .....	167.8	85.0	50.0	139.5
No. of cases expected in persons over age 15 .....	7,280	1,053	310	8,646

TABLE 2—BCG vaccination of newborns, 1972.

No. of vaccinations	Live births in maternities	Per cent vaccinated	Total live births	Per cent vaccinated
193,519	212,552	90.9	253,162	76.4

TABLE 3—BCG revaccination of primary school students, 1972.

First year of primary school		Eighth year of primary school	
No. of vaccinations	% of goal	No. of vaccinations	% of goal
204,848	69.1	129,134	89.2

TABLE 4—National Health Service bacteriologic and radiologic examinations, 1972.

Microscopic examinations		Radiologic examinations	
No. performed	% of goal	No. performed	% of goal
115,627	68.5	230,606	95.7

(achieving nearly twice the target figure in one instance), others performed as little as one-fourth of the examinations programmed.

Table 5 shows the number of cases of pulmonary tuberculosis diagnosed in persons over 15 during 1972, and the percentage of the program target attained. It can be seen that the target set for the SNS was met satisfactorily, 93.8 per cent of the expected cases being found, although the degree to which local targets were reached in different areas of the country varied considerably. SERMENA found only about 23 per cent of the expected cases, and the other health institutions involved have not supplied data. Even

so, these figures indicate that for the country as a whole, 82 per cent of the expected cases were actually found. On the basis of these results we have stepped up our coordination with SERMENA, in order to improve reporting and to intensify case-finding activities. We have also initiated contacts with a number of smaller health institutions in order to obtain data on their anti-tuberculosis activities.

Although these data relate only to pulmonary tuberculosis, case-reporting in Chile covers all forms of the disease. Table 6 shows the incidence of reported cases in 1972, broken down by the patient's age and the site affected. It is evident that pulmonary tuber-

TABLE 5—Case diagnosis in persons over age 15, by health institution, 1972.

Institution	No. of cases diagnosed	% of goal
National Health Service	6,837	93.8
Employees' National Medical Service	245	23.3
Other institutions	—	—
Total	7,082	82.0

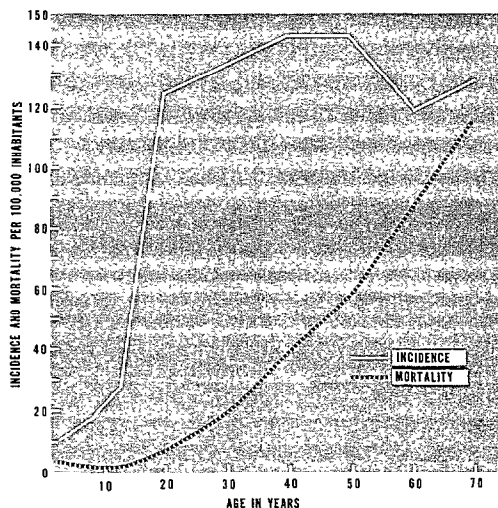
**TABLE 6**—Incidence of reported tuberculosis cases, by age of patient and site of infection, 1972.

Site of infection	Persons over 15		Persons under 15	
	No.	Case incidence per 100,000	No.	Case incidence per 100,000
Lungs	7,092	114.4	718	18.1
Pleura	488	7.9	55	1.4
Other	509	8.2	103	2.7
National total	8,089	130.5	876	22.2

culosis accounted for the great majority of cases, particularly among adults, and that the incidence of pleural and extrapulmonary tuberculosis was quite low, especially in those under 15.

Figure 1 shows the age-specific incidence of tuberculosis cases and deaths reported for 1972. At about age 15 there is a sharp rise in the case rate, which thereafter remains fairly stable. On the other hand, mortality progressively increases with age, the most important increases occurring after age 30.

Table 7 presents follow-up data on a sample group of cases diagnosed in 1971, and Figures 2 and 3 show the mortality curves for tuberculosis and tubercular meningitis.

**FIGURE 1**—Age-specific tuberculosis incidence and mortality in Chile, 1972.

## Discussion

Chile's National Health Service, which up to about five years ago was operating a highly specialized, clinically oriented low-coverage tuberculosis program, has now changed course by integrating its anti-tuberculosis activities into its general health services. This has given the tuberculosis program a primarily epidemiologic orientation and has permitted extensive coverage on a national scale. Thus practically all rural areas now have a simplified program, although tuberculosis specialists are still in charge of certain activities in major urban areas.

