THE LEPROSY CONTROL PROGRAM IN ECUADOR
CONSIDERATIONS ON THE FIRST TWO YEARS OF ACTIVITY

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The results of the first two years of the current leprosy control program in Ecuador are evaluated. Data are presented on morbidity, distribution, and the procedures used. The conclusion is reached that definitive control of this endemic disease may be expected within a short time.

Background

Ever since leprosy was first introduced into Ecuador by the Spanish settlers, four centuries ago, there have been foci of the disease distributed irregularly over the country. A number of attempts to determine the magnitude of the problem have been made in the past. The following are the most important.

In 1954 a survey was made of the origin of the leprosy cases in two sanatoria—Verdecruz in the city of Quito and Mariano Estrella in Cuenca, which have been serving as leprosaria since 1927—and in the old transit station in Guayaquil, which is now a sanatorium.

In May 1961 an examination of the leprosy situation was made in which all available data were used. The results were as follows: 569 cases registered (including those who died and those whose whereabouts were unknown), of whom 344 (57.48 per cent) came from four provinces—Guayas, Los Ríos, Azuay, and El Oro. All the other provinces except the Galápagos Islands had registered cases.

In May 1962 another survey showed 250 cases being treated, in the Verdecruz, Mariano Estrella, and Guayaquil leprosaria (120, 45, and 30 cases, respectively), the Guayaquil Dispensary (40), and the outpatient service operated by health inspectors in El Oro Province (15). There may have been others receiving treatment from the outpatient clinics of the Verdecruz and Mariano Estrella leprosaria, but their number was not significant.

In brief, the agencies in charge of leprosy control in the past were merely small hospitals for the isolation and treatment of cases; there were very few resources for outpatient treatment in permanent agencies. That is, only patients who spontaneously asked for treatment received it.

Planning the Program

In June 1962 the National Department of Health decided to conduct a nation-wide leprosy control program and asked the Pan American Health Organization/World Health Organization (PAHO/WHO) and the United Nations Children’s Fund (UNICEF) for their cooperation. During that year the

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3 Conducted by L. Badger.
Director of the Guayaquil leprosarium and the Chief Consultant of PAHO/WHO in Ecuador drew up a plan of operations, which was submitted to and approved by the Advisory Council on Health. The plan included the detection and treatment of cases, the control of contacts, the training of personnel, and the rehabilitation of patients.

The agreement under which the program was to be carried out set the following objectives:

- To establish a demonstration area for a leprosy control program and work out operating methods there that would enable specific control activities to be conducted as a regular part of the general health services.
- To detect, through an adequate investigation system, at least 750 new cases annually during the first two years of the program and as many as possible in subsequent years.
- To treat all patients as early as possible. Treatment was preferably to be ambulatory and in the home; hospitalization would be reserved for special cases and must be voluntary.
- To carry out periodic control of patients and their contacts.
- To prevent avoidable deformities in patients with anesthetized hands and feet, by means of an effective education program and prompt treatment of early cases detected.
- To examine 15 per cent of the total population of the country. All age groups and the populations served by the different regional services would be represented equally in the sample. It was hoped thereby to detect 75 per cent of the estimated infective cases and examine 80 per cent of the contacts.

Organization of Services

As may be seen in Figure 1, the National Leprosy Service uses six regional services to carry out the Leprosy Control Program. The areas reached cover 15 provinces altogether (Figures 1 and 2). In making this distribution, attention was given to the information available on the magnitude of the problem, the population to be served, and geographic proximity, among other matters.

Figure 1—Structure of National Leprosy Service of the National Department, Ministry of Social Welfare, Labor, and Health, Ecuador.
The central headquarters, with the advice of the PAHO/WHO consultant, sets standards and also carries out supervision and evaluation, with the help of the deputy chief. The executive units are the regional services, each of which has a dispensary at its headquarters, with a dermatological clinic, and a mobile team composed of a leprologist-epidemiologist, an inspector, four field auxiliaries, and a driver. The regional office also has a secretary-statistician.

The personnel trained included 9 physicians, 6 inspectors, and 30 field auxiliaries. The four-month course given to the physicians—conducted with the cooperation of the National Department of Health, the School of Medical Sciences of the University of Guayaquil, and PAHO/WHO—covered administration, epidemiology, statistics, bacteriology, dermatology, leprology, and health education.

