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TUBERCULOSIS ERADICATION:

A TASK FOR PRESENT PLANNING AND FUTURE ACTION

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TABLE OF CONTENTS

	<u>Page</u>
IS THE IDEA OF ERADICATING HUMAN TUBERCULOSIS ACCEPTABLE?	1
IS THE IDEA THAT TUBERCULOSIS CAN BE ERADICATED USEFUL IN PRACTICE?	9
WHAT CAN OTHER ERADICATION CAMPAIGNS TEACH US?	10
PRESENT STATUS OF TUBERCULOSIS IN THE AMERICAS	12
NEED TO ESTABLISH TARGETS IN TUBERCULOSIS CONTROL	14
KIND AND TYPE OF SERVICES NEEDED FOR TUBERCULOSIS CONTROL	16
TARGETS AND THE PROCEDURES TO ATTAIN THEM	21
1. Search for infectious cases	21
i. Bacteriological methods	22
ii. Radiological methods	24
iii. Tuberculin methods	26
2. Suitable treatment	26
3. Protection of the exposed population	29
SUPPLEMENTARY ASPECTS	31
1. Personnel training	31
2. Health education	32
3. Assistance to tuberculosis patients	32
4. Rehabilitation	33
5. Bovine tuberculosis	33

TUBERCULOSIS ERADICATION:A TASK FOR PRESENT PLANNING AND FUTURE ACTION

By Dr. José Ignacio Baldó

IS THE IDEA OF ERADICATING HUMAN TUBERCULOSIS ACCEPTABLE?

Soon after Koch prepared tuberculin in 1890, veterinarians began to use it for diagnosing bovine tuberculosis, control programs gradually came into being and finally, use of the Bang method in Denmark showed that the eradication of the disease and the infection in animals was possible. It is therefore not surprising that the possibility of eradicating the disease in man and the technique for doing so should have been first envisaged in the places where those programs were begun.

J. Arthur Myers, in his book "INVITED AND CONQUERED", ^{1/} published in 1949, said, with reference to Minneapolis, that: "This was the first city in the United States to require that milk be supplied only from tuberculin-tested cattle. This was in compliance with a law enacted by the Minnesota legislature in 1895 to the effect that any city may by ordinance provide for inspection of milk and dairies. This was the first law of its kind enacted in the United States".

When I made the acquaintance of Dr. Myers sixteen years ago, the first thing he suggested to me was a visit to the State Livestock Sanitary Board in St. Paul so as to show me the history and the process in detail, with all its alternatives, up to the eradication of tuberculosis in cattle and other animals in the state of Minnesota. Subsequently, when at a second meeting he provided me with the basic information and explained the method for controlling human tuberculosis in the state, I understood the reasons for the day devoted to study in St. Paul. ^{2/}

On that occasion, for the first time in the history of the control of human tuberculosis in the state of Minnesota, it was possible to show the largest number of areas where the school population was negative to tuberculin. Moreover, in nineteen counties or accredited districts

^{1/} Myers, J. Arthur - Invited and Conquered. Historical Sketch of Tuberculosis in Minnesota. Webb Publishing Co., St. Paul, Minn.

^{2/} Myers, J. Arthur - Eradication of tuberculosis by epidemiological methods - Am. J. of P.H. Vol. 38, No 4, 1948.

where between 90 per cent and 98 per cent of the senior high school student (age 18) were tested, only 4 per cent to 8 per cent reacted. Myers compared these achievements with those attained in the eradication of bovine tuberculosis, in that transmission of infection to the younger generation had been interrupted. As this pattern was extended to other age groups, areas in which tuberculosis had been eradicated would be formed. He was thus laying the foundation for the possible eradication of the disease in man. He pointed out that although tuberculosis mortality was lower in other states than in Minnesota, the epidemiological phenomenon of decrease was nowhere so manifest as in Minnesota, if one recalled that a century earlier that region because of its climate and living conditions had been the Mecca of Scandinavian immigrants who were tuberculous.

The experiment in question was based on every known method of active case-finding and isolation, and a complete epidemiological study was made of every group to be investigated. Since the number of tuberculin reactors was decreasing appreciably, surveillance could be focused on them. He was firmly opposed to BCG vaccination, because it was necessary to prevent the introduction of any element which could interfere with the diagnostic value of the tuberculin test.

I understood for the first time that under the conditions created in Minnesota it was possible to accept the idea of eradication of human tuberculosis. On return to my own country, the Minnesota experience with bovine tuberculosis eradication could be put to practical use; however, the daring concept of Myers regarding the human problem was beyond our possibilities, even though it could not be refuted in principle.

Then came antibiotics and drugs, and ten years later, in 1958, Carrol E. Palmer in a paper entitled: "A DECADE IN RETROSPECT AND IN PROSPECT" ^{1/} could state: "In countries where great progress has already been made, tuberculosis work in the future will certainly differ from what it has been in the past. Not the least of the differences will be a change in objective from control to eradication. At long last, it is not only possible but, I believe, obligatory to set the goal at eradication and not at some intermediate stage connoted by the term 'control'".

After experience had shown that it was possible to render most active tuberculosis cases non-infectious within a very short time, and to cure them in a longer time if the chemotherapeutic treatment was suitable and sufficiently prolonged many articles, editorials, and papers appeared, and many national and international meetings on the subject in the years that followed were held. Those same drugs showed that chemoprophylaxis

^{1/} Palmer, Carroll E. - Tuberculosis: A Decade in Retrospect and in Prospect - Journal - Lancet - June 1958.

might be possible, which is of importance since the results of chemotherapy are the same in the patient who rests in a sanatorium and in the one who receives ambulatory treatment at home and continues in his normal activities.

Even in the developing countries where social and economic conditions were bad the same results were obtained in pilot studies, especially after the 1959 Arden House Conference which signalized the transformation of tuberculosis from a social and economic to a public health, medical and administrative problem and recommended its direct therapeutic solution.

In 1961, the world's most authoritative voice on the eradication of diseases was heard: "I have had long association with eradication projects dating back some forty years" said Fred L. Soper, and in his characteristic way, went on to issue a call for a great crusade in the categorical terms of a true leader of public health. That paper ^{1/} "PROBLEMS TO BE SOLVED IF THE ERADICATION OF TUBERCULOSIS IS TO BE REALIZED", deserves detailed consideration, for although the author specifically discusses the situation in the United States of America, his views apply to other parts of the world and to other stages of development, and deal with all the points that have to be considered whatever the situation in view.

He maintains that eradication must be based on four points, three of which can be accepted without question.

First, a definition of eradication as an absolute: acceptance by the national and state health authorities and by interested voluntary agencies of eradication, thus defined, as a feasible and urgent objective.

This no doubt is possible, in principle, since it is only a matter of stages. It is a goal to which every tuberculosis control program, whatever its stage of development, should aspire. If I could accept it seventeen years ago when I first heard it put forward by Myers, then there is all the more reason to accept it now after the advances that have been made in chemotherapy.

His third point calls for a national coordination authority to stimulate tuberculosis eradication programs backed by technical, epidemiological, educational, and administrative, and financial support when needed.

^{1/} Soper, Fred L. - Am. J. Pub. Hlth. Vol. 52 No 5 - 1962

With respect to the first desideratum of this third point, some developing countries are ahead of developed countries, because the tuberculosis divisions of the health ministries are empowered to adopt overall policy which is binding on and must be carried out by the state and district authorities to which the present system of regionalization gives sufficient autonomy to square with the principle of executive decentralization.

Although it may sound an exaggeration, a system of this kind with its unquestionable advantages may perhaps be the only obstacle which countries such as the United States of America may have to overcome in order to have a national tuberculosis eradication campaign.

The fourth point is the training of professional staff in the eradication concept of disease; standardization and simplification of procedures to facilitate the training of non-professional staff in the routine identification, registration, supervision, and surveillance of infected persons and their intimate contacts.

These three points can be accepted by the authorities responsible for tuberculosis campaigns in developing countries, even if only to apply them, not to infected persons but to patients.

It is the second point which the developing countries cannot accept without certain reservations and comments. It is formulated as follows:

"Acceptance of tuberculosis as no longer essentially a social and economic but, rather, a public health and medical administrative problem; establishing the responsibility of the community to the infected individual; but also establishing the responsibility of the infected individual to uninfected persons."

The second and third parts of this point contradict the first, at least in developing countries. To place the responsibility for the infection on the individual himself, in view of the danger he represents to others, and to establish the responsibility of the community to the infected individual calls for a very high level of education, which can only go hand in hand with a very high social and economic level.

In discussing Soper's paper, James E. Perkins rightly stated that it would be difficult to gain acceptance of the idea that the individual should accept the responsibility on his own part for determining whether or not he is a menace to his fellow citizens; but he is not right when he says that Soper's concept is new. In his work mentioned above, Myers quoted T.S. Roberts, who early in this century said: "The greatest work of all is still and must continue to be the education of the populace..."

When every member of the community has been taught to regard consumption as an infectious and preventable malady and when public opinion backed by the self-interest of the uninfected has become sufficiently strong to demand of the consumptive a sense of personal responsibility that will lead him to care properly for himself and to protect others, then may we hope to see steadily disappear from our midst that greatest of all scourges, the Great White Plague

If I mention these points it is because I wish to show that old aspirations, voiced by others more than half a century ago, are still far from having been fulfilled. This fact is confirmed by the statistical data presented in an article by I. Jay Brightman and Herman E. Hilleboe entitled "THE PRESENT STATUS OF TUBERCULOSIS CONTROL" which appeared in the same issue of the American Journal of Public Health as Soper's article. The Journal very aptly recommended that the two articles should be considered together. The authors, in referring to the state of New York, point out that a recent review of non-hospitalized patients showed that 13 per cent were not under indicated medical supervision and that 16 per cent of the non-hospitalized individuals had refused hospitalization or had left hospital against medical advise. It would be difficult to estimate the number of unknown cases.

David G. Simpson and Anthony M. Lowell ^{1/} found that in 1960, 4.4 per cent of new, active tuberculosis cases in New York City were first reported and registered at the time of their death.

In April of this year the Tuberculosis Committee of the American College of Chest Physicians reported ^{2/} that "Serious deficiencies in our (United States of America) case discovery, reporting and registration system still occur, as evidenced by the fact that (a) three-fourths of the new, active cases of tuberculosis are in the advanced stages of disease when first reported; (b) 100,000 of the estimated 250,000 active cases of tuberculosis in the United States of America are not registered by official health agencies; and (c) one-fourth of the deaths from tuberculosis in the United States of America occur in previously unreported cases - a situation which has changed little in the last ten years. Unfortunately, it is the unknown patients with tuberculosis in the infectious state who are the continuing source of most new cases".

^{1/} Simpson, David G. and Lowell Anthony M. - Tuberculosis First Registered at Death - The American Review of Respiratory Diseases - Vol. 89 No 2, February 1964.

^{2/} Diseases of the Chest - Vol. 45 No 4, April 1964, page 444.

Such figures lead us to reflect on the situation in the developing countries, where the level of education is still very low and where it cannot be admitted that tuberculosis no longer has social implications merely because a great resource has been found in chemotherapy.

As already mentioned, since the ARDEN HOUSE CONFERENCE there has been a marked tendency on the part of the public health leaders in developed countries -whose experience with tuberculosis in developing countries or in frankly underdeveloped countries is limited to pilot programs- to consider the matter solely from the health and administrative viewpoint. That tendency is due to the effective measures that can now be brought into play, but it involves the risk of minimizing the importance of social and economic conditions.

There would be nothing to object to in that tendency if its only consequence was to stimulate positive action; its disadvantage is that it leads to the neglect of such basic epidemiological facts as a natural or acquired resistance, which is the result of non-specific indirect factors which are transmitted to certain human groups through centuries of selection, or which may be acquired in a few generations, as is happening to Negroes in the United States of America as their educational, economic and social level improves.

Moreover, in a developing country, such affirmations may diminish the importance of a concept whose acceptance by the government authorities and the community was slow and difficult to achieve.

History knows no better example than the dispute over the contagiousness or non contagiousness of tuberculosis. Francastor's studies in the sixteenth century seemed to have definitively demonstrated the contagious nature of tuberculosis. -These subsequently led to the edicts of Ferdinand VI in 1756 and those of Phillip IV of Naples, which upheld the contagious nature of the disease and were extended to the colonies of Hispano America where notification became compulsory, nevertheless the most violent discussions broke out in the middle of the nineteenth century in the Academy of Medicine in Madrid and ended in 1856 in the doctrine of non-contagiousness.

Between 1865, after Villemin's communication at the Academy of Medicine in Paris on the inoculability of tuberculosis, and 1882, when Koch discovered the bacillus, there was a flood of equally convincing studies for and against contagiousness. What made it possible to maintain conflicting opinions with equal force was nothing more than social and economic factors, whose influence was able to falsify the conclusions based on observations made in the different economic environments in which the studies were conducted.

The epidemiological factors established by Flatzeck-Hofbauer ^{1/} and by Geissler ^{2/} demonstrate the validity of the concept of additional tuberculosis, which it is difficult to control solely by chemotherapy, to those who work under the natural conditions of the developing countries.

Esmond R. Long, in a paper presented at the Academy of Medicine in Caracas in 1941 on "Constitution and Nutrition in relation to Resistance to Tuberculosis" summarized the ideas of the school of the Henry Phipps Institute in Philadelphia, and referring to the known experiments of Max B. Lurie entitled "HEREDITY, CONSTITUTION, AND TUBERCULOSIS - an Experimental Study" stated: "Although the mortality rate among Negroes in the United States of America may seem high, today it is falling as rapidly as that of the white race, and at present is no higher than it was for the white race thirty years ago. In other words, even if the intrinsic resistance of Negroes is relatively lower it will not hamper the success of the campaign against tuberculosis in this group".

The favorable changes pointed out by Long are due to the gradual improvement in the living conditions of Negroes in the United States of America, especially as regards nutrition and education. These are the indirect factors which condition the present improved resistance to the disease and the disappearance of pathological anatomical forms of the time when Opie, Pinner, Kasper, and others were making their studies.