SERMENA, the other large health institution, has not been able to integrate its activities because of its organic structure, but it has simplified its methods and coordinated its work; it has also taken advantage of some National Health Service facilities. Many smaller health institutions are also tending to use facilities which the SNS has made available to them. The overall result has been to

**TABLE 7**—Twelve-month follow-up of a group of patients with pulmonary tuberculosis whose cases were diagnosed by the SNS in 1971.

	No.	%
No. of cases observed	1,357	100
Treatment abandoned	313	23
Treatment completed	998	73.5
Deaths	46	3.5
Hospitalizations	903	66.5
Average days of hospitalization	117	—

organize a medical care system that affords all Chileans an opportunity for protection and cure.

### *Evaluation of the Program*

No true evaluation of the tuberculosis program can be made until its epidemiologic impact is known. Unfortunately, the chief data required for such an evaluation—the incidence and prevalence of tuberculosis infection in Chile—are not available. The incidence figures now available are too recent to show a meaningful trend, and thus the only indicator available is the trend of total tuberculosis-induced mortality. This is not the best indicator for our purpose, although it undoubtedly provides some insights. As Figure 3 shows, the risk of dying from tuberculosis has fallen markedly since 1952. Mortality from tubercular meningitis has also declined drastically over the long run, even though the toll of deaths from this disease in 1972<sup>5</sup> represents a notable increase over the preceding year.<sup>6</sup>

It should also be mentioned that the age distribution of tuberculosis has changed significantly. Twenty years ago most deaths occurred in the younger age groups. Today, as seen in Figure 1, most of the deaths occur among older people.

Because accurate epidemiologic evaluation is not possible at the present time, this report has concerned itself primarily with operational assessment of current levels of achievement in terms of pre-set goals.

**BCG vaccination.** It is evident that much has been accomplished with regard to BCG vaccination of newborns, since the figures show that over 75 per cent of all newborn babies were vaccinated in 1972. On the other hand, the percentage of school-age children vaccinated was lower, especially the percentage of vaccinated primary school entrants.

<sup>5</sup>Fifty-seven per cent of the persons dying were over 15 years of age.

<sup>6</sup>Recent data show the 1972 increase in mortality from tuberculosis to have been a passing phenomenon. In 1973 tuberculosis mortality fell to 19.8 per 100,000 inhabitants and mortality from tubercular meningitis (for all ages) fell to 0.9 per 100,000.

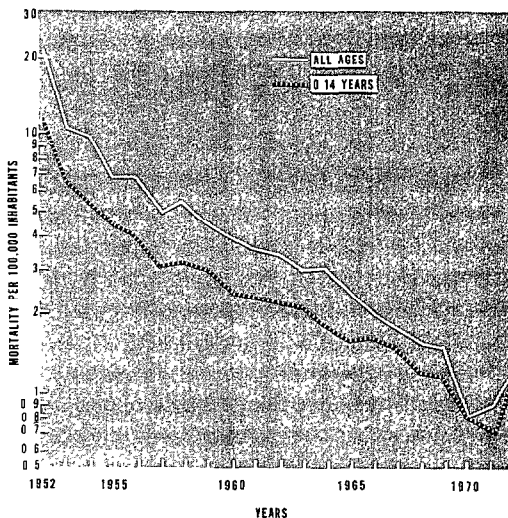


FIGURE 2—Tuberculosis mortality in Chile, 1952-1972, including mortality from tubercular meningitis.

Even so, we believe that the revaccination program is overambitious and we propose to reduce it from two revaccinations to one. It would be ideal to revaccinate children only when they leave primary school at 14-15 years of age. However, because the school dropout rate is unfortunately still very high (almost 50 per cent), we will have to continue revaccinating primary school entrants. This will permit extensive coverage, since nearly all Chilean six-year-olds attend school.

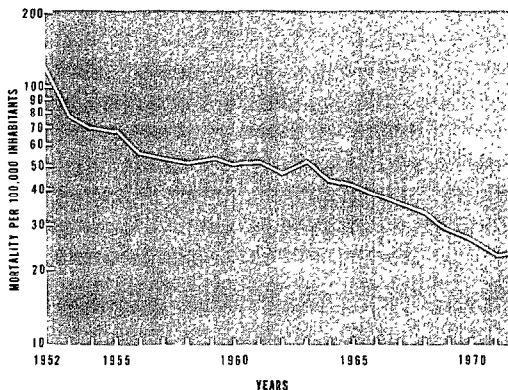


FIGURE 3—Mortality from tubercular meningitis in Chile, 1952-1972.

