



Development of Environmental Health Programs

Recognizing that improvement in environmental conditions would aid materially in solving some of the major health problems of Latin America, the *Servicios* devoted considerable effort to the development of sanitation and other environmental health programs. Their undertakings are evaluated in terms of technical competence, benefits derived, and the degree to which they have strengthened national health services.

ONE OF THE PRIMARY objectives of the bilateral health programs during World War II was to provide an environment in which workers in the Latin American Republics could produce desired strategic materials. The most important environmental health problems during that period were those of malaria and gastrointestinal disease control, and improvement in sanitation was recognized as a major factor in attacking these problems. The early sanitation programs were concerned primarily with construction of small water supply systems and sanitary privies, though in some countries rather large sewerage systems were constructed. At the time of the Public Health Service survey, early in 1952, most of the permanent works installed during the emergency period were being maintained by the Latin American governments.

This is the tenth in a series of excerpts from the Public Health Service's evaluation of the bilateral health programs of the Institute of Inter-American Affairs undertaken during the decade 1942-52. For additional information, see page 1243 of this issue.

Following the war, emphasis was shifted gradually from meeting the needs dictated by war to providing technical assistance and financial support for continuous improvement of health. A safe water supply and adequate sewage disposal were recognized as basic essentials of a public health and sanitation program, and primary emphasis in sanitation was placed on these two factors.

Water Supply

The *Servicios* have built water supply systems in every country except Colombia. During the decade under survey, major efforts were directed toward the small cities and towns. Planning, designing, and construction were usually all done by the *Servicio*. Construction by private contractors was tried but generally found unsatisfactory because the contractors were not accustomed to doing such work and were not always available in the isolated locations where much of the work was done. Force accounts methods usually proved to be cheaper than contracting. However, in Mexico all work was being done by contract, and Brazil was gradually developing contractors competent to do the work.

Three advantages especially were apparent in the *Servicio* method of operation in building water supply systems. It provided opportunity for the development of experts who could devote full time to this activity, made possible a minimum of redtape in financing projects, and resulted in a minimum of friction among planners, designers, and builders. Low construction costs, by United States standards, were made possible by the use of low-cost labor and local materials whenever possible. Construction was generally done efficiently and well. For these reasons, the *Servicios* were generally stronger and had a greater appeal for the limited national funds in the field of sanitation than the indigeneous health services.

There were disadvantages, however, to this type of operation. It might tend to stifle local initiative in the technical and administrative fields, and there was a decided tendency to bypass existing local agencies that had some responsibility for the construction or operation of water supply systems. In one country, the division of sanitary engineering in the national health service was abolished and its activities turned over to the *Servicio*. In another, responsibility for building public water systems was transferred from the national agency to the *Servicio*. Exceptions to this tendency were found, however, notably in Chile and Costa Rica. In Chile, the *Servicio* was assisting the national health service in the technical and financial phases of its sanitation program instead of developing competing programs.

The value of national organizations doing things for themselves is basic. In the long run, the development of administrative and operational units is as important as the development of technical competence or the fulfillment of the immediate desires of a community. *Servicios* might well direct their efforts toward the establishment of divisions of sanitation in the Latin American countries where they do not exist, and in all countries they should carry on the majority of their activities in the sanitation and engineering fields through such divisions. Working through indigeneous health agencies will facilitate the conversion from bilateral to unilateral programs.

Water supply systems were generally very simple constructions. Ground water was usually the source of supply, and the supply was usually brought to the place of use by gravity. Gravity-pressured ground water systems are advantageous because they are relatively inexpensive to operate and simple to maintain. Distribution systems were generally modest compared with those in the United States. Since there is not the need for fire protection that there is in the United States and since most systems are unmetered, small-capacity distribution systems are favored because they reduce water wastage occasioned by faucets being left open.

Considerable credit is due the *Servicios* for their efficiency in constructing water supply systems. Much improvisation was observed, which went far in overcoming the handicaps of undertaking major construction in remote areas which were not served by ground transportation and where few, if any, skilled artisans were to be found. Many projects were built with a minimum of construction equipment. In one Honduras town, where all materials had to be moved by air, the only equipment provided was hand tools.