The training of the 6 inspectors and the 30 auxiliaries laid special emphasis on field activities and methods of detection. They were taught to recognize the signs and symptoms of leprosy, especially inapparent or early forms, and of dermatological and neurological affections closely resembling the disease. The idea was to train them to pre-select suspect cases that would later be checked out by the leprologist-epidemiologist. This function of the auxiliaries is extremely valuable in the surveillance of contacts, since they can inform the physician about the appearance of possible leprosy lesions. The training was rounded out with an introduction to methods of health education. These three-month courses are brought up to date constantly through in-service training.

In-service courses, meetings, seminars, and short courses for physicians and medical students have been organized periodically in cooperation with the country’s medical schools. PAHO/WHO has provided fellowships for studies in leprology, rehabilitation, and public health administration.

Activities

In the two-year period (July 1963 to June 1965) with which this report deals, the coverage goal—examination of 15 per cent of the local population—has been reached in the following provinces: Esmeraldas, Manabí, Guayas, Los Ríos, El Oro, Loja, Azuay, Cañas, Bolívar, Pichincha, and Imbabura.

Besides this coverage by the Service itself, there has also been a certain amount of what might be called “indirect coverage”—the work of private physicians, volunteer collaborators, and so on, in notifying cases. Its precise extent is not known, but the Service is looking into administrative procedures for determining it.

During the period 345,065 persons were examined (the age breakdown is given further on); 780 new cases were detected.
Added to those previously registered and to the leprosarium patients, this brought the total of known cases to 1,120 as of June 1965. Since the population of the country in 1965 was estimated at 4,892,500, this figure reveals a general prevalence of 0.23 per 1,000.

The general prevalence by province (cases detected per 1,000 total population) was as follows (Figure 2): Guayas and Los Ríos, 0.30; Manabí and Esmeraldas, 0.093; Azuay, Cañar, and Bolívar, 0.21; Loja, 0.35; El Oro, 0.98; and Imbabura and Pichincha, 0.068.

The prevalence by population examined (cases detected per 1,000 persons examined in each province) was as follows: Guayas and Los Ríos, 3.69; Manabí and Esmeraldas, 0.88; Azuay, Cañar, and Bolívar, 1.66; Loja, 1.77; El Oro, 4.78; and Imbabura and Pichincha, 1.76. The over-all prevalence in the population examined was 2.26 per 1,000.

The objective with respect to contacts was to examine 80 per cent of the 4,293 registered. During the first two years of work 2,772 were examined or re-examined, for a coverage of 64.57 per cent. In general, an average of 3.6 contacts for each registered case have been examined. Measures are now being taken to reach the 80 per cent figure.

The health education activities included 595 lectures and talks, 1,664 interviews with patients, and 3,990 interviews with community leaders.

**Evaluation of the Program**

Of the total of 417,260 persons programmed for examination, 345,065 (82.7 per cent) were actually examined. This coverage may be considered good in view of the unforeseeable seasonal conditions—among them long and violent rainy seasons, which made communities difficult to reach.

As Table 1 shows, the percentage distribution of newly detected cases by clinical type was as follows: infective lepromatous, 39.49; indeterminate, 37.82; tuberculoid, 21.15; and borderline, barely 1.54. The fact that the figure for the lepromatous type was only slightly higher than that for indeterminate cases is attributable to the effectiveness of the Service in finding and promptly diagnosing early cases.

As for distribution by clinical type and age group (Table 2), 71 cases, or 9.10 per cent, were found in the group under 15 years, and among these the indeterminate type predominated (5 per cent), which again showed the effectiveness of the detection of early types. Of the remaining cases in this age group, 3.2 per cent were of the tuberculoid type and 0.90 of the lepromatous type; there were no borderline cases. In the over-15 group there were 709 cases, 90.90 per cent of the total number. The lepromatous type predominated conspicuously, with 38.85 per cent; next came the indeterminate type, with 33.72 per cent, and the tuberculoid, with 16.79. The natural explanation is that in this age group many indeterminate cases had earlier been ignored and developed into lepromatous cases. There were 12 cases of