*Case-finding.* It is interesting to note that 75.8 per cent of all tuberculosis cases reported in 1972 (including both pulmonary and extrapulmonary types) yielded positive microscopic findings. This indicates that simple microscopic diagnosis would have produced as good results as X-ray examination, and at much lower cost. Since X-ray examination is still the method used for coverage of over half the population, we are striving to have microscopy made the only case-finding method, with radiology being reserved for studying cases that yield a negative microscopic diagnosis.

It is also important to note that bacteriological culture methods have detected relatively few cases. That is, it was necessary to prepare over 60,000 cultures in order to diagnose 870 cases of pulmonary tuberculosis. We therefore believe that this examination should be reserved for cases showing radiologic lesions but yielding negative results on microscopic examination.

*Treatment.* Another noteworthy point is the high percentage of patients who abandon treatment. In one group of cases, for example (see Table 7), 23 per cent of the patients failed to complete 12 months of treatment. Furthermore, in this same group the percentage of cases hospitalized was 66 per cent and the average stay in the hospital was 116.7 days. These unacceptably high figures were obtained for cohorts of patients whose cases were diagnosed in 1971. Measures taken the following year made it possible to reduce the proportion of patients abandoning treatment and to drastically reduce both the percentage of cases hospitalized and the length of the average hospital stay. These measures included the following:

1) Restricting hospitalizations to severe cases with urgent medical symptoms. Previous-

ly, hospitalization was provided for all who requested it.

2) Requiring that all hospitalized tuberculosis patients obtain authorization from the chief of the service in order to remain in the hospital over 60 days.

3) Integrating the beds of tuberculosis facilities into those of general hospitals and using them to accommodate all pathological pulmonary cases—thereby transforming the bed management attitude into one consistent with handling urgent hospital cases.

### Conclusions

To sum up, it may be said that Chile's tuberculosis program has numerous merits, among them the extensive national coverage it provides, the tendency to use uniform standards in all institutions, the high BCG vaccination levels achieved, the high percentage of bacteriological confirmations for diagnosed cases, and the use of uniform chemotherapeutic treatment regimens. The program also has weaknesses which call for immediate remedial measures. These weaknesses include the continued reliance on specialized programs in urban areas, excessive use of radiology, the high percentage of patients hospitalized, and the high percentage abandoning treatment. These weaknesses all help illustrate the need to simplify the anti-tuberculosis methods employed, in accordance with the conclusions of the II Regional Seminar on Tuberculosis held in Bogotá, in 1972.<sup>7</sup>

<sup>7</sup>The final report of the Seminar is contained in the English edition of the *Boletín de la Oficina Sanitaria Panamericana*, Volume VII, No. 1, 1973, pp. 104-111. For the full proceedings see *II Regional Seminar on Tuberculosis*, Pan American Health Organization, Washington, D.C., 1973 (PAHO Scientific Publication 265).

### SUMMARY

The economic and social circumstances prevailing in Latin America make it imperative for each nation to integrate its anti-tuberculosis efforts with its general health activities

and to coordinate and utilize the resources of its different health institutions in a common program. Chile's tuberculosis program has been reoriented in that direction. This report

presents an evaluation of the program's 1972 activities, citing the goals set, the actions carried out, and the degree to which a satisfactory level of performance was achieved. The most striking findings include the following:

1) The BCG vaccination program succeeded in vaccinating a high percentage of 1972 newborns and primary school graduates; but the percentage of primary school entrants receiving the vaccination was low in comparison with previous years.

2) The case-finding program of the National Health Service was very effective. In comparison, the Employees' National Medical Service achieved only about 23 per cent of its goal.

3) A positive microscopic diagnosis was obtained from over 80 per cent of the pulmonary tuberculosis cases reported, which

indicates that this simple method would have sufficed to diagnose a high proportion of these cases. Nevertheless, radiology is still used in over half of the country, despite its relatively high cost and low yield.

4) Koch bacillus culture examinations were found to result in detection of relatively few cases in terms of the amount of effort involved.

5) Within a sample of patients whose cases were diagnosed in 1971, many persons were found to abandon treatment. The proportion failing to complete 12 months of treatment was 23 per cent. In this same sample the percentage of patients hospitalized (around 60 per cent) and the average length of hospitalization (nearly four months) were found to be excessive. These three findings led to immediate corrective measures which have already had a significant effect.

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