Construction costs averaged about \$16 per capita, with a range of from \$5 to \$43. These costs, though not exceedingly high, represented a considerable investment for Latin American countries, whose per capita annual income, based on United Nations estimates, was about \$155 in 1949.

Shortcomings of water supply construction programs could generally be attributed to insufficient consideration of the economic status and cultural background of the community to be served. Some examples were observed of expensive, ornate architectural treatment of buildings and the incorporation into projects of unnecessary gadgets, such as totalizing meters and various gauges.

In an effort to provide the utmost safeguards to the public health, chlorinators were placed on a great number of ground water supply systems, despite the fact that the quality of the water was generally satisfactory. This precaution was apparently not fully appreciated by

the recipient people, and perhaps half of the chlorinators were not in operation at the time of the evaluation survey. The lack of operating funds and the complexity of the chlorination devices, coupled with the fatalistic attitude of many of the people concerning disease, were identified as factors influencing the removal, the destruction, or the nonuse of chlorinating equipment.

Third-Party Contributions

Contributions by the people directly benefited by water systems are considered essential to their full appreciation of, and responsibility for, a community water system. The *Servicios* recognized this principle and in recent years nearly all systems built by them received local, or third-party, contributions. In the 177 completed projects, third-party contributions amounted to 38 percent of total costs. The amounts varied from small individual contributions of labor to contributions covering the total cost of the system.

Frequently, however, contributions promised by third parties did not materialize, and the *Servicio* was forced to use more funds than was originally allotted to complete a project. In one country failure of third-party contributions has been reduced by the requirement that such contributions be in the hands of the *Servicio* before any construction begins.

In a few instances, contributions of labor were successful, but the organizational problem of using gratuitous labor generally precluded its effective employment. Satisfactory use of gratuitous labor appeared to be limited to towns of not over 3,000 population where there was a strong local leader who could command support of the people and supply initiative. There also must be a well-recognized and pressing need for the water supply and no other way to obtain it.

Public Attitudes

Water supply projects were received enthusiastically by the people of the communities. However, it appeared that usually reception was based on the desire for water rather than upon the public health significance of a safe water supply. In one community local inhabitants felt that pure water was good for the

children but was unnecessary for the older people because they had developed an immunity to waterborne diseases. In another community the local druggist reported that the installation of a safe water supply had materially reduced the incidence of gastrointestinal diseases. His report was based on a reduction in sales of medicines widely used to control these diseases.

To really appreciate the effect of the installation of a water supply system on the citizens of a community, one should witness the inauguration celebration held at the completion of a project. It is a holiday, a festival that may last for as long as 2 weeks. It is solemn, with its religious dedication, and stirring, with its speeches by political and civic leaders. It is spectacular, with its parade and marching bands, its sports events, its bullfights, and its dances. For the time at least the people feel that the project is the most important thing in their lives.

Operation and Maintenance

Unlike some projects undertaken by the *Servicio*, the water supply projects were generally turned over immediately by the national government to the municipality for operation. In general, the operation and maintenance of *Servicio*-built water systems was inadequate because of the lack of competent operators and sufficient funds. A definite trend within the *Servicio* toward the training of water supply operators was noted, however.

In some countries, the *Servicios* were establishing local boards to act as policy-making and administrative groups and to be responsible for collecting the necessary funds for maintenance and operation. This procedure has worked well in Mexico, where all water users pay for water service. In Honduras, the *Servicio* not only set up the administrative board but trained the persons who would become the operators when the project should be turned over to the local authorities.

There is much to be done in securing better operation and maintenance of many of the *Servicio* projects. Unless maintenance is improved, the capital investment in some will ultimately be lost. In a number of instances, the systems which the *Servicio* built replaced systems which had been put into operation 30 to

50 years previously and had been allowed to deteriorate until there was very little left. It is apparent that responsibility for operation and maintenance cannot be left solely to local interests and that some national government agency (preferably a division of sanitary engineering) should assist the local people. The national agency could not only check on the safety of the supply, but also assist the local boards, administrators, and operators in all phases of operation, including financing and business administration.