<table>
<thead>
<tr>
<th>Clinical form</th>
<th>No. cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lepromatous</td>
<td>308</td>
<td>39.49</td>
</tr>
<tr>
<td>Indeterminate</td>
<td>295</td>
<td>37.82</td>
</tr>
<tr>
<td>Tuberculoid</td>
<td>165</td>
<td>21.15</td>
</tr>
<tr>
<td>Borderline</td>
<td>12</td>
<td>1.54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>780</td>
<td>100.00</td>
</tr>
</tbody>
</table>

**TABLE 1—Distribution of New Leprosy Cases in Ecuador, by Clinical Form, July 1963 to June 1965.**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Clinical form</th>
<th>0-14 years</th>
<th>15 and over</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. cases</td>
<td>%</td>
<td>No. cases</td>
</tr>
<tr>
<td>Lepromatous</td>
<td>7</td>
<td>0.90</td>
<td>303</td>
</tr>
<tr>
<td>Indeterminate</td>
<td>39</td>
<td>5.00</td>
<td>263</td>
</tr>
<tr>
<td>Tuberculoid</td>
<td>25</td>
<td>3.20</td>
<td>131</td>
</tr>
<tr>
<td>Borderline</td>
<td>0</td>
<td>0.00</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>71</td>
<td>9.10</td>
<td>709</td>
</tr>
</tbody>
</table>
the borderline type, or 1.54 per cent of the total.

Among the 622 contacts of open cases examined, 109 were found to be infected, which amounts to an attack rate of 17.52 per cent in this particular group.

The study of regional variations in prevalence by controlled patients belonging epidemiologically to the areas examined and in relation to the total populations (Table 3) shows the highest prevalence to be in El Oro Province, the oldest focus in the country, with 0.98 per thousand—an indication of high endemicity there. El Oro was followed by Loja, Guayas, Los Ríos, Cañar, Azuay, and Bolivar; at the end of the list were Manabí, Esmeraldas, Pichincha, and Imbabura.

The distribution of new cases by sex and age group (Figure 3, Table 4) was 501 among males (64.23 per cent) and 279 among females (35.77 per cent), of which 37 (4.74 per cent) of the male cases and 34 (4.36 per cent) of the female were in the 0-to-14 age group. These figures, as can be seen, are very similar. In the 15-and-over group, the difference by sex was considerable: 464 (59.49 per cent) of the cases were in males and 245 (31.41 per cent) in females.

From the standpoint of the regional distribution in the under-15 group, these 71 cases represented the following percentages, by province, of the total of 780 new cases: Guayas and Los Ríos, 3.46; Loja, 1.92; El

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**TABLE 3—Prevalence of Leprosy by Regional Service, According to Number of Cases Registered, Ecuador, 30 June 1965.**

<table>
<thead>
<tr>
<th>Regional service</th>
<th>Population</th>
<th>Cases</th>
<th>Rate per 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Oro</td>
<td>162,595</td>
<td>159</td>
<td>0.98</td>
</tr>
<tr>
<td>Loja</td>
<td>285,331</td>
<td>99</td>
<td>0.35</td>
</tr>
<tr>
<td>Guayas and Los Ríos</td>
<td>1,236,207</td>
<td>373</td>
<td>0.30</td>
</tr>
<tr>
<td>Cañar, Azuay, and Bolivar</td>
<td>526,374</td>
<td>113</td>
<td>0.21</td>
</tr>
<tr>
<td>Manabí and Esmeraldas</td>
<td>739,545</td>
<td>69</td>
<td>0.093</td>
</tr>
<tr>
<td>Northern Sierra</td>
<td>761,743</td>
<td>52</td>
<td>0.068</td>
</tr>
</tbody>
</table>

* a 1962 census.  
* Only Pichincha and Imbabura Provinces have been examined.

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**TABLE 4—Distribution of New Leprosy Cases in Ecuador, by Sex and Age Group, July 1963 to June 1965.**