For the same reason that no one doubts the influence of non-specific factors on the decrease in tuberculosis mortality, it is untimely at the peak of the specific era to minimize the importance of non-specific factors in the developing countries. Some of those non-specific factors are fully operative in the countries of Latin America today as are those connected with the beginning of industrial expansion, and the increasing birth rate.

The situation in many of them today is similar to that of the western countries a century ago in that they are faced with the problem of large concentrations of workers in mining and in factories located on the outskirts of cities whose living conditions are bad as those during the first stages of the industrial revolution. In the past fifty years there has been a marked reduction in the birth rate in both Europe and the United States of America, whereas Latin America is experiencing a population explosion. Whereas the birth rate in Europe is 24 per thousand and 25 in North America, in Latin America it is 40.

^{1/} A. Flatzeck.- Hofbauer-Kommen und Gehen der Tuberkulose. Leipzig, 1931.

^{2/} Geissler - Die Wandlung der sozialen Komponente der Tuberkulose Sterblichkeit. Z. Tbk. 57-3.

That body of doctrines which was the object of so many statistical studies during the decades which preceded the era of tuberculosis chemotherapy is the normal outcome of emphasizing the environmental factor as opposed to the strictly bacterial approach of the Pasteur era at the turn of the century. That is why Arnold Rich in his exhaustive study on the "Pathogenesis of Tuberculosis" in 1946 did not hesitate to say: "No known measure is more effective against tuberculosis anywhere than improvement of the living conditions of the masses of the poor". ^{1/}

This explains why the large group of Latin American tuberculosis specialists who met in April of this year in La Paz, Bolivia, on the occasion of the ULAST (Unión Latinoamericana de Sociedades de Tisiología) Tuberculosis Congress, in discussing control measures for this continent, were so vitally interested in the meeting which was being held simultaneously in Geneva by the World Conference on Trade and Development, where such problems as better prices for raw materials and more equitable international trade agreements were being discussed, for without them there is no possibility of overcoming underdevelopment and hence of making plans of any kind, not even for better tuberculosis control, let alone eradication.

I believe that they err who hold that in this kind of study the physician does better to limit his attention to control techniques and not concern himself with the economic aspects, which are dominant factors in epidemiology.

With the authority he enjoys in our continent, Dr. Horwitz, Director of the Pan American Sanitary Bureau, in an article entitled "ELIMINATION OF TUBERCULOSIS IN THE WORLD - A TASK OF THE GOVERNMENTS" ^{2/} emphasized the social aspect of the disease: "The decline in tuberculosis mortality which began some fifteen years ago with the advent of antibiotics and chemotherapy, may not continue at the same rate in many areas in the world where the needs are greater than the means, and where economic development does not keep pace with the population growth.." "As for the eradication of tuberculosis, the problem goes beyond the possibilities of present day medicine. It becomes a social problem..." He placed his hopes in the Charter of Punta del Este, which deals with the main social problems.

In conclusion, while it is possible to accept the idea of the eradication of human tuberculosis under certain conditions and the definitions formulated in certain basic papers nevertheless, as far as the problem in the developing countries is concerned, emphasis must be placed on the dominant epidemiological role played by indirect factors.

^{1/} Rich, Arnold - Pathogenesis of Tuberculosis

^{2/} Boletín de la Oficina Sanitaria Panamericana - Vol. LI, Nº6 - 1961.

IS THE IDEA THAT TUBERCULOSIS CAN BE ERADICATED USEFUL IN PRACTICE?

This question comes to the fore when one turns one's mind to the difficulties inherent in the formulation of tuberculosis eradication programs in terms of tasks for present planning and future action.

When one studies the objectives formulated by the group which James E. Perkins has aptly called "the intramural health scientists," one must ask whether the enthusiasm and optimism of those whom the same author calls "extramural health workers" is justified and whether it is convenient for us.

Having admitted that the concept of tuberculosis eradication can be accepted in principle, I believe that this question is acquiring practical usefulness because, together with the stimulation its formulation is giving, it is forcing a change in attitude and a reappraisal of the goals of control, of the disease which had not been done because of the sudden drop in mortality.

With regard to planning and administrative measures the following changes are apparent:

- 1) In developing countries, where the few beds available are always poorly used owing to the traditional habit of long hospitalization, it is becoming possible for the sanatorium physician to accept the priority - in view of the goal of negativization of every newly diagnosed case within three to four months through intensive treatment with combined drugs - and they are making efforts to reduce the length of the patient's stay in hospital.

The complaint of Raska ^{1/} about Czechoslovakia, applies to all the Latin American countries; it reads as follows: "We still sometimes see patients with fresh active disease waiting days or even weeks for hospitalization and hence also for isolation; and once hospitalized they may be kept in the hospital for excessively long periods, although isolation is no longer necessary and treatment could be continued outside the hospital. This applies especially to my country if we observe the practice in tuberculosis sanatoria and tuberculosis wards of general hospitals".

^{1/} K. Raska - On the Methodological aspects of Tuberculosis Eradication - WHO, TB Techn. Rept. September, 1963.

- 2) In view of the new incentives, greater attention and care is being given in the dispensaries to the new cases and the cavity cases, which were formerly displaced by the "interesting" cases or those which were difficult to diagnose. These used to receive all the attention, while the others went home without having received any care, or hospitalization, and they were lost to control.
- 3) It has been recognized that efforts must be made to achieve better national coverage in tuberculosis control, and that the traditional aspiration of doing perfect work in circumscribed areas would have to suffer somewhat.
- 4) The new concept has helped to popularize experiments of using medical personnel which have attended short courses on tuberculosis and to the acceptance of the idea that non-professional personnel with a minimum of training are urgently needed. This has helped to bring phthisiology out of its purely clinical and academic field.
- 5) The various methods of case-finding even the most simple, have been reappraised.
- 6) Under the new approach and owing to their decisive importance impetus has been given to epidemiological studies, the definition of objectives and quantitative goals, and the fixing of deadlines for the reduction of tuberculosis mortality, morbidity, and infection.

WHAT CAN OTHER ERADICATION CAMPAIGNS TEACH US?

The great campaigns to eradicate smallpox, malaria, yellow fever, and other diseases were conducted by special mass campaign methods. In spite of their impressive success, it has been shown even in the case of malaria, that a special mass campaign in itself can be only a temporary measure during the acute, attack phase, which needs to be supported by organized general health services to ensure maintenance and consolidation of the gains. In malaria, once the incidence of infection is low, a local service is permanently needed to sound the alarm should a case occur so that the necessary steps may be taken to prevent transmission. This cannot be done economically except through a health infra-structure, however, minimal it may be. The high costs incurred when attempts were made to implement those measures separately in the last stages of a campaign, and the constant surprises and failures encountered when campaigns of this kind were conducted in areas where there was no health infra-structure that could subsequently undertake surveillance, has lately led to a reconsideration of the entire matter. For this reason, a study group in Geneva recently discussed the integration of mass campaigns into the general health services.

Nevertheless, in the case of diseases whose epidemiological chain has a vulnerable link, such as a vector of known habits or a vaccination method of absolute value, one can understand the arguments of those who do not believe that one should wait until general health services are available, because in the developing countries it takes a long time to organize them, so that the moment for alleviating the situation of large numbers of human beings who can be protected through mass campaigns is too long delayed.

In tuberculosis - even in countries where the health organizations is rudimentary - it is not possible to consider tuberculosis control even in the first stages of attack unless there is an organization built on the general health services, whatever their degree of development may be. This is a disease which, instead of a vulnerable vector, possesses multiple means of transmission, involuntarily created by reservoirs which are difficult to demonstrate, ascertain, or control. There is the aggravating factor of aerial transmission whose difusibility and frequency through respiration still further aggravates the situation, which does not seem to be controllable except through a certain degree of education.

Moreover, although the Koch bacillus is not capable of multiplying in the air and has no spores, it is fairly resistant and knows well how to live in the best harmony with its host.

In addition, there is much to be learned from what has happened with syphilis and the high hopes held when penicillin appeared. Despite the rapid decrease in mortality everywhere, the World Health Organization undertook a detailed study in which 106 countries participated, and the conclusion reached was that syphilis incidence increased by 71 per cent in recent years. ^{1/} In the United States of America, for example, the increase per 100,000 in primary and secondary cases was as follows: ^{2/} 1959: 4 per cent; 1960: 7.1 per cent; 1961: 10.4 per cent; 1962: 11.0 per cent and 1963: 11.9 per cent.

The factors involved in this increase are too complex and varied to go into here, but one could venture to say that what is occurring here is a world-wide phenomenon of the reversibility of the infection; in other words, since 1950 a kind of mutation of the chronic disease has been in progress in which at the present time latent and the late symptomatic forms predominate over the acute stages of extreme contagiousness.

^{1/} WHO Bull. - July, 1962.

^{2/} Today's VD Control Problems. Joint statement by: The Association of State and Territorial Health Officers; The American Venereal Diseases Association; The Social Health Association. March, 1964.

In the planning of effective tuberculosis control aiming at eradication, besides limitations in campaign facilities in terms of personnel, organization of general services, and financial resources, there are still many imponderables which have barely begun to be studied. For example, the resistant strains about which the great bacteriologists have not yet reached agreement, either as to definition or to pathogenic power.

This also applies to the role played by atypical strains. In April of this year, Rufus F. Payne, in a communication to the editor of the American Review of Respiratory Diseases ^{1/} said: "...there is still much to be learned..." and in referring to the plans of 1949: "If the suggestions made at that time for a complete study of this organism had been followed, our knowledge of the role of Bettey mycobacterial infections in man would, in my opinion, be far more complete than it is today".

As the diagnosis of cases and the methods of chemotherapy improve, the concern over these new problems becomes the more pressing. Rodolfo A. Vaccarezza ^{2/} sums the situation up as follows: "It is to be hoped that among the conquests to be made it will be possible to define the nature of the mutations, both spontaneous and induced, which operate in the authentic tuberculosis mycobacteria in their passage through the various levels of resistance, and to distinguish them from the atypical mycobacteria, for which a better characterization is lacking".

In embarking on this new crusade, therefore, we must be prepared for future surprises and difficulties.

PRESENT STATUS OF TUBERCULOSIS IN THE AMERICAS

Even though we say that mortality figures are not an accurate expression of the problem, mortality figures are the least inaccurate, their evolution in the course of time can indicate a trend, and a comparison of them with the figures for countries whose conditions are well known is useful for evaluating the present status of the problem.

Tables I and II show the absolute figures and mortality rates for tuberculosis in the continent from 1950 to 1962. Figures 1,2,3, and 4, show the evolution of death rates in certain countries arranged in the four

^{1/} The American Review of Respiratory Diseases - Vol. 89 - No 4
April 1964.

^{2/} Revista Argentina de Tuberculosis y Enfermedades Pulmonares.-
Vol. XXIV - No 1, 1963.

groups based on the mortality rate for 1962. As may be seen, in each group there is a fairly consistent downward trend in the curve, except for the few sharp declines or a few rates which have remained stable for the 13 years the information covers. It is surprising how limited the information for some countries is, and it was not possible to include certain other countries because they lacked data for many years or because they lacked figures at least for 1961 and 1962. Nevertheless, the countries with incomplete mortality figures still reported the number of known cases regularly each year.

The annual numerical data on the known cases are very incomplete, irregular, and depend on such variable circumstances that there seems little purpose in analyzing them here. (Tables III and IV). Some typical cases are presented in Figure 5 for the sole purpose of showing some of these disparities: there is no doubt that the increase in some countries is due to expanded services and better collection of data; some of the major annual variations may possibly be explained by the periodic intensification of case detection through photofluorograph campaigns; and the higher figures in still other countries may be due to the fact that the estimates were made for "registration areas".

According to the data furnished on certain programs currently under way with PAHO/WHO assistance, tuberculosis cases in those areas range from 0.8 to 4.5 for every 100 persons.

However, to obtain a global estimate of the health care problem which tuberculosis cases represent, it would be better to use the data contained in Table V. ^{1/}

Indeed, if the case/death ratio obtained in North America were applied to the 60,872 deaths estimated for Central and South America and Mexico, there would be 359,144 known cases each year, of which less than half, or 126,688, are known. This means that between the known and the unknown cases it is possible to establish that at least one million are active cases.

The figures on the prevalence of tuberculous infection are even less comparable, owing to the variety of tuberculins, techniques, the criteria reading tests and method of administering them. Table VI shows the data obtained in some countries, where PPD Rt 23 was used in a dose 1 TU per 0.1 cc.

In sum, with all their deficiencies -which rather favor comparison- tuberculosis death rates in Latin America are from 3 to 16 times greater

^{1/} The statistical data appearing in Tables 1-5 was kindly provided by the Health Statistics Branch, Pan American Sanitary Bureau.

than in the United States of America and Canada. The average rate of annual known cases in Central America and Mexico is twice, and that in South America is 4 times, that in the United States of America. All figures for infection up to school age range from 15 per cent to 40 per cent, as compared with an average of 12.6 per cent in the city of New York.

In this brief description two points stand out: a) that the true extent of the problem of tuberculosis in the countries of the Region is not well known, save for a few exceptions; and b) that even with only this half-knowledge it is obvious that it is a major one, and that, after infant diarrheal diseases, tuberculosis is the communicable, avoidable, and curable disease which causes most deaths, most cases, and most social and economic damage.

In considering the planning and evaluation of a tuberculosis campaign, it must be borne in mind that side by side with the urgent action the problem requires, each program must also include a suitable means of obtaining basic epidemiological data, which will serve as the starting point for a subsequent evaluation of the effectiveness of the measures being applied. This need for useful epidemiological information, at the time the program is initiated and periodically thereafter in order to evaluate its effect, presupposes the establishment of uniform definitions or standards of classification in a given country and, if possible, in all the countries of the Region, so as to obtain epidemiological data on suitable population samples.

NEED TO ESTABLISH TARGETS IN TUBERCULOSIS CONTROL

What has been said above shows that the term "control" must be retained and defined.

After the Arden House Conference mentioned earlier which drew attention to chemotherapy as a means for eliminating the source of contagion by diagnosing and treating cases, the United States Public Health Service appointed a special committee to formulate the quantitative targets of a good control program as regards mortality, morbidity, and infection.