Surveys

In Panama, where the *Servicio* program was being reinstated in 1951, a sanitary survey of all communities was being made as a logical primary step in undertaking a water supply program. Such information was not available in most Latin American countries, and water supply systems were being built with little regard for the priority of need between the various cities and without too much concern about the demonstration value of any particular project. The availability of third-party contributions was regarded as perhaps the greatest determining factor in deciding where supplies would be developed. Inasmuch as the *Servicios* cannot build all the systems desired, it would seem better to concentrate efforts on good demonstration projects and in areas where the health problems are most pressing.

Individual Supply Units

A relatively small amount of work has been done in the development of individual water supply units. This phase of sanitation has not received the emphasis it deserves. Individual units are inexpensive and can be built by sub-professional personnel. It seems advisable to have at least one demonstration project of this type in each country.

Sewage Disposal

The latest figures available at the time of the survey showed that a total of 101 community sewage projects had been undertaken at a cost of \$5,885,797. Third-party contributions amounted to 6 percent of the total cost. Only a few of these projects included sewage treatment.

The general impression gained during the survey was that communities wanted sewerage systems primarily because some neighboring community or the capital city had them. However, most Latin American communities were greatly in need of improved and expanded excreta disposal systems, and the cost of sewers was quite modest. The few figures available showed that construction costs amounted to about \$5 per capita.

It was a universal practice to use concrete sewer tile manufactured at the project site. No evidence of failure of these concrete pipes was found, even though they are subject to rapid deterioration if septic sewage is handled. The success in using these materials was attributed to skillful designing by the *Servicio* engineers.

Sanitary Privies

The construction of sanitary privies has been an important sanitation project of the bilateral health programs since their inception. This activity was carried on in every country. Fifty-seven projects costing \$415,000 have been undertaken, 15 percent of the funds supplied by third parties. In Brazil, about 20,000 privies were built; in Chile and Colombia, 3,000 each; in Venezuela, 9,000; and in Nicaragua, 2,500.

Construction of sanitary privies is fundamental to a sanitation program and ties in closely with the building of individual safe water supply units. It is a program which can be carried on by subprofessional workers, and it is effective in controlling intestinal parasites.

Privy building costs were found to be relatively high. The cost of a concrete slab and riser was about \$6, and that of a completed privy from \$11 to \$16, an excessive amount in some regions. In many small villages the cost of a privy would be close to 50 percent of the value of the home it services. Efforts to reduce costs by mass production and the development of new materials, such as precast, wood-reinforced concrete superstructures, were observed in Chile.

Stream Pollution Control

The disposal of community sewage into the nearest water course creates new health hazards for downstream water users. The danger of

this practice, which was found common to most *Servicio* sewerage projects, was quite evident because of the widespread use of the streams for bathing, laundry, and drinking purposes.

The economic condition in most of the countries, however, would seem to preclude the early installation of sewage-treatment plants. There are several possible solutions to the problem:

1. Instead of sewerage systems, individual septic tanks could be built which would discharge into the ground. They could be financed by the persons needing them. The rest of the community could be supplied with pit privies. This solution would be satisfactory in small- and medium-sized communities, as well as in suburban areas around the larger cities.

2. The lagooning of sewage for a 30-day period before discharging it to streams would be inexpensive and, where the lagoons are properly designed has been found to be successful, as in the western part of the United States.

3. The use of streams for other purposes than waste disposal could be prohibited, and public laundries, bathhouses, and water supply systems constructed so that the people would not have to use streams for these purposes.

Little evidence was found that industrial wastes were a problem of major significance. Generally, industrial wastes are discharged through separate outlets, with the dilution water available usually caring for these wastes satisfactorily. In El Salvador the industrial-waste problem connected with the coffee industry was investigated by United States engineers. However, no definite conclusions were reached or remedial measures taken. In Chile the *Servicio* has built three modern sewage-treatment plants and has joined with the Ministry of Public Works in supervising the operation of these and other plants which are the responsibility of the Ministry. These plants are well operated, and the personnel assigned to the operation project have been quite successful in obtaining additional sewer connections to the system.

In contrast to this situation, a sewage-disposal plant built by the *Servicio* at Santa Tecla, El Salvador, was being allowed to function improperly and to deteriorate to a point where it needed replacement. The condition of the plant clearly indicates that a followup must be

made by some competent person from a responsible agency after the construction of a sewage-treatment plant.

Vector Control

Malaria has long been a leading cause of death and economic loss in many parts of Latin America and has received a great deal of attention by indigenous health services. It was natural, therefore, that the *Servicio* should join the countries in their antimalaria campaigns in order to carry out more widespread and intensive programs. In the beginning, antimalarial measures were of the so-called permanent type, such as ditching, draining, filling, diking, and larvaciding with oil and toxic agents.

Vector control was greatly benefited by the development of new insecticides that have a residual killing power. The use of these insecticides has in many instances reduced the need for permanent control projects and permits carrying out antimalaria programs with less highly skilled technicians. Spraying, however, should not replace other means of control.

In Mexico, the *Servicio* was providing spray equipment free and furnishing DDT at cost. In Colombia, the *Servicio's* spraying program had stimulated the establishment of several commercial spraying firms that were providing services on contract. The *Servicio* was aiding such communities by checking the toxicity and coverage of sprays used by independent contractors. In El Salvador, Brazil, and Venezuela, vector control activities begun by the *Servicio* had been turned over to the national health services and were being successfully carried on by them.

Vector control by the *Servicio* in Ecuador was found to have been eminently successful. In the highlands near Quito, anopheles mosquitoes had migrated up the deep narrow valleys from the sea, bringing malaria with them. In the affected communities, the enlarged spleen rate in children ran as high as 80 percent. Populations were dwindling and some of the country's most valuable agricultural land was not being used. By drainage and other antilarval measures, mosquito-breeding areas in the highland communities were destroyed; 1,400 square kilometers of land were freed from anopheles

mosquitoes. Malaria disappeared and land values soared as agriculture was again extensively pursued. An incidental byproduct of the drainage work done for mosquito control was the improvement of the land for agriculture. The drainage made irrigation possible.

Industrial Hygiene

A division of industrial hygiene in the national government may be found in all of the Latin American countries which are partially industrialized. They have functioned primarily, however, in the field of labor-law enforcement and have not developed technical, fact-finding services with which to aid industry in the study of its health problems. There has been a conspicuous absence of preventive programs, and trained industrial hygiene personnel are lacking.

Agricultural workers, the largest group of workers in Latin America, should not be excluded from industrial hygiene programs. It is now realized that serious problems occur with the use of large quantities of insecticides toxic to human beings, the properties of which are little known. Much of the agriculture in Latin America may be considered "industry-in-the-field," since sugar, cotton, and coffee plantations employ thousands of workers under single management, making it possible to attack health problems of the workers effectively.

Efforts to develop modern industrial hygiene programs have been successful in Bolivia, Brazil, Chile, Colombia, and Peru. In Peru and Bolivia, laboratories and libraries have been established, personnel trained at home and abroad, and surveys made to define the problems. Corrections of many health hazards have already been made.

In Peru, the Department of Industrial Hygiene had a staff of nearly 50 workers, of whom more than 20 were professionals. During the 2½ years just preceding the evaluation survey, approximately 70 industries were studied and 7,200 physical examinations made. The medical examinations were being analyzed by machine methods. These analyses were to establish the incidence of silicosis and other occupational diseases as the basis for steps in their control.

The establishment of industrial hygiene programs has been accomplished with the concurrence of the appropriate ministries. The program was usually headed by a North American engineer who had had broad experience in the field. Sometimes he acted as a consultant to a national chief of industrial hygiene activities. National physicians, engineers, chemists, and other technicians were employed, the ratio of national professional staff to the United States professionals being about 14 to 1.

Although it has been found preferable to place the industrial hygiene program organizationally so that its activities may be closely coordinated with other phases of environmental health, only in Chile was the program placed in the Ministry of Health. In Peru and Colombia, however, the programs were placed under the administrative jurisdiction of the *Servicio*. In Peru, Brazil, and Bolivia, they were in the Ministry of Labor.