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>No. cases</td>
<td>%</td>
<td>No. cases</td>
</tr>
<tr>
<td></td>
<td>37</td>
<td>4.74</td>
<td>464</td>
</tr>
<tr>
<td></td>
<td>34</td>
<td>4.36</td>
<td>245</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>9.10</td>
<td>709</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Regional service</th>
<th>Male</th>
<th>Female</th>
<th>Total %</th>
<th>Male</th>
<th>Female</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lepromatous</td>
<td>Tubercolid</td>
<td>Indeterminate</td>
<td>Total</td>
<td>% a</td>
<td>Lepromatous</td>
</tr>
<tr>
<td>Guayas and Los Ríos</td>
<td>1</td>
<td>9</td>
<td>7</td>
<td>17</td>
<td>23.94</td>
<td>1</td>
</tr>
<tr>
<td>Manabi and Esmeraldas</td>
<td>—</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2.82</td>
<td>—</td>
</tr>
<tr>
<td>El Oro</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7.04</td>
<td>1</td>
</tr>
<tr>
<td>La Plata</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>8.45</td>
<td>2</td>
</tr>
<tr>
<td>Canar, Azuay, and Bolivar</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>8.45</td>
<td>—</td>
</tr>
<tr>
<td>Northern Sierra</td>
<td>—</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5.63</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>14</td>
<td>19</td>
<td>37</td>
<td>52.10</td>
<td>3</td>
</tr>
</tbody>
</table>

a Of 71 new cases in 0-14 age group.  
b Of 780 total new cases.  
Provinces of Imbabura and Pichincha.

Oro, 1.15; Canar, Azuay, and Bolivar, 1.03; Imbabura and Pichincha, 1.03; and Manabi and Esmeraldas, 0.51. These percentages indicate that the frequency of cases in this group is most significant in the Guayas and Los Ríos regional service, where the focus is most active at present (Table 5).

Of the 780 cases registered during the period, 367 (47.05 per cent) had some disability; the remaining 413 (52.95 per cent) did not. The most frequent disabilities (according to the WHO classification) were plantar ulcer, 121 cases (15.51 per cent); claw hand, 90 cases (11.54 per cent); intense osteotrophies, 47 cases (6.03 per cent); drop foot, 10 cases (1.28 per cent); lagophthalmos, 10 cases (1.28 per cent); impaired vision, 6 cases (0.77 per cent); and blindness, 3 cases (0.38 per cent).

The control and treatment of patients was in general ambulatory; hospitalization was selective and temporary. The standard adopted was to examine open cases every three months and closed cases every six months. It would therefore have been possible in theory to conduct 2,863 examinations; actually there were 1,846, or 64.48 per cent. This is considered acceptable, especially in view of the fact that some of the patients died during the period. In other cases the patients were not at home at the time of the visit, and the difficulty of reaching patients scattered in rural areas made it impossible to come back during the same monthly schedule. It should be mentioned that if the patient was away during the home visit, medicines were left for him to ensure continuity of treatment. Volunteers played an outstanding part in this assignment.

During the two-year period covered by this study 2,027 bacilloscopies were performed, which means at least one a year for every patient. In addition, 269,163 100-mg tablets of DDS (diamino-diphenylsulfone) were distributed—a figure appropriate to the number of patients registered.

Among the methods used for the detection of cases (Table 6, Figure 4), the most productive were notification and reporting, with a return of 186.40 per 1,000 persons examined. Re-examination of contacts came next (23.96 per 1,000), followed by dermatological examination (2.98 per 1,000). The least productive methods were the intensive census (1.05 per 1,000) and the examination...
FIGURE 4—Results of Methods Used for Detection of Cases in Ecuadorian Leprosy Control Program, July 1963 to June 1965.

EXAMINATION OF CONTACTS
NOTIFICATION AND REPORTING
DERMATOLOGICAL EXAMINATION
INTENSIVE CENSUS

The distances traveled by the various units of the Service totaled 637,826 kilometers, of which 581,970 were covered by car and 55,856 by other means (muleback, boat, or afoot).

The training given to the medical and paramedical personnel at the start of the program continued with in-service training by means of periodic supervision. In addition, the chief of the program pursued public health studies in São Paulo, Brazil, on a PAHO/WHO fellowship; the Service histopathologist took a course in his specialty in Rio de Janeiro and São Paulo, also as a PAHO/WHO fellow; and two regional chiefs, on fellowships from the Government of Venezuela and PAHO/WHO, studied the rehabilitation of leprosy patients in Caracas.

Finally, mention should be made of the splendid results obtained from the use of paramedical personnel (inspectors and auxiliaries) in the control of rural patients and the preselection of possible cases. The Service is now looking into the possibility of making even more use of such personnel in other health activities.