Although it may seem difficult for the developing countries to reach some of them, they do make it possible to make an appreciation which, even if only an approximate one -because the statistical data available are insufficient- is nevertheless interesting as a measure of what still needs to be done to attain a satisfactory level of control.

The paper in question established the following performance standards as indicating satisfactory control: ^{1/}

1. The annual rate of new active cases of tuberculosis should be reduced to 10 for every 100,000 by 1970, for the nation as a whole, and all communities should achieve a specified reduction each year. The authors, Brightman and Hilleboe, indicate a figure of 37 new active cases per 100,000 in the United States of America for the period 1957-1959, and point out that the rate for New York State, excluding New York City, is 26.2 while that of the City of New York alone is more than twice the rate of the State. In 1962 the rate in the United States of America was 29.1.

As examples of Latin American countries, the following have services that cover a good part or all of their population and these rates per 100,000: Uruguay: 63; Puerto Rico: 73; Venezuela: 154; and El Salvador: 302.

2. The spread of infection should be controlled to the point where not more than 1 per cent of the 14-year-olds react to tuberculin.

The rate in Latin American countries varies greatly but in that age group it is about 30 per cent in most countries.

3. A complete diagnosis should be made on at least 75 per cent of all persons who on x-ray examination are suspected of having a pathological condition as a result of an examination because of symptoms or any other reason.
4. By two months after a tuberculin survey, at least 90 per cent of the tuberculin reactors should have received a chest x-ray.

This measure, which in the developed countries is applied in mass surveys, may not be possible in most Latin American countries except in the age group 0-4 or in slightly older group who as supposedly well children, can be tuberculin tested in child care and pre-school age care services.

5. All close contacts should be examined and these tests should be completed by 31 January of the year following the report of the discovery. In New York State the standard is to examine 90 per cent of all contacts within three months of the discovery of the case; this measure seems to us very useful.

^{1/} Brightman, I. Jay and Hilleboe, Herman E. "The Present Status of Tuberculosis Control" Am. J. of Pub. Hlth. Vol. 52, No 5, May, 1962.

6. At least 75 per cent of all cases reported as active cases with positive sputum should be treated so as reverse the findings to a negative status within six months.
7. At any given time, 90 per cent of all known active tuberculosis cases should be under drug treatment, whether ambulatory or in hospital.
8. At least 80 per cent of the people living at home with active tuberculosis should have had a sputum examination within the preceding six months.

The goals which the Directing Council of the Pan American Health Organization ^{1/} proposed for the Hemisphere in 1961 came closer to reality, namely:

1. To reduce tuberculosis mortality to one half of its present level.
2. To reduce the morbidity rates to one third.
3. To reduce the infection in the under 5 year age group to less than 2 per cent; in the under 10 year group to 10 per cent; and in the under 15 year age group to 20 per cent.

Time periods should be established to attain these targets depending on each particular situation and "insofar as possible, in the next ten years".

KIND AND TYPE OF SERVICES NEEDED FOR TUBERCULOSIS CONTROL

Whether a tuberculosis control program consists of a minimum of activities or is the most advanced eradication plan, it will need the support of the entire health organization in the country. The principle of incorporation or integration of tuberculosis work into the general health services is applied in some of the countries in Latin America even though not in many, and it has been possible to resist the temptation of mass x-ray campaigns and BCG vaccinations campaigns which were so highly recommended after the Second World War. A short-term campaign does not fulfill the objectives, and in addition it is very costly. Some reasons were previously given which make this viewpoint even more imperative, when tuberculosis campaigns are compared with other special campaigns.

^{1/} XIII Meeting of the Directing Council of PAHO, Washington, D.C. Oct. 1961

The following additional points supplement what was said above:

1. Regardless of its plan of action, the service should operate permanently within the local health service, because for the detection of cases, which continuously appear, for the supervision of cases and contacts, and for the protection of the new population with BCG vaccination daily vigilance is needed.
2. The service should aim at the total coverage of the various levels of population.
3. It would be a basic error to have no local tuberculosis activities whatever, in view of the public health importance of this disease.
4. The only way to improve tuberculosis control is by delegating the responsibility to the local services. Experience has shown that when a case has been detected by the local service on its own initiative, its interest is far greater since it considers it "its own case."
5. The service should be simplified and reduced to those activities which are within the range of local possibilities both personnel and financial possibilities.

The types of services that will have to be developed in Latin America will depend basically on the population levels in the country as well as on the distances to be travelled and means of communication; the last two conditions are even more difficult in tropical areas during the rainy season. This will hold true for all countries, with but few exceptions, Uruguay among them, for it has a special population distribution, means of communication, and cultural level.

Certain data collected by Dr. Rogelio Valladares, the Regional Advisor on Tuberculosis of the Pan American Health Organization, are enlightening. In an internal report he states the following: "Although we are convinced that medical care and health services in these large cities leave a lot to be desired, we wish to place the problem at a slightly lower level of population, e.i., in communities of from 2,500 to 24,999 population, which are not reached by specialists and where 18,061,682 persons live in over 3,000 different communities; this represents 13.4 per cent of the population of the 14 countries about which the data collected are shown in the attached table". And further on he states: "There are 73 million persons, or 54.8 per cent of the population in the region, living in small communities of less than 2,500 population, of which 60 per cent to 80 per cent have under 200 inhabitants. In other words, for the scattered population of the rural areas of Latin America, which cannot be provided with nursing or medical professional personnel, a coordinated system of services will

have to be organized by using auxiliary personnel permanently stationed in the area and regularly supervised by senior staff including physicians".

Any attempt at planning an effective tuberculosis control, therefore, must take into account at least three population levels. First, the urban, composed of groups living in towns with 25,000 inhabitants and over; second, the intermediate level, composed of groups living in localities with from 2,500 to 24,999 inhabitants; and third, the rural level, consisting of communities with less than 2,500 population. This latter limit (2,500) may vary, but the figures for 14 countries show that the two last mentioned groups (intermediate and rural) represent 68.2 per cent of the total, or 91 million persons.

Urban level.- In the 14 countries in question there are 42,650,739 persons who live at the urban level in 363 towns, but in Argentina and Brazil alone there are 31 million persons living in 264 cities, while in the remaining countries somewhat over 11.5 million persons live in 99 cities.

It is at the urban level that the best public health and medical care services are to be found. The classic "tuberculosis dispensaries", which used to be the heart of the tuberculosis campaign, have gradually become discredited because they lost sight of their purpose at the very moment when the possibility of ambulatory treatment made them essential and required them to act promptly, with an efficiency and a purpose which it was not theirs to show. They concentrated mainly on the clinical activities and lost sight of the epidemiological aspect. Consequently these services must be completely reoriented along the following lines:

- a. To increase the number of population examined preference being given to the most vulnerable population groups;
- b. to have as their primary purpose the detection of new cases;
- c. to give ambulatory chemotherapy to every new tuberculosis case for at least one year (including any other treatment that may be necessary);
- d. to examine all contacts of tuberculosis cases; and
- e. to serve as a center of reference, consultation, orientation, and stimulus to the intermediate services.

Nothing more need be added since BCG vaccination is the function of services which care for young, uninfected population groups, and, in our opinion, there should be no chemoprophylaxis until such time as all known sources are being properly treated.

At the urban level, tuberculosis control activities should be incorporated into all health services. The "dispensaries" in turn, should be brought administratively under either a local or regional public health authority wherever the health organization or the administrative relationship between the dispensaries and state or semi-autonomous agencies so permits.

All general hospitals operating in these cities should include the diagnosis and ambulatory treatment of tuberculosis cases and the surveillance of contacts into their regular activities.

The tuberculosis sanatoria which are generally found at this level, should be reoriented towards a maximum utilization of the beds available before considering any new special hospital or sanatorium beds for tuberculosis patients. Nowadays every general hospital should have a certain number of beds available to meet the community's basic needs for hospitalizing tuberculosis patients. In Latin America the amount expended for tuberculosis sanatoria is four to five times more than that expended for out-patient services, while the number of hospitalized patients is four to five times less than the number of those receiving ambulatory treatment.

Intermediate level.- The health units, health centers, and small hospitals, which vary from good to bad, are to be found at this level. They are usually serviced by a few state-employed physicians who work according to their inclination, ability, and training, but generally without any suitable guidance.

I must apologize for referring to an experiment of a particular country in a paper of this kind, but I consider it the only contribution I make to these discussions. Despite its shortcomings, that experiment has stood the test of 20 years of work. Moreover, it may offer a solution to the problem of extending tuberculosis services to both the intermediate and the rural levels. No useful purpose will be served by mass x-rays at these two levels, because their effect is ephemeral unless a permanent service is available. A sudden unexpected heavy load of x-ray shadows and tuberculosis cases (including many so-called "minimum" cases) falling on a small health service at the intermediate level will end by demoralizing or discrediting it. I know of no experience in Latin America, except that of Uruguay, where it has been possible to maintain a regular service on the basis of mobile units. And I purposely do not mention the cost.

In my country, Venezuela, the health authorities have since 1942 been carrying on an experiment which has gradually been extended to the intermediate population level. In Venezuela the level consists of localities with from 4,999 to 24,999 inhabitants where there are suitable conditions for organizing an integrated health service with a new kind of health officer.

This new type of officer needed to meet the pressing needs of the country was trained in a full time postgraduated medical course lasting

four months, in groups of 12 students, to prepare him in the clinical aspects of acute communicable diseases, puericulture and pediatrics, phthi-
siology, venereal diseases, leprosy, nutritional diseases, and certain ru-
ral endemic diseases.

The essential point was that such elementary training in the clini-
cal aspects of health was imparted together with a program, also basic and
elementary, comprising subjects taken from the curriculum of the courses
for public health officers.

In that program public health phthi-
siology was conceived as simpli-
fied phthi-
siology for use by the public health worker, and was aimed at
opening up new areas of tuberculosis activity in General Health Services
at the intermediate level. The local officer could act not only in admin-
istrative and epidemiological matters but also in the clinical field. The
elementary training he had received in phthi-
siology, which consisted of
168 hours, was compensated in practice by the knowledge which he acquired
in health administration, statistics, epidemiology, environmental sanita-
tion, nutrition, and health education. He was trained to detect cases by
x-raying all those who had suspicious symptoms of tuberculosis; the contacts;
young children giving a positive tuberculin reaction; and such threatening
groups as teachers. Any case presenting a finding was subjected to x-ray
(large film) and a sputum examination.

Since the experiment began at a time when regionalization in the
country was just dawning, the executive agencies were called secondary net-
works, to show that they were subordinate to a higher service called prima-
ry network. This, as far as tuberculosis was concerned was represented by
the tuberculosis dispensary, which was part of the Health Unit of the larger
urban centers.

This intermediate population level has been considered the "SAFETY
ZONE" because it embodies conditions suitable for an appropriate health
strategy. Above it, in the primary network, are all the resources of devel-
oped medicine, which makes it possible to supervise and to refer cases
which cannot be solved at the level of the secondary network. But equally
important or more so is the fact that it makes it possible to open up ac-
tivities in the following two lower population levels:

1. Communities of from 2,500 to 4,999 inhabitants; and
2. Communities with less than 2,500 inhabitants down to the numer-
ous sectors with less than 200 inhabitants.

Rural level.- On the first of these two lower levels is the rural
medical post manned by a physician but with very few diagnostic resources
and no x-ray; and on the second, the rural dispensary manned by non-profes-
sional auxiliary personnel, which constitutes the advance post of the sim-
plest medical care or the minimum rural health infrastructure.

Suspicious cases can be selected at both these levels and referred to the intermediate level; treatment can be supervised; and the healthy population can be protected through BCG vaccination; health education.

The important thing is to recognize that what is required is an integrated service, regardless of its possibilities that will act permanently in the locality, and that an isolated measure, even if it will initially produce greater results owing to its intensity, will not be a solution. ^{1/} ^{2/}

I understand that a similar approach, which includes urban, suburban, and rural communities in which the methods practicable in and suited to each level are applied, is being tested in the project in Queretaro State, Mexico, and partly, in the project in Recreo, Argentina, where the so-called "peripheral" dispensaries were recently established.

TARGETS AND THE PROCEDURES TO ATTAIN THEM

The basic ones are as follows:

1. Search for infectious cases.
2. Suitable treatment.
3. Protection of the exposed population.

1. Search for infectious cases

In dealing with tuberculosis as an infectious and contagious disease, the first step is to detect the greatest possible number of cases in order to extinguish the sources of dissemination. This is all the more urgent because it is now possible to do so with chemotherapy, even when the living conditions of patients are poor.

I do not consider it advisable to continue the course taken in recent years, namely, an evaluation of the usefulness of the various case detection methods in tuberculosis. The plight of underdeveloped or developing countries is one thing, and another is the appropriateness of using a polemic style in evaluating methods when what needs to be done is

^{1/} Baldó, J.I., Curiel, J., Lobo Castellanos, O., Tuberculosis in Rural Venezuela - XIV Pan American Tuberculosis Congress, La Paz, Bolivia, April 1964. (Proceedings in press)

^{2/} Valladares, R., Curiel, J., Quevedo Segnini, L. The Venezuelan experience with the system of tuberculosis campaign networks - Boletín of the Pan American Sanitary Bureau, Vol. LVI, No 1, 1964.

to recommend that which because of its simplicity or low cost is the only one that can be used in a given situation.

It is desirable to make an objective study of the advantages and applicability of each method in a given place, and to recognize the need for using them all, so that no effort may be spared to attain those which, although they may be more costly because of the equipment involved, could significantly improve performance with a given number of easily trained personnel.

This matter has come up at many international and regional meetings, as well as in articles of various kinds.

One of the most characteristic of those articles is that published in the journal of the International Union Against Tuberculosis which summarizes the discussions in Paris in 1962: "Tuberculosis Control in the Underdeveloped Countries - Microscope versus x-rays", it contains the replies to questions addressed by John Holm and J. Dominique to a panel of six international experts which show not only a diversity of view points but in some of them great concern.

i. Bacteriological methods

There is no doubt that a direct examination of a sputum smear from subjects with suspicious symptoms is the easiest method to use and the cheapest, even though one cannot wholeheartedly accept the statement that it costs a one hundredth part of the cost of x-ray when it is applied to a country's entire population in nationwide coverage.

Although it may not yield more than 30 per cent in case detection, which is a very low figure epidemiologically, as J. Meijer indicated at the meeting previously mentioned, I believe that where no more can be done, that is already a good deal. But the question is to know whether, although the test may be applicable to an entire area, the results will be comparable to those which were attained in pilot studies which is what we have up till now.

In Latin America, when it is no longer a matter of a pilot study but rather of nation-wide coverage, one encounters, in practice, many obstacles to using the direct sputum test for primary case detection.

The shortage of laboratory technicians in these countries is alarming. So is the difficulty in collecting the samples from the population and in identifying them properly. Errors of every kind occur, especially at the lower population levels where these tests are most needed.

A further difficulty -and to my mind the greatest- is the danger inherent in having the material handled by auxiliary personnel that have undergone only a short period of training, which is the only personnel

available in view of the countries' needs; and also unsuitable premises and equipment which in so many places give no assurance of the proper handling of containers and of residual materials. In many of the places where the need for this method is greatest there is not sufficient water all the year round, but there are plenty of flies.

That is why in my country interest has turned to cultures. According to some bacteriologists, the value of cultures is double or triple that of the direct test. It would mean to disregard the advances made in bacteriology in recent decades if one were to embrace the enthusiasm of some experimenters such as Wallace Fox ^{1/} who in an excellent article - to which we shall refer again when dealing with treatment- stated that the culture adds little to the smear.

At the last meeting of the Regional Committee for Southeast Asia, ^{2/} despite the enthusiasm with which the smear test was recommended owing to local possibilities, the following figures were given for: sputum culture, 9.1 per cent; laryngeal swab culture, 7.0 per cent; and direct smear, 4.4 per cent. Moreover, in addition to efficiency, culture was considered more economical from the operational viewpoint because it would probably be possible to process five times more specimens than with the smear.

The reason it was so difficult to bring the culture technique into general use outside well-equipped laboratories was that not all personnel could seed the Löwenstein-Jensen, solid medium which was the one generally used. The facilities which the liquid Sula medium offers in this regards leads me to believe that if it is introduced, it will be possible to change the work methods of tuberculosis bacteriology in the countries which lack sufficient laboratory technicians.

The semi-synthetic medium of L. Sula, which is concentrated and lyophilized, can be kept stored in the laboratories to which it is sent for from six to twelve months, and can be readily reconstituted in liquid form. In addition, any kind of auxiliary personnel can easily seed laryngeal swabs in it. ^{3/}

^{1/} Wallace Fox - Realistic Chemotherapeutic Policies for Tuberculosis in the Developing Countries - Brit. med. J. 1964, 135-142.

^{2/} Conclusions and recommendations arising out of the Technical Discussions held during the Sixteenth Session of the Regional Committee for South-East Asia - 1963 - Bangkok, Thailand.

^{3/} Ladislav Sula - WHO Cooperative Studies on a Simple Culture Technique for the Isolation of Mycobacteria - Bull. Wld. Hlth. Org., 1963, Vol. 29, No 5.

Although the results with laryngeal swabs are slightly lower than with sputum specimens, I believe that the procedure eliminates identification errors and the risks of contamination already mentioned. It can be practiced not only by the physician at the lower population levels where there are no x-rays but also by the nursing auxiliary in the rural medical posts. Protection of the head with a cellophane sheet and immediate seeding of the swab in the tube containing the liquid medium, eliminates any risk to the operator.

Transportation protected from light gives an extra margin of time for sending the material to the central laboratory of the regional hospital of each state or province, where the technical resources are.

In the countries of Latin America it is administratively easier to organize a state or provincial service than it is to multiply the services for direct examination in each locality. Moreover, it opens the door to the subsequent general use of resistance tests throughout the country.

In Venezuela an experiment to compare the Sula medium with the Löwenstein-Jensen medium is being performed in accordance with the protocols of the WHO Cooperative Studies which are being made elsewhere.

It is as yet premature to voice an opinion, but in view of the urgency to bring this important matter up for discussion, may I be permitted to state that the impression is favorable both as to efficacy and the possibility of extending the method on a national scale.

ii. Radiological methods

Since it is the consensus that in the developing countries mass x-rays (photofluorography) for tuberculosis case-finding should be eliminated owing to its cost in terms of productivity, as should the use of the large x-ray for a first examination of suspects, because of its high cost, I shall refer especially to radioscopy as a screening test for suspect cases, followed by radiography in the event that the radioscopy shows any abnormality.

It is this method which has been the subject of most discussion in the recent years since efforts were begun to extend the method of direct microscopic sputum examination.

It has been said that it is subjective; that no record is left; that it is dangerous because of the radiation; that it is uneconomical.

The attacks come especially from countries which have no trained medical personnel and where it has been necessary to resort to the sputum test for primary case detection.

The document previously cited contains the following statement: "Fluoroscopy should not longer have any place in tuberculosis case-finding nor in the routine examination of patients, because it provides no permanent record of a diagnosis that can be discussed and confirmed and because of the relatively high radiation dose to which examinees are exposed".

To start with, it must be accepted that some kind of x-ray examination method is necessary since microscopy detects only one third or one quarter of the cases it should.

Radiscopic case-finding has been profitably used in the intermediate services in Venezuela for the past twenty years.

The conditions required are as follows:

1. Suitable training of medical personnel to enable it to use the method correctly.
2. Availability of 30, 60, or 100 milliamper installations to take large x-ray photograph whenever an image appears not to be normal.

I cannot enter into the technical regulations here, and in any case they are governed by international provisions. If the operator is duly trained, if the installation has no defects and a diaphragm or interruptor is used, if the operator uses protection, and if the rules for suitable adaptation are followed, radioscopy with a conventional type apparatus will require no more than 2 milliamperes and the duration will not exceed 15 seconds.

It is regrettable that the screen with image intensifier, which permits a reduction to 1 milliamper, is still too costly.

If we eliminated certain groups such as pregnant women from the examination, then we would have to consider the danger, not for the examinee, but rather for the operator. The use of suitable protection and a restriction of the test to only those who require it will make it possible to reduce the number of examinations.

The examination is applied to the following productive groups:

1. Cases with suspicious symptoms.
2. Contacts.
3. Young, tuberculin-positive children.
4. Groups that may be a menace (owing to their profession).

Surely with this procedure cases which expectorate bacilli will be detected, for they are the cases which radiologically show a cavity, or a suspicion of a cavity, and such other apparent lesions as those of primary infection.

In the developing countries that is the only way to restrict x-rays to the case with some finding, and the only way to fill the void left by the use of a single method, such as the microscope.

It has been shown that it gives a high yield and is readily accepted by the public; that offsets the only objection left, which is its relative cost and that is far lower than that of other radiological methods.

iii. Tuberculin methods

In the developing countries, tuberculin tests remain valid only in the first years of life, owing to the high percentage of natural infections which occur as early as age 14, as mentioned in connection with the targets.

Their epidemiological significance was pointed out in the first part of this paper, and later in speaking of x-ray examination of every young tuberculin-positive child and contacts. I believe that the pediatric and pre-school age child surveillance services should perform the test as a routine. A positive reaction to tuberculin at these ages makes a radiological examination a necessity.

In many countries the number of positives in school BCG vaccination programs may be so high that x-ray examinations will only be possible for the hyperergic, or whenever indicated for some other reason.

2. Suitable treatment

Chemotherapeutic treatment, an incomplete term but the one generally used, which has been responsible not only for the new approach to tuberculosis control but also for posing the problem of its eradication, should be considered differently in the developing countries from the way it is now considered in developed countries.

McDermott, ^{1/} who worked in areas of both high and low technological development, had the impression that tuberculosis represented two different diseases in the two areas.

There is nothing to add to present knowledge and experience about the requirements and results with primary and reserve treatment in the

^{1/} McDermott, W. - Antimicrobial Therapy of Pulmonary Tuberculosis, Bull. WHO 23-421, 1960.

developed countries. But in the developing countries, it is an entirely different matter. It is here that the oft-quoted saying of Samuel Manuwa ^{1/} "The trap to avoid in health planning is to permit the best to become the enemy of the good" is fully appropriate.

Canetti ^{2/} said that we must not discuss which is the best method but rather which method can be applied. He complained that authors have concerned themselves more with the efficacy and innocuity of methods than with their applicability in the developing countries; that there has been indifference to testing less complex and cheaper regimens which can be of use to certain groups; and that none of the highly efficient regimens are applicable or adaptable to the possibilities of developing countries. It is for these reasons that he so greatly favors the two-phase regimen, i.e., the short attack phase, in which all efforts and resources enter into play, and the maintenance phase, in which a single drug, isoniazid, is applied since it is the least costly and the most easy to tolerate for a long period of time.

Wallace Fox made a cost comparison and found that costs range from 2.35 dollars per person, per year when isoniazid alone is used to 44.50 dollars per person per year if isoniazid plus streptomycin is used for one semester, which requires another 20.50 dollars the next semester for the use of isoniazid with PAS. If, owing to lack of funds, a clinic is unable to treat more than 100 cases in a locality with 2,000 cases, and therefore has to leave 1,900 persons untreated as possible sources of infection, it is preferable to treat all of them with isoniazid so as to render 1,400 persons quiescent even if it would leave 600 isoniazid-resistant, since the latter is the lesser of the two evils.

In the McDermott paper already referred to it is also stated that isoniazid should be more widely used, whether with or without an associated drug. He based that opinion on the fact that powerful anti-tuberculous influence can be exercised on patients who would otherwise receive no treatment at all. There is no doubt that if treatment with isoniazid alone were

^{1/} Manuwa, Sir Samuel: "The Methodology of Planning the Development of National Health Programmes in Underdeveloped Countries 1960 (WHO, PHAA/ Working Doc. No 1, not-published). Quote taken from paper by González, C.L., Minimum Requirements of Rural Health Services to Maintain Malaria Eradication Programs.- PASE Boletin Vol. LV, No 2, 1963.

^{2/} Canetti, George - (Institute Pasteur, Paris): The Eradication of Tuberculosis: Theoretical Problems and Practical Solutions - Reprinted from Tubercle - Vol. 43, No 3 - 1962.

given to young children who without radiological signs or symptoms convert from tuberculin-negative to tuberculin-positive, it would prevent most of the spread of the disease and save an appreciable number of lives, especially of those who die from tuberculous meningitis.

It was these considerations which led the Chemotherapeutic Center of Madras to face the dilemma and attempt to study the matter experimentally. What is the pro and contra of good regimens with optimum results? How can the failures of the more readily applicable regimens be reduced, and what will their future consequences be? For obvious reasons I cannot analyze these various questions which attempts are being made to clarify and which will require experiments under different conditions in other countries.

It has been verified both there and elsewhere that the combination of isoniazid with PAS produces almost as good results as the daily administration of isoniazid with streptomycin, and has the added advantage that it can be used in ambulatory patients in developing countries. In addition to financial problems, there is the problem of maintaining treatment after the first six months have elapsed, when there is sufficient improvement for the patient not to wish to continue treatment at the slightest sign of gastritis or diarrhea, and one loses sight of him.

It is therefore evident that the problem also affects the countries with sufficient means to provide the drugs free of charge but which lack sufficient general public health services to supervise the less easily maintained regimens. The problem has two facets: one, financial and the other, the organization of control.

I, therefore consider it urgently necessary to intensify research on regimens which, although less efficient, will partially fill the gap that the highly efficient regimens are leaving in Latin America for well known reasons. It would seem to us that experiments should be made in this Continent because conditions vary as much from one part of the world to the other.

In addition to the fact that it should be possible to offer treatment free of charge, it should be the responsibility of the governments to do so, as the Director of the Pan American Sanitary Bureau said in the paper I mentioned earlier.

I believe, moreover, that the drugs should be controlled in order to prevent any self-medication. The recommendation of the X Pan American Tuberculosis Congress held in 1953 ^{1/} that "it was advisable for the

^{1/} Memorias del X Congreso Panamericano de la Tuberculosis - Caracas, 1953.

governments of the countries of the Americas to take the necessary steps to prevent the indiscriminate use and abuse of antibiotics" was ratified by the XI Congress held in 1957. ^{1/}

In Venezuela, control over isoniazid has been exercised from the time of its appearance by the Ministry of Health and Social Welfare, and the sale of the drug is not permitted. Official agencies supply the drug free of charge even to patients who are under private care, upon presentation of a prescription from the physician accompanying the notification of the case. This measure has, in addition, led to the notification of cases treated by private practitioners.

3. Protection of the exposed population

The protection conferred by BCG vaccination is considered very important in developing countries, if the vaccination of from 70 per cent to 80 per cent of the susceptible population is attained. The relative value of the protection conferred is subject to many known factors, which I shall not analyze here.

The problem lies in how to reach this target.

Owing to the need to vaccinate the new population which continues to be born, the mass campaigns which were recommended some years ago are now limited to certain accessible groups such as school-age children. The maternity services and visiting nurses are therefore used for the newborn, and in some countries the midwives, for children born at home.

The pediatric services should make compulsory vaccinations a matter of routine. Where pre-school age services exist, it is easy to investigate allergies and administer BCG.

The time-table for revaccination varies from country to country, according to their possibilities, but generally between the ages of 4 to 6 and 14 to 16 is recommended.

The techniques used are usually those recommended by WHO.

A special problem is that of the intermediate population level, and the lower population levels in rural areas where the population is scattered.

^{1/} Memorias del XI Congreso Panamericano de Tuberculosis - Medellín, Colombia, 1957.

The short lifespan of the fresh vaccine, deficient systems of transportation and supply, and the technical requirements for its intradermal administration, which it is difficult to extend to all levels, have led to other routes being used and to the use of a lyophilized product that can easily be kept for several months.

Statistics from Canada, Japan, and the Soviet Union concerning use of the lyophilized product and the intradermal route give percentages of conversion which are analogous to those obtained with the fresh product.

The oral route has been advocated in Brazil by Arlindo de Assis and in Uruguay by Fernando D. Gomez, with satisfactory results, although experiments made in other countries have not produced favorable conversion figures.

In Venezuela, Juan Delgado Blanco and Luis Quevedo Segnini induced positivity in 80 per cent of negative school children, using a single dose of lyophilized BCG by the scarification route; the positive reaction measured not less than 12 millimeters. ^{1/}

The same authors also used 120 mg/ml of lyophilized BCG vaccine by scarification in tuberculosis cases, without any local complications appearing (the Koch phenomenon did not occur). They therefore reached the conclusion that it could be used indiscriminately in rural areas whenever a prior tuberculin test was not feasible. It was used last year by auxiliary personnel of the medical services in rural areas with a scattered population where a previous limited reconnaissance had shown low percentages of infection.

This would be equivalent to the minimum program recommended for any type of community by Sofia Bona de Santos ^{2/}.

In the developing countries there is no need to consider the objection to BCG vaccination, namely that it falsifies a subsequent tuberculin test, by introducing a factor which interferes with the search for the natural infection.

I regard as highly important the recommendations made by the Conference on BCG Vaccination held in New York in February of this year: "It was

^{1/} Delgado Blanco, Juan and Quevedo Segnini, Luis - "Estudios sobre Alergia Tuberculínica y BCG." - Instituto Nacional de Tuberculosis - Caracas, 1963.

^{2/} Proposed program for the area of Queretaro, Mexico.

recommended the seventh grade pupils, with an average age of 12, in areas of high tuberculosis prevalence, should be offered BCG vaccination." 1/

The recommendation was based on the following:

"The Committee reviewed the trends of tuberculosis mortality and morbidity in New York City during the past ten years. It was noted that the continuous decline in the number of newly reported cases per year was reversed for the first time in recent years in 1962, when there was a 2 per cent increase in new active cases."

It is the opinion of Wallace Fox that chemoprophylaxis produces no dividends in developing countries, since there is no guarantee that each new case will be treated for at least one year.

I believe this opinion to be justified.

SUPPLEMENTARY ASPECTS

I shall refer to a few supplementary aspects that must be taken into account in a tuberculosis control program, and list them in their order of importance.

1. Personnel training

This should cover both medical and paramedical personnel.

With regard to medical personnel, there is agreement about the need for training at all levels, beginning with undergraduate medical studies. A recent publication 2/ contains the following statement: "Exploration of a means of improving the use of undergraduate curriculum time allotted to tuberculosis in schools of medicine..." and: "expansion of present activities to provide opportunities to physicians and other professional workers to refreshing and bringing up-to-date their knowledge of tuberculosis through short courses, symposiums, and workshops."

Mention has already been made of the need for short courses of not more than four months' duration at the postgraduate level to train physicians,

1/ BCG Vaccination in New York City. Conference Report of the Advisory Committee, February 18-19, 1964. Sponsored jointly by the Dept. of Health. The City of New York and the New York Tuberculosis and Health Association.

2/ Public Health Service Publication No 1119 - December, 1963.

hygienists, and phthysiologists which the Latin American countries need for their intermediate services.

Complete postgraduate training in phthysiology should include, together with clinical knowledge, as much preventive and social medicine as possible, including of course, epidemiology, and health statistics and administration. The special branches of phthysiology require duly trained personnel for the growing number of respiratory diseases. The surgical centers will retain their up-to-dateness for a long time to come.

As to nursing, apart from professional nurses, which are not available in sufficient numbers in almost all Latin American countries, special attention should be paid to nursing auxiliaries. The future of tuberculosis control in the vast rural areas with scattered population in the American continent lies in short courses for nursing auxiliaries. The paper already mentioned deals with the importance of training other types of personnel which may be used, such as veterinary officers, national guards, or the rural guards, and missionaries, who could be trained through short courses similar to those for nursing auxiliaries.

The trend nowadays is to make increasing use of voluntary workers from the community for certain aspects of the work, when that community is duly motivated and oriented. Enrique Pereda's experience in the Dominican Republic confirms this trend and the possibility of using this kind of personnel. ^{1/}

The alarming scarcity of such other auxiliary technical personnel as laboratory technicians, x-ray technicians, rehabilitation workers, and social workers, has already been mentioned. I believe that concrete training courses for all these types of personnel should become an integral part of any plan of action for tuberculosis control in the years to come.

2. Health education

I again refer to the quotation from the work of T. S. Roberts, written some 60 years ago which I cited in the first part of this paper. It is as valid today as it was then, since it gives concise expression to the idea underlying the program we should develop.

3. Asistance to tuberculosis patients

Since it is a disease which in many cases still incapacitates, temporarily or permanently, in spite of the wishful thinking brought about by

^{1/} Personal communication.

the new era of chemotherapy, the tuberculosis patient and his family will continue to require one form or another of assistance for a long time to come.

In some countries patients are covered by social insurance, although in general such protection is inadequate and of short duration. The most complete in this respect is the Mattiuada Law in Uruguay, since it applies to the entire population and for a sufficient length of time. There is no doubt that this law has strongly affected the favorable evolution of endemic tuberculosis in that country.

4. Rehabilitation

It is important to point out that this "fourth activity" of medicine should have been included in the undergraduate curriculum. Its introduction at this stage of training is a conquest of equal importance as the inclusion of the departments of preventive and social medicine some years ago. The classic type of training should make the necessary sacrifice of time to make room for the teaching of the basic principles of rehabilitation.

Insofar as Latin America is concerned, rehabilitation of tuberculosis and other pulmonary diseases should not be organized separately, as is usually the case, but should take place in centers which engage in other fields of rehabilitation, since there is a great lack of key personnel. With good direction and orientation it is not difficult to solve problems of physiotherapy. Physiotherapy is becoming increasingly important, because respiratory insufficiency is becoming more and more frequent as more and more persons are cured of tuberculosis and other broncho-pulmonary diseases.

5. Bovine tuberculosis

Before concluding I must mention the need for extending the control of bovine tuberculosis and for conducting eradication campaigns. These campaigns will have to be geared to the conditions and financial possibilities of each country.

The Fifth Meeting of the Expert Committee on Tuberculosis ^{1/}made a recommendation which I quote here because I consider it essential if good results are to be obtained in the bovine tuberculosis eradication campaigns which will be planned in the continent. "For this reason the Committee

^{1/} Wld. Hlth. Tech. rep. Ser., 32, 12.

recommends that in each country join commissions of medical and veterinary physicians and their co-workers be organized to control activities. This will mean mutual aid with personnel and financial resources. All means of enlisting public support should be sought to produce the necessary funds to carry forward all phases of control".

In Venezuela, the bovine tuberculosis eradication program was begun in 1954. The two preceding years had been devoted to an epizootiological and statistical study of the problem which received technical advisory services from the Pan American Sanitary Bureau. By virtue of a Government Decree which coordinated the activities of the Departments of Health, Agriculture and Stockraising, and Development (Commerce and Industry), the direction and control of the campaign was entrusted to a national committee which between 1954 to 1962, tested a total of 1,575,260 milk cows, slaughtered 16,419, and reduced the rate of tuberculosis infection from 3.48 per cent to 0.34 per cent in the controlled areas. There are still areas in which control procedures have yet to begin.

TABLE I

NUMBER OF DEATHS FROM TUBERCULOSIS, ALL FORMS (001-019) IN THE AMERICAS, 1950-1962

Area	Year												
	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Argentina	8942	8470	7943	5399	4959	4786	3844	...	...	3524	3363	...	...
Bolivia	1737	1874	1843	1739	1185	...	...	...	...	...	...	...	...
Brazil (a)	6444	4604	3396	2443	2470	2410	2568	8522	7973	8434	...	4023	1892
Canada	3583	3417	2457	1810	1562	1382	1256	1183	1027	959	823	769	785
Chile	9282	8755	6758	4879	4615	4530	4129	4110	3776	4073	4032	4112	3906
Colombia	4107	4202	3652	3169	3230	3570	3487	3614	3662	3841	4074	4066	4260
Costa Rica	412	417	340	224	156	220	198	217	165	163	151	105	151
Cuba	...	...	...	...	...	...	...	1175	1076	1146	1054	...	...
Dominican Republic	1341	1265	1380	831	800	768	767	614	476	512	467	457	354
Ecuador	1379	1189	1096	...	1256	1213	...	1420	1454	1220	890	...	...
El Salvador	722	690	648	568	476	456	363	406	432	384	408	372	373
Guatemala	1540	1460	1520	1443	1191	1311	1439	1272	1306	1207	1266	1237	1261
Haiti	...	...	...	...	...	...	...	...	...	...	...	...	...
Honduras	292	326	354	...	251	266	278	286	244	297	265	236	271
Jamaica	1109	1013	963	599	500	398	323	...	...	...	...	143	...
Mexico	10588	11201	9993	8608	8052	7708	8434	9494	9399	9168	9719	9403	...
Nicaragua	221	158	154	105	88	82	88	72	97	113	123	97	125
Panama	577	464	422	313	244	203	292	267	266	238	288	233	252
Paraguay (b)	394	391	...	288	264	301	243	219	220	244	292	275	275
Peru (c)	...	4405	...	2597	...	2460	2583	3224	2627	3182	...	3002	3164
Trinidad & Tobago	470	416	362	317	282	290	169	139	110	116	95	86	48
United States of A.	34319	31165	24861	19707	16527	15016	14137	13390	12417	11474	10866	9938	9506
Uruguay	1309	1299	955	707	568	635	...	599	519	507	453	449	...
Venezuela	3055	3212	3178	2675	2390	1932	1723	1731	1547	1466	1411	1312	1255
Antigua	19	28	24	19	9	19	21	12	7	9	3	9	7
Bahama Islands	87	75	58	47	41	...	21	13	20	12	22	...	9
Barbados	85	110	78	64	42	53	43	25	18	16	16	13	17
Bermuda	4	7	1	-	1	1	4	-	2	1	1	1	1
British Guiana	205	178	168	147	116	124	107	139	77	...	...	47	36
British Honduras	38	39	37	23	38	...	19	14	14	21	16	8	10
Canal Zone	27	18	7	9	3	1	6	2	1	1	-	-	2
Cayman Islands	...	...	...	...	...	...	...	...	...	...	...	...	-
Dominica	60	45	64	53	48	48	37	27	32	19	29	...	19
Falkland Islands	...	...	...	...	...	...	...	-	2	-	-	-	-
French Guiana	...	...	...	...	...	...	7	7	12	8	11	11	...
Grenada	28	36	27	...	32	20	...	18	5	7	10	6	11
Guadeloupe	14	24	38	35	...	28	...	73	38	55	59	68	58
Martinique	...	159	110	75	...	102	82	96	108	76	92	71	56
Montserrat	14	7	5	11	2	2	...	6	4	...	5	2	2
Netherlands Antilles	...	...	...	...	...	...	...	3	4	5	...	1	...
Puerto Rico	2861	2654	2092	1037	852	746	825	741	667	679	689	633	582
St. Kitts-Nevis and Anguilla	51	39	23	19	19	20	9	6	11	14	14	7	11
St. Lucia	70	74	76	80	50	48	41	48	41	39	15	12	11
St. Pierre and Miquelon	6	5	8	3	...	5	...	2	3	5	1	3	3
St. Vincent	46	45	45	42	33	23	...	...	...	...	...	...	...
Surinam	79	56	52	...	...	22	28	37	30	20	22	...	6
Turks & Caicos I.	...	...	...	...	...	...	...	...	...	...	...	-	-
Virgin Islands (UK)	3	8	3	1	-	1	1	1	-	-	2	-	-
Virgin Islands (US)	6	5	7	4	3	5	2	4	3	2	...	1	2

(a) State of Guanabara and city of São Paulo in 1950; State of Guanabara only in 1951-1956; State of Guanabara and capitals of other states, with exceptions in 1957-1962; (b) Area of information; (c) Principal cities 1951-1959, districts with medical certification, 1961-1962; ... Data not available; - quantity zero.

TABLE II
DEATHS FROM TUBERCULOSIS, ALL FORMS (001-019) PER 100,000 POPULATION IN THE AMERICAS, 1950-1962

Area	Year												
	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Argentina	52.2	48.2	44.3	29.5	26.6	25.2	19.9	...	...	17.3	16.2	...	...
Bolivia	57.7	61.4	59.5	55.4	37.3	...	...	...	...	...	...	...	...
Brazil (a)	140.9	187.8	134.4	93.8	93.8	87.1	90.0	87.4	79.7	84.2	...	52.7	79.1
Canada	26.2	24.4	17.0	12.2	10.2	8.8	7.8	7.1	6.0	5.5	4.6	4.2	4.2
Chile	152.8	141.6	107.4	75.8	70.0	67.0	59.5	57.7	51.7	54.6	52.9	52.5	48.8
Colombia	36.2	36.3	30.9	26.2	26.1	28.2	26.9	27.3	27.1	27.8	28.8	28.2	28.8
Costa Rica	51.3	50.5	39.9	25.3	17.0	23.1	20.0	21.0	15.3	14.5	12.9	8.6	11.8
Cuba	...	...	...	...	...	...	...	18.4	16.5	17.2	15.5	...	...
Dominican Republic	63.0	57.5	60.6	35.3	32.8	30.5	29.4	22.7	17.0	17.7	15.6	14.7	11.0
Ecuador	43.1	36.6	32.7	...	35.2	32.9	...	36.1	35.9	29.2	20.6	...	...
El Salvador	38.7	35.9	32.6	27.7	22.4	20.8	16.0	17.3	17.7	15.2	15.6	13.7	13.3
Guatemala	54.9	50.5	51.0	47.2	37.7	40.2	43.0	36.9	36.8	33.1	33.6	31.8	31.4
Haiti	...	...	...	...	...	...	...	...	...	...	...	...	...
Honduras	21.3	23.1	24.4	...	16.3	16.8	17.0	17.0	14.1	16.6	14.4	12.5	13.9
Jamaica	79.8	71.8	67.2	41.2	33.9	26.5	21.2	...	...	...	...	8.8	...
Mexico	41.0	42.1	36.5	30.5	27.7	25.7	27.3	29.8	28.6	27.0	27.8	26.1	...
Nicaragua	20.8	14.5	13.7	9.0	7.3	6.6	6.8	5.4	7.0	7.9	8.3	6.4	7.9
Panama	69.9	54.7	48.5	35.0	26.6	21.5	30.1	26.8	26.0	22.7	26.7	21.0	22.1
Paraguay (b)	56.4	54.8	...	38.5	34.5	38.5	30.1	28.6	27.7	28.7	32.4	30.6	29.6
Peru (c)	...	226.9	...	122.1	...	98.3	100.2	118.5	83.6	89.4	...	77.4	72.1
Trinidad and Tobago	74.4	64.1	54.6	46.8	40.4	40.2	22.7	18.2	13.9	14.2	11.3	9.9	5.5
United States	22.6	20.2	15.9	12.4	10.2	9.1	8.4	7.8	7.1	6.5	6.3	5.4	5.1
Uruguay	54.4	53.0	38.4	28.0	22.1	24.3	...	22.0	18.8	18.1	16.0	15.6	...
Venezuela	61.4	62.0	58.6	47.2	40.5	31.4	27.0	26.1	22.5	20.6	19.6	17.2	15.9
Antigua	42.2	60.9	51.1	39.6	18.4	38.0	41.2	23.1	13.2	16.7	5.5	16.1	12.1
Bahama Islands	110.1	92.6	69.9	54.7	45.6	...	21.9	13.3	19.8	11.7	21.0	...	8.1
Barbados	41.5	53.1	37.3	30.2	19.5	24.3	19.5	11.2	7.9	7.0	6.9	5.6	7.3
Bermuda	10.8	18.4	2.6	-	2.6	2.5	10.0	-	4.9	2.4	2.4	2.2	2.2
British Guiana	48.1	40.7	37.4	31.8	24.4	25.4	21.2	26.8	14.4	...	...	8.1	6.0
British Honduras	56.7	56.5	51.4	31.1	30.0	...	23.5	16.9	16.3	23.9	17.6	8.5	10.4
Canal Zone	50.0	32.1	12.1	15.8	5.5	1.8	11.3	3.8	2.3	2.4	-	-	4.3
Cayman Islands	...	...	...	...	...	...	...	...	...	...	...	...	-
Dominica	117.6	86.5	120.8	98.1	88.9	87.3	66.1	47.4	55.2	32.2	48.3	...	31.1
Falkland Islands	...	...	...	...	...	...	...	-	100.0	-	-	-	-
French Guiana	...	...	...	...	...	...	23.3	23.3	38.7	25.8	35.5	32.4	...
Grenada	36.4	46.2	34.2	...	39.0	24.1	...	21.2	5.8	8.0	11.2	6.7	12.2
Guadeloupe	6.8	11.3	17.5	15.7	...	11.8	...	29.1	14.8	20.8	21.8	24.0	20.1
Martinique	...	70.4	47.8	32.1	...	41.3	32.4	37.2	40.9	28.0	33.2	24.3	18.8
Montserrat	107.7	53.8	38.5	84.6	15.4	15.4	...	46.2	30.8	...	41.7	15.4	15.4
Netherlands Antilles	...	...	...	...	...	...	...	1.6	2.1	2.7	...	0.5	...
Puerto Rico	129.1	118.7	93.9	47.1	38.5	33.2	36.7	32.8	29.0	29.2	29.2	26.3	23.7
St. Kitts-Nevis and Anguilla	104.1	78.0	45.1	37.3	36.5	37.7	16.7	11.1	20.0	25.0	24.6	11.9	18.3
St. Lucia	93.3	97.4	98.7	102.6	63.3	60.0	50.0	57.8	48.8	45.9	17.4	13.3	11.6
St. Pierre and Miquelon	120.0	100.0	160.0	60.0	...	100.0	...	40.0	60.0	100.0	20.0	60.0	60.0
St. Vincent	68.7	66.2	65.2	59.2	45.8	31.5	...	...	...	...	...	...	...
Surinam	43.2	29.8	26.7	...	...	10.2	12.3	15.5	12.1	7.7	8.1	...	2.0
Turks and Caicos Islands	...	...	...	...	...	...	...	...	...	...	...	-	-
Virgin Islands (UK)	50.0	114.3	42.9	14.3	-	14.3	14.3	14.3	-	-	28.6	-	-
Virgin Islands (US)	22.2	17.9	25.0	14.8	11.1	17.9	7.1	13.8	10.0	6.5	...	2.9	5.6

(a) State of Guanabara and city of São Paulo in 1950; State of Guanabara only in 1951-1956; State of Guanabara and capitals of other states, with exceptions, in 1957-1962; (b) Area of information; (c) Principal cities 1951-1959, districts with medical certification, 1961-1962; ... Data not available; - Quantity zero.

TABLE III
NUMBER OF REPORTED CASES OF TUBERCULOSIS, ALL FORMS (001-019) IN THE AMERICAS, 1950-1962

Area	Year												
	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Argentina	...	9835	12840	14701	16655	16577	18307	19647	16508	17387	18865	19098	p)18000
Bolivia	3166	3608	3940	4894	...	859	745	596	522	1779	1136	1244	1714
Brazil (a)	18755	11251	14351	13416	15651	10883	11556	13735	7986	14079	9943	11837	...
Canada (b,c)	11905	10881	10099	9734	9621	9184	8405	7979	7502	6579	6345	5784	6284
Chile	*	*	*	*	*	*	*	*	*	*	*	*	*
Colombia (d)	11137	10123	9401	13599	15628	12273	11048	13787	14579	13858	14392	13961	14362
Costa Rica	734	693	725	622	646	681	700	605	560	649	624	492	602
Cuba	1102	1338	1569	1721	2118	1749	1951	1838	1177	1849	1856	2625	2725
Dominican Republic	1536	1833	1864	729	2188	1799	2149	2184	2199	2189	2122	1197	1060
Ecuador	...	...	...	...	5122	4542	4466	4699	5463	4692	5223	5758	5082
El Salvador (d)	2506	3474	3314	2410	2058	2518	2615	3011	2918	3872	5251	5388	4581
Guatemala	2533	2881	2843	3275	2651	2721	2157	1942	1153	3649	3802	3362	3495
Haiti	...	...	...	1223	1423	799	779	1188	2278	3067	2860	3332	3875
Honduras	...	...	...	...	...	...	...	...	1439	1609	4566	1985	d)2157
Jamaica	996	859	878	959	734	704	614	701	574	838	629	495	335
Mexico	7354	7049	7456	6787	7863	8257	9421	10392	11157	11348	12417	13801	16242
Nicaragua	...	1018	1052	1524	1359	964	1051	1014	1330	744	581	707	p) 391
Panama	1740	1672	1340	1159	1021	826	1323	1878	1385	1673	1487	1104	1423
Paraguay (d)	1243	1190	1206	945	933	640	1158	1381	1206	1126	1113	920	1223
Peru (d)	15496	19640	17919	17635	18081	19408	19818	22552	19336	22796	19485	21503	24005
Trinidad & Tobago	411	473	428	411	536	412	345	380	281	298	243	...	398
United States (b,e)	...	...	85607	83250	78592	76245	69895	67171	63537	57535	55494	53727	54159
Uruguay	2305	2232	1611	1493	1571	3705	653	3164	3134	2134	1928	2044	1836
Venezuela (d)	9824	9450	9799	9088	8287	8699	8062	7211	7494	7887	8722	8487	8138
Antigua	24	19	30	34	19	18	19	16	22	28	8	6	p) 2
Bahama Islands	87	83	88	94	49	82	109	117	107	124	187	p)122	156
Barbados	78	77	83	101	111	123	88	79	72	68	43	47	74
Bermuda	26	13	10	7	23	6	4	2	11	7	12	22	10
British Guiana	272	279	209	283	216	207	190	192	202	172	186	172	212
British Honduras	62	73	99	107	112	46	38	56	74	38	72	54	58
Canal Zone	58	66	79	45	23	31	27	26	28	16	8	16	21
Cayman Islands	...	...	...	...	...	...	...	...	...	...	...	p) 3	3
Dominica	108	77	71	82	77	89	96	85	83	94	166	...	161
Falkland Is.	...	...	...	...	...	1	5	3	4	3	3	-	6
French Guiana	...	...	...	...	...	47	51	21	14	...	...	37	26
Grenada	...	...	...	46	47	35	...	...	...	34	45	37	29
Guadeloupe	...	...	...	...	...	...	...	298	234	459	241	106	208
Martinique	292	245	292	300	234	215	191	215	271	225	190	149	151
Montserrat	...	...	...	3	8	12	11	6	7	...	...	9	4
Netherlands Antilles	39	48	32	58	36	43	36	45	24	52	30	23	33
Puerto Rico	5866	6079	6206	4726	4520	4471	3597	3120	2800	2487	2137	b)1812	b)1816
St. Kitts-Nevis and Anguilla	42	29	22	21	14	8	19	22	27	70	47	23	8
St. Lucia	86	128	194	156	79	143	67	118	120	75	67	59	53
St. Pierre and Miquelon	...	16	17	15	15	12	36	10	15	17	9	7	17
St. Vincent	56	36	8	18	127	34	33	29	15	37	35	...	...
Surinam	137	139	115	81	163	152	120	119	135	187	126	p) 204	143
Turks and Caicos Islands	...	...	...	...	...	...	...	...	...	...	...	2	-
Virgin Is. (UK)	6	34	27	20	13	4	7	...	...	2	2	2	2
Virgin Is. (US)	8	8	11	5	9	9	7	8	9	15	6	12	p) 4

a) State of Guanabara and capitals of other States and territories, with exceptions (data incomplete)
 (b) Newly reported active cases; (c) Excluding Northwest territories 1950-1958; (d) Reporting area.
 (e) Excluding Alaska and Hawaii 1952-1955; (p) Provisional; ... Data not available; * Disease not notifiable; - quantity zero.

TABLE IV

Reported Cases of Tuberculosis, All Forms (001-019) per 100,000 Population
in the Americas, 1950-1962

Area	Year												
	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Argentina	...	56.0	71.6	80.4	89.5	87.4	94.8	99.8	82.3	85.2	90.9	90.6	p)84.0
Bolivia	105.1	118.2	127.3	156.0	...	26.6	22.8	18.0	15.5	52.2	32.9	35.5	48.3
Brazil(a)	230.0	135.6	170.1	154.3	175.0	118.2	122.1	204.2	115.7	138.2	100.8	158.9	...
Canada(b,c)	87.0	77.8	70.0	65.7	63.0	58.6	52.3	47.8	43.8	37.5	35.4	31.7	33.8
Chile	*	*	*	*	*	*	*	*	*	*	*	*	*
Colombia(d)	141.8	121.3	127.7	138.5	143.1	110.8	93.0	114.6	119.3	110.1	106.5	101.5	105.2
Costa Rica	91.4	84.0	85.0	70.4	70.5	71.6	70.9	58.6	52.0	57.6	53.3	40.2	47.3
Cuba	20.0	23.7	27.3	29.3	35.3	28.5	31.2	28.8	18.0	27.8	27.3	37.8	38.6
Dominican Republic	72.1	83.3	81.9	31.0	89.8	71.3	82.3	80.8	78.5	75.5	70.8	38.5	32.9
Ecuador	...	...	...	...	143.3	123.1	117.5	119.6	134.9	112.2	121.0	129.2	110.6
El Salvador(d)	337.3	401.6	359.4	269.9	228.7	243.5	239.0	262.7	231.2	294.0	358.0	365.8	302.6
Guatemala	90.3	99.6	95.4	107.1	83.9	83.5	64.4	56.3	32.5	99.9	101.0	86.5	87.0
Haiti	...	...	...	34.1	38.9	21.4	20.4	30.5	57.3	75.4	68.8	78.4	89.2
Honduras	...	...	...	...	...	...	...	...	83.0	90.1	248.4	104.9	q)226.6
Jamaica	71.7	60.9	61.3	66.0	49.7	46.9	40.3	45.3	36.5	52.5	38.8	30.3	20.4
Mexico	28.5	26.5	27.2	24.0	27.0	27.5	30.4	32.6	33.9	33.5	35.5	38.2	43.6
Nicaragua	...	93.1	93.3	130.8	113.0	77.4	81.6	76.1	96.5	52.2	39.3	46.3	p)24.8
Panama	210.9	196.9	153.8	129.5	111.1	87.5	136.5	188.6	135.4	159.3	137.8	99.5	124.9
Paraguay(d)	100.0	94.1	93.3	71.4	69.2	89.4	124.1	135.3	107.6	65.2	63.0	77.3	100.2
Peru d)	459.4	561.0	525.0	471.7	454.8	472.9	450.3	472.8	397.5	425.3	348.4	440.9	465.8
Trinidad and Tobago	65.0	72.9	64.6	60.6	76.8	57.1	46.4	49.7	35.6	36.5	28.8	...	45.2
United States(b,e)	...	...	55.0	52.6	48.7	46.4	41.6	39.2	36.5	32.5	30.8	29.4	29.1
Uruguay	95.8	91.1	64.8	59.1	61.1	141.6	24.4	116.1	113.5	76.3	68.1	71.1	63.0
Venezuela(d)	372.4	333.2	328.5	300.5	258.0	260.4	232.7	200.3	201.2	204.3	217.7	168.1	154.2
Antigua	53.3	41.3	63.8	70.8	38.8	36.0	37.3	30.8	41.5	51.9	14.5	10.7	p)3.4
Bahama Islands	110.1	102.5	106.0	109.3	54.4	87.2	113.5	119.4	105.9	120.4	178.1	p)113.0	140.5
Barbados	38.0	37.2	39.7	47.6	51.6	56.4	39.8	35.3	31.7	29.6	18.5	20.2	31.9
Bermuda	70.3	34.2	26.3	17.9	59.0	15.0	10.0	4.9	26.8	16.7	28.6	48.9	21.7
British Guiana	63.8	63.8	46.5	61.3	45.4	42.3	37.7	37.1	37.9	31.3	32.9	29.6	35.5
British Honduras	92.5	105.8	137.5	144.6	147.4	59.0	46.9	67.5	86.0	43.2	79.1	57.4	60.4
Canal Zone	107.4	117.9	136.2	78.9	41.8	56.4	50.9	50.0	65.1	38.1	19.0	37.2	44.7
Cayman Islands	...	...	...	...	...	...	...	...	...	...	...	p)37.5	37.5
Dominica	211.8	148.1	134.0	151.9	142.6	161.8	171.4	149.1	143.1	159.3	276.7	...	263.9
Falkland Islands	...	...	...	...	...	50.0	250.0	150.0	200.0	150.0	150.0	-	300.0
French Guiana	...	...	...	...	...	156.7	170.0	70.0	45.2	...	...	108.8	74.3
Grenada	...	...	...	57.5	57.3	42.2	...	...	...	38.6	50.6	41.1	32.2
Guadeloupe	...	...	...	...	...	...	...	118.7	91.1	173.9	89.3	37.4	72.0
Martinique	131.5	108.4	127.0	128.2	97.9	87.0	75.5	83.3	102.7	83.0	68.6	51.0	50.8
Montserrat	...	...	...	23.1	61.5	92.3	84.6	46.2	53.8	...	...	69.2	30.8
Netherlands Antilles	24.1	28.7	18.6	32.6	19.9	23.9	19.8	24.3	12.8	27.7	15.8	11.8	16.7
Puerto Rico	265.8	272.0	278.7	214.4	204.2	198.7	159.9	138.0	121.8	107.1	90.5	p)75.2	b)73.9
St. Kitts-Nevis and Anguilla	85.7	58.0	43.1	41.2	26.9	15.1	35.2	40.7	49.1	125.0	82.5	39.0	13.3
St. Lucia	114.7	168.4	251.9	200.0	100.0	178.8	81.7	142.2	142.9	88.2	77.9	65.6	55.8
St. Pierre and Miquelon	...	320.0	340.0	300.0	300.0	240.0	720.0	200.0	300.0	340.0	180.0	140.0	340.0
St. Vincent	83.6	52.9	11.6	25.4	176.4	46.6	44.0	38.2	19.5	46.8	43.8	...	...
Surinam	74.9	73.9	59.0	40.1	78.0	70.4	52.9	50.0	54.4	72.2	46.7	b)72.1	46.6
Turks and Caicos Islands	...	...	...	...	...	...	...	...	...	...	...	33.3	-
Virgin Islands (UK)	100.0	485.7	385.7	285.7	185.7	57.1	100.0	...	...	28.6	28.6	25.0	25.0
Virgin Islands (US)	29.6	28.6	39.3	18.5	33.3	32.1	25.0	27.6	30.0	48.4	18.2	34.3	p)11.1

(a) State of Guanabara and capitals of other States and territories, with exceptions (data incomplete)

(b) Newly reported active cases; (c) Excluding Northwest territories 1950-1958; (d) Reporting area.

(e) Excluding Alaska and Hawaii 1952-1955; (p) Provisional; ... Data not available; * Disease not

- Quantity zero.

notifiable.

TABLE V

REPORTED CASES AND DEATHS FROM TUBERCULOSIS, ALL FORMS (001-019), WITH RATES PER 100,000 POPULATION, IN THE THREE REGIONS OF THE AMERICAS, RECENT YEARS

Region	Cases		Deaths		Ratio $\frac{\text{cases}}{\text{deaths}}$	Estimated number of cases* in total population	Estimated number of deaths* in total population
	Number	Rate	Number	Rate			
TOTAL	187,158		46,953				71,168
Northern America	60,470	29.6	10,296	5.0	5.9	(60,470)	(10,296)
Middle America	a) 40,104	58.0	b) 14,288	21.2	2.7	41,413	15,137
South America	c) 86,584	130.8	d) 22,374	30.2	4.3	198,084	45,735

* Reported rate for each region applied to total population of region.

a) Based on data for 96.8 per cent of population. b) Based on data for 93.8 per cent of population. c) Based on data for 43.7 per cent of population.

d) Based on data for 48.9 per cent of population.

TABLE VI

Taberculin positivity rates (a) per 100 persons tested with PPD Rt23 (dose of 1 or 2 T.U.) in some areas in Latin America

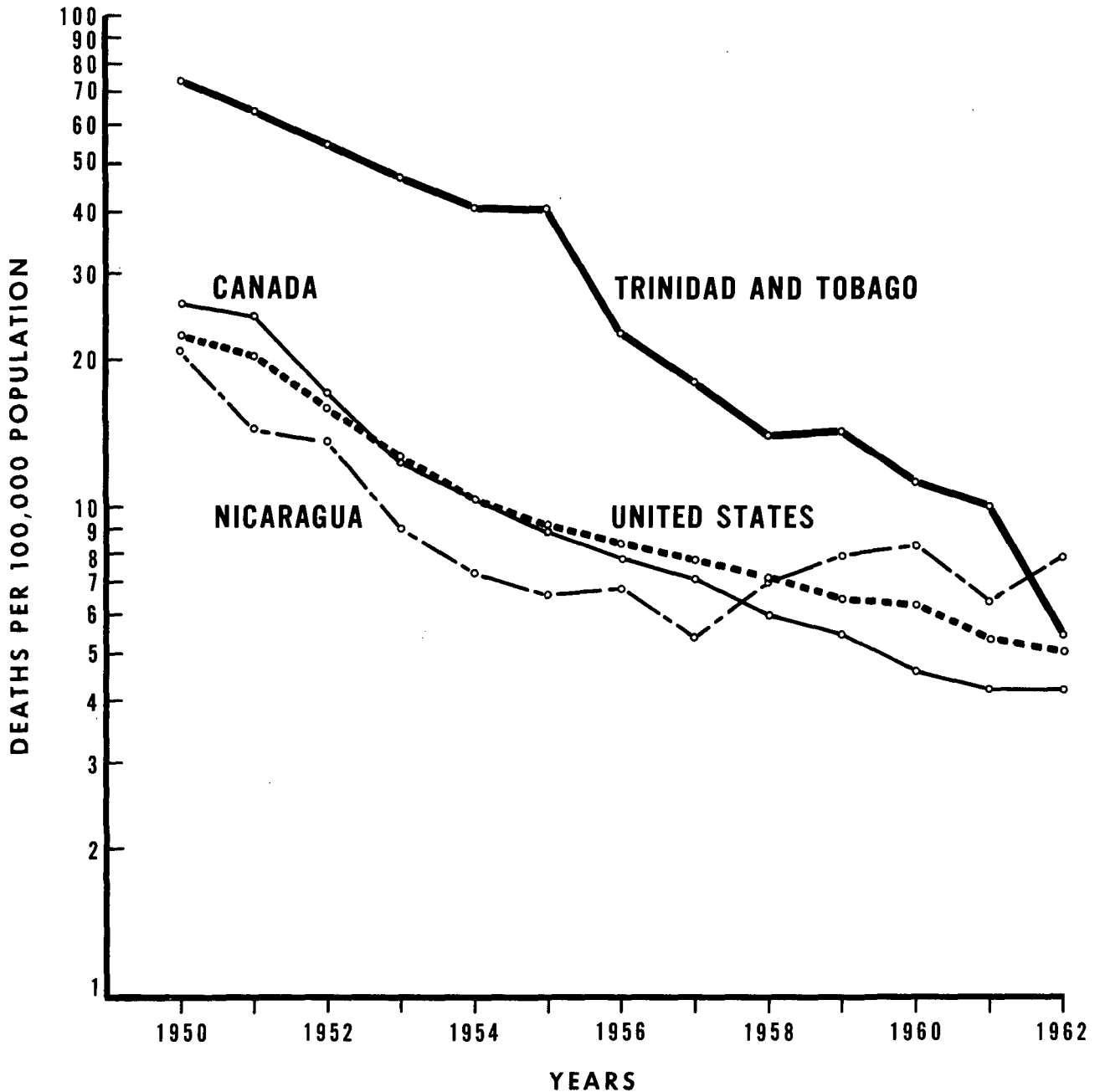
A r e a	Age group	Positivity rate per 100	Number of tests read	Y e a r
<u>ARGENTINA</u>				
Sta.Fe (Capital)	6 - 14 a.	12.5	24,878	1962
San Javier	5 - 14 "	17.5	1,376	1962
<u>BOLIVIA</u>				
El Alto de la Paz	5 - 14 "	41.1	4,950	1963
Guaqui y Pillapi	5 - 14 "	27.3	903	1964
<u>GUATEMALA</u>				
Escuintla Dept.	All ages	47.3	23,990	1962
<u>HONDURAS</u>				
Comayaguas	5 - 14 a.	16.3	2,419	1962
La Paz and others	5 - 14 "	13.2	2,956	1962
Ojojona	5 - 14 "	25.0	1,036	1962
(Total)	All ages	32.7	19,692	1962
<u>MEXICO</u>				
Misantla	5 - 14 a.	31.6	1,609	1961
Indep.yLibertad	5 - 14 a.	21.8	1,226	1961
Cuernavaca	5 - 14 a.	26.2	7,620	1961
(Total)	5 - 14 a.	21.0	38,911	1961-63
(Total)	All ages	42.7	117,957	1961-63
<u>NICARAGUA</u>				
35 Health Centers	All ages	25.8	17,202	1964
<u>PANAMA</u>				
Central area	< 15 a.	30.7	64,206	1962-63
<u>PERU</u>				
Tacna	5 - 14 a.	48.6	1,156	1963
Moquegua	5 - 14 a.	43.7	1,035	1963

(a) Positive = any reaction measuring 6 mm. or more.

Source: PASB Archives

FIGURE 1

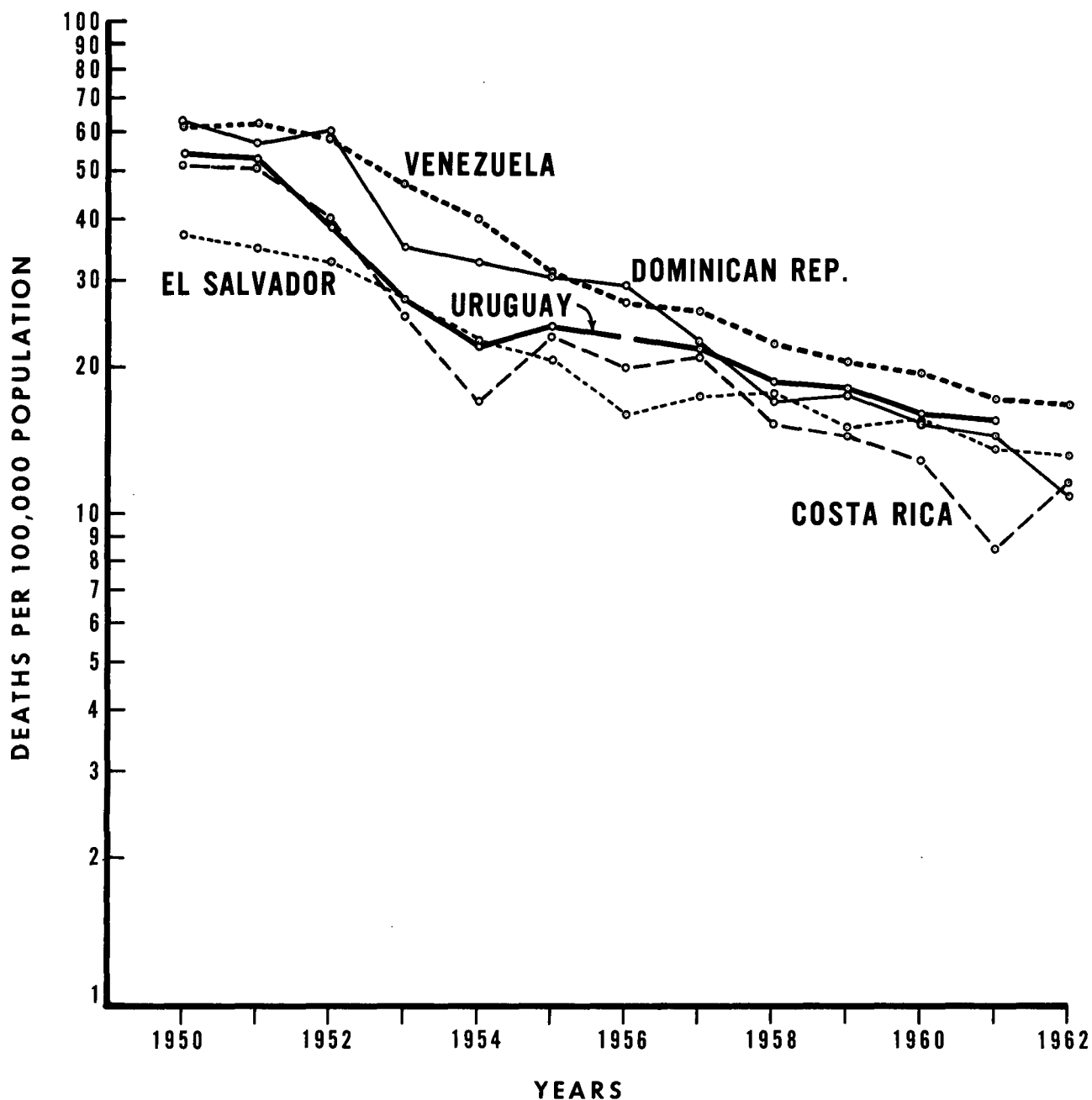
**DECREASE IN THE DEATH RATE FROM TUBERCULOSIS (ALL FORMS)
PER 100,000 POPULATION, IN 4 OF THE COUNTRIES AND
TERRITORIES WHERE THE MORTALITY RATE WAS UNDER 10 PER
100,000 POPULATION IN 1962.**



IN THIS GROUP THERE ARE 4 COUNTRIES AND 7 TERRITORIES WITH AN AVERAGE OF 11,162 KNOWN DEATHS PER ANNUM IN THE THREE YEARS 1960-1961-1962.

FIGURE 2

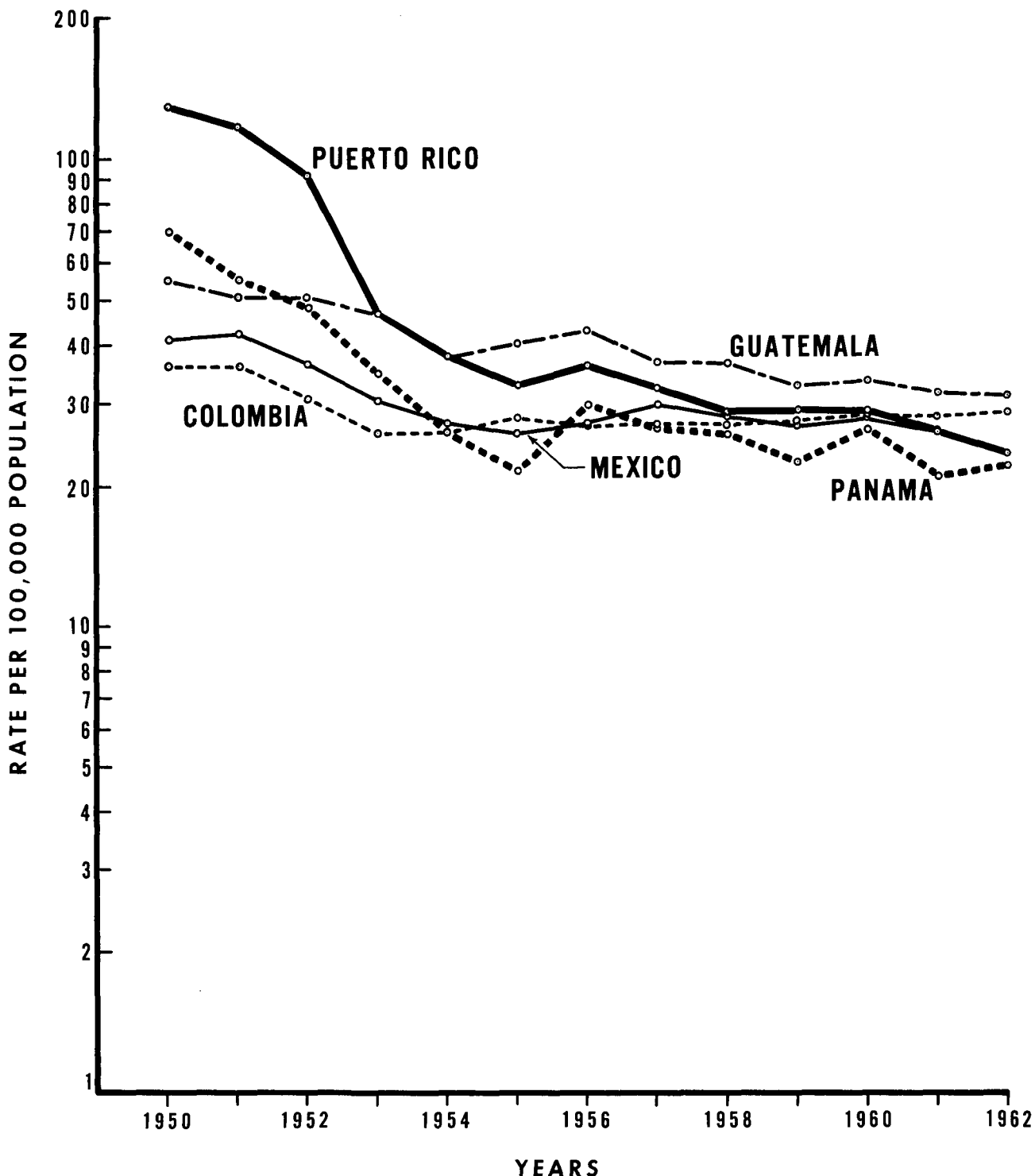
DECREASE IN THE DEATH RATE FROM TUBERCULOSIS (ALL FORMS) PER 100,000 POPULATION, IN 5 OF THE COUNTRIES AND TERRITORIES WHERE THE MORTALITY RATE WAS BETWEEN 10 AND 20 PER 100,000 POPULATION IN THE YEAR 1962.



IN THIS GROUP THERE ARE 6 COUNTRIES AND 7 TERRITORIES WITH AN AVERAGE OF 3,105 KNOWN DEATHS PER ANNUM IN THE THREE YEARS 1960-1961-1962.

FIGURE 3

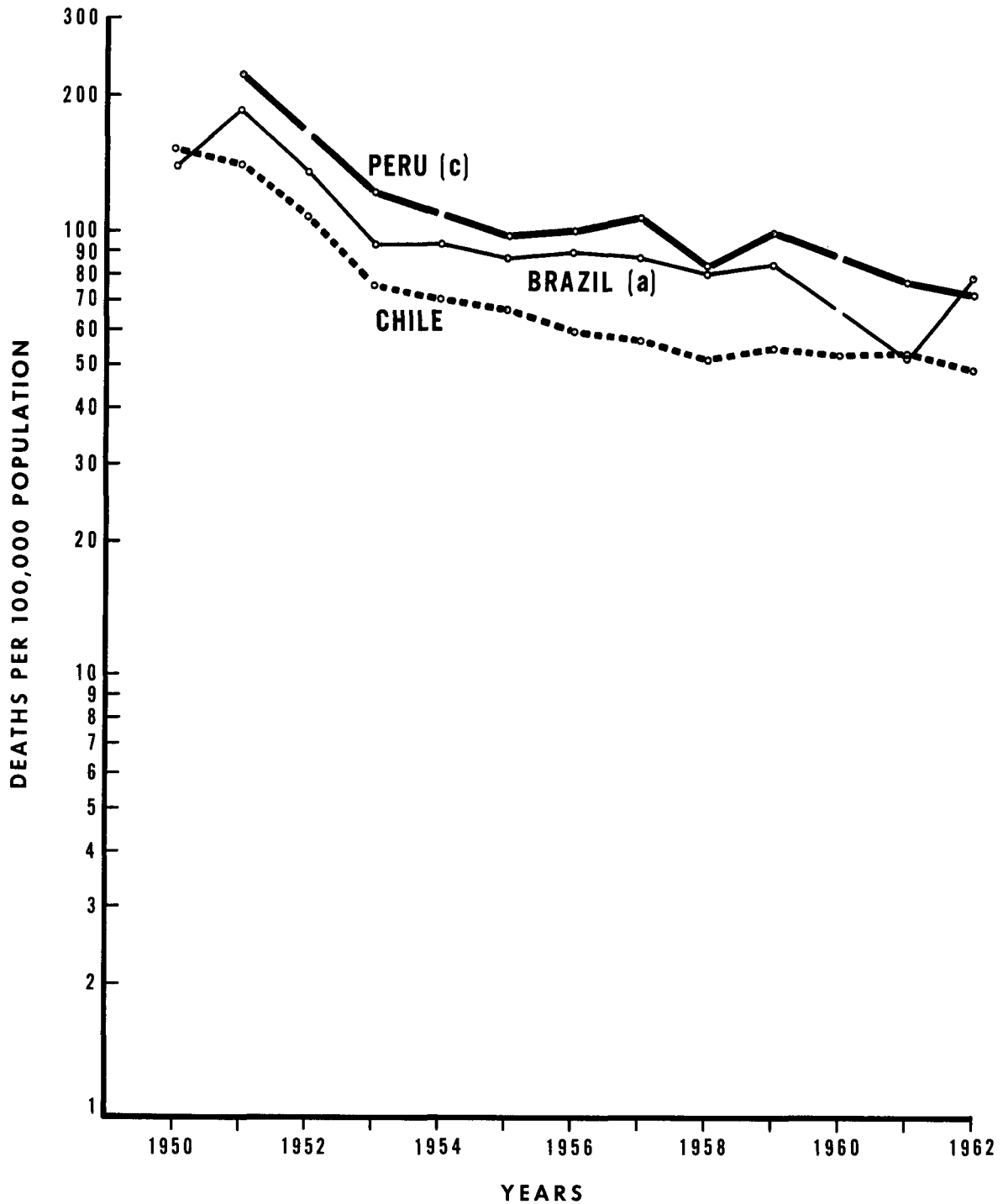
**DECREASE IN THE DEATH RATE FROM TUBERCULOSIS (ALL FORMS)
PER 100,000 POPULATION IN 4 COUNTRIES AND THE
COMMONWEALTH OF PUERTO RICO, WHERE THE MORTALITY RATE
WAS BETWEEN 20.1 AND 40 PER 100,000 POPULATION
IN THE YEAR 1962**



IN THIS GROUP THERE ARE 5 COUNTRIES, 2 TERRITORIES, AND PUERTO RICO, WITH AN AVERAGE OF 16,207 KNOWN DEATHS PER ANNUM IN THE THREE YEARS 1960-1961-1962.

FIGURE 4

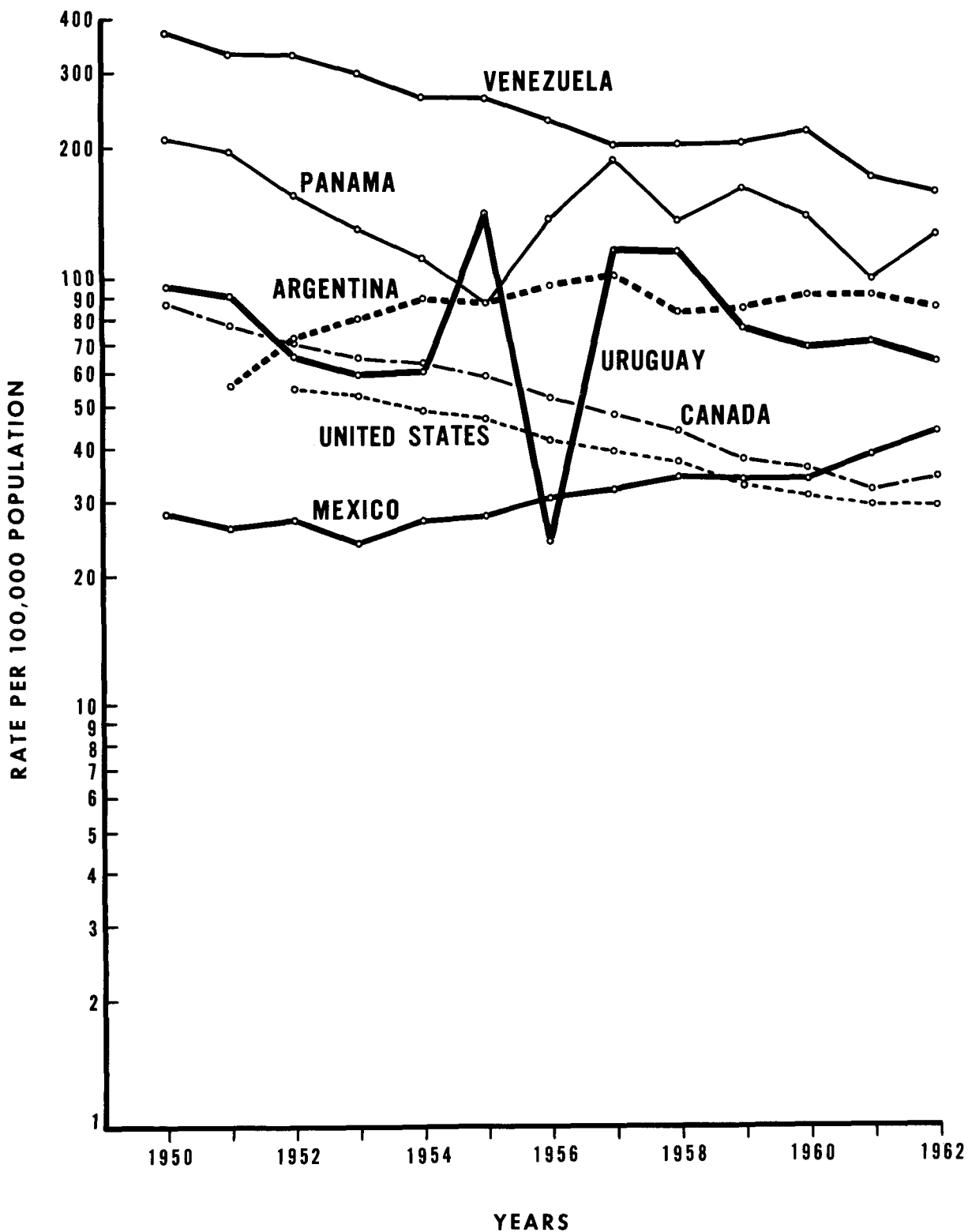
**DECREASE IN THE DEATH RATE FROM TUBERCULOSIS (ALL FORMS)
PER 100,000 POPULATION IN THE 3 COUNTRIES WHERE THE
MORTALITY RATE WAS MORE THAN 40 PER 100,000 POPULATION
IN THE YEAR 1962.**



IN THIS GROUP THERE ARE 3 COUNTRIES AND 1 TERRITORY WITH AN AVERAGE OF 10,058 KNOWN DEATHS PER YEAR IN THE THREE YEARS 1960-1961-1962. (FOR (a) AND (c), SEE THE TABLES)

FIGURE 5

**RATE PER 100,000 POPULATION OF KNOWN TUBERCULOSIS
CASES IN 7 AMERICAN COUNTRIES
IN THE YEARS 1950-1962.**





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TUBERCULOSIS ERADICATION
A TASK FOR PRESENT PLANNING AND FUTURE ACTION
TUBERCULOSIS IN RURAL VENEZUELA

Drs. José Ignacio Baldó
Juvenal Curiel
Oscar Lobo Castellanos

INDEX

	<u>Page</u>
1.- RURAL POPULATION	1
2.- EPIDEMIOLOGY	3
3.- THE TUBERCULOSIS CAMPAIGN IN RURAL AREAS	4
<u>Basis for the doctrine</u>	5
<u>Public Health Phthisiology</u>	5
<u>Work Program (Networks)</u>	6
4.- BCG APPLICATION IN RURAL AREAS	15
5.- EXAMPLES OF THE SYSTEM OF NETWORKS	16

TUBERCULOSIS IN RURAL VENEZUELA

Dr. José Ignacio Baldó*

Dr. Juvenal Curiel**

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1. Rural Population

The eight million and ninety-