Miscellaneous Projects

A number of other projects for the improvement of environmental conditions were undertaken in several countries. Public laundries and public bathhouses were built rather frequently by the *Servicios*. These facilities were enthusiastically accepted. The people could easily comprehend their value, not so much from the public health standpoint, but as a convenience and a way to better living.

In El Salvador, the *Servicio* was engaged in a rather extensive slaughterhouse-building program. In the capital city, this project was fairly successful, but in the small towns, maintenance and sanitation of the abattoirs left much to be desired.

In a few instances, *Servicios* have assisted communities with their garbage disposal problems. Costa Rica was studying the possibility of composting garbage, and the *Servicio* in Brazil was preparing standard plans for small incinerators.

In some instances, the *Servicio* has been instrumental in training subprofessional public health workers in the field of sanitation. It was explained that more of this work would be done were there a demand for it, but it was considered unlikely that the demand would

develop until the realization of what this type of worker has to offer to health programs should become more widespread.

Summary and Conclusions

The need for environmental health programs, particularly sanitation programs, in Latin America is great and widespread. Improved environmental conditions will help lower the high infant mortality rate, make labor more productive, and prevent the enormous economic loss due to illness.

In general, the environmental health projects have been successful and have been accepted with enthusiasm by the recipient peoples. From an administrative, technical, and financial standpoint, the work of the *Servicios* compares favorably with that of the indigenous agencies.

Generally, however, *Servicio* sanitation programs have not strengthened existing health agencies. The use of *Servicio* personnel as consultants and the development of projects on a demonstration basis have not been widely practiced. Notable exceptions were found in Chile and Costa Rica, and the programs in these countries appear to be eminently successful.

In view of the different cultural, political, and economic patterns of Latin American countries, the importance of timing, and the varying objectives of the programs, it is impossible to establish definite criteria for evaluating the existing programs or to make detailed recommendations for their improvement. The following, however, may serve as guiding principles:

1. The *Servicio* should encourage the development of environmental health activities on as broad a base as possible, within the framework of the indigenous health services.

2. It should give major emphasis to planning, advisory, and directional services and devote less effort to detailed design, construction, and operational services.

3. It should make greater use of its prestige, influence, and knowledge to bring harmony between the various national agencies having an interest in environmental health problems.

4. Recognizing that American public health practices cannot be transposed without modification, the *Servicio* should encourage research in the methods and standards that will best fit Latin American cultural and economic patterns.

Public Health Developments in Liberia

This excerpt is from an address by Nelson A. Rockefeller, Undersecretary of Health, Education, and Welfare, before the biennial convention of the National Council of Negro Women in Washington, November 12, 1953:

"The first bilateral international health program in which the United States participated outside our own Hemisphere was in Liberia. Although Liberia has had close ties with the United States, it has not kept pace with the development of our own country. In 1944, however, the Public Health Service dispatched a mission to Liberia—at the request of President Tubman of Liberia—to help the Liberian government work toward a solution of its major health problems.

"Here was the situation that confronted the Public Health Service mission to Liberia in 1944: Preventable diseases were seriously hampering the economic and social growth of the country. There were only 6 physicians, 2 dentists, and 4 graduate nurses to serve a population of 1.5 million. There were only 230 hospital beds in the entire country, and no pharmacists or drug stores.

"The major accomplishment of the U. S. Public Health Service Mission has been the assist-

ance given the Liberian Government in developing the Liberian Public Health Service. In 1946, the Liberian Government's appropriation for public health activities was \$82,630. In 1953, the total expenditures of the Liberian Public Health Service exceeded one million dollars.

"With our help, Liberia has controlled malaria around the capital, Monrovia. A nursing school has been established. Smallpox is no longer a public health problem in Liberia. For the first time in the history of Liberia, a Liberian physician heads its own Public Health Service.

"He is Dr. Joseph Togba, born of tribal parents and educated at the Meharry Medical School. The U. S. Public Health Service brought Dr. Togba back to the United States to study at Harvard and Columbia Universities, in order to prepare him for his present post. He has succeeded magnificently. In 1953, he was one of three candidates for the Presidency of the World Health Organization of the United Nations.

"The international health and education programs of our Government now circle the globe. They have all been built on the lessons learned first in Latin America and the experience gained in Liberia."