Operating Cost

The operating cost of the program comes to 7,500 sucres (USA$365.85) a day, on a calendar-year basis. Ambulatory control costs 2.10 sucres (USA$0.10) per patient daily, and the detection of cases amounts to 7 sucres (USA$0.34) for each examination. These data are based on the fact that the Service spends 40 per cent of its budget on the control of patients and 60 per cent on the investigation of new cases.

Records

In order to make it possible to obtain immediate epidemiological and administrative information in the interests of better evaluation of the data, the Service set up a recording system according to the recommendations of the Seminar held in Cuernavaca, Mexico, in 1963.

A Kardex visible file is used for patients, with information on all changes in condition entered daily. These entries are made by a secretary-statistician; at the end of each month they are tabulated. Changes are coded by color, which makes it possible to see at a glance the progress of patients on the active register.

This visible file is kept at the regional level. The cards on annual prevalence, opened for every person examined, are codified daily by the secretary-statistician. At the end of every month the cards are tabulated and then filed alphabetically, so as to eliminate possible duplications that would affect the denominator. Calendar cards, for data on patient examinations, contain information on the dates on which the control of patients should be carried out and make
it possible to confirm whether or not the examination was made on the scheduled date. These cards are grouped by month, for the programming of the work. Thus a monthly control can be kept on patients who have not received care; their cards are set aside at month's end, and special attention is given to them so that they can be brought back under control.

The system also includes registers of contacts, in which are entered the annual examinations and any changes in situation, and also daily registers of the activities of the medical and paramedical personnel, which are compiled on a monthly form. This makes possible an evaluation of individual output.

At the central level, the data received from the regional services are compiled, tabulated, and evaluated monthly. The information is entered on special forms and sent to the national and international (PAHO/WHO and UNICEF) agencies quarterly, semiannually, and annually.

Conclusions

Although in general the endemicity of leprosy in Ecuador is low, its prevalence should be considered significant because of its economic and social impact and also because, within its irregular distribution, there are foci such as El Oro, Loja, and the Guayas and Los Ríos areas in which the endemicity is high. In this last case particularly, the disease seems to be more active and recent.

It is expected that continuation of the procedures adopted during the first stage of the program, improved by continuing research on the administrative, epidemiological, and sociological levels, will make it possible within a short time to achieve definitive control of the endemic disease.

Summary

The current leprosy control program was started in June 1962 under the direction of the National Department of Health, with the cooperation of PAHO/WHO and UNICEF pursuant to a tripartite agreement between these organizations and the Government. An evaluation is being made of the results of operations over a two-year period, from July 1963 to June 1965. The following activities are cited as the principal elements in the program: detection and treatment of patients, control of contacts, training of medical and paramedical personnel, and rehabilitation of patients. Among the methods employed for the detection of cases, the most productive have been notification and reporting, followed by the examination and re-examination of contacts and dermatological examination. The least productive have been the intensive census (mass examinations of the population) and the investigation of school communities, both of which are low in yield and costly.

The total number of persons examined was 354,065, out of the total of 417,260 that had been calculated for the period, which means 82.7 per cent coverage. It is proposed to examine a representative sampling (15 per cent) of the entire population of the country (4,892,500, according to the 1965 estimate).

Including 780 new cases that were identified and those already registered or interned in leprosaria, there are now 1,120 cases. Thus the general prevalence of the disease in the country is 0.23 per 1,000, while the prevalence in the sample examined was 2.26 per 1,000. Among the new cases discovered, the following distribution by clinical type was found: infective lepromatous type, 39.49 per cent; indeterminate, 37.82 per cent; tuberculoid, 21.15 per cent; and borderline, 1.54 per cent. Of the 4,293 contacts registered, 2,772 were examined (64.57 per cent coverage). Among the 622 contacts of open cases, 109 were found to be infected, which amounts to an attack rate of 17.52 per cent in this group.

Control and treatment of patients is in general ambulatory; hospitalization is selective and temporary. The importance of using inspectors and auxiliary personnel in the preselection of possible patients is emphasized, as are control of contacts and follow-up observation of patients under treatment, especially in the rural zones. The author concludes that, although the endemicity of leprosy is low, the disease should receive attention because of its social and economic effects and because of the existence of some foci of high endemicity. The continuation and improvement of the procedures employed should lead to definitive control of the endemic disease within a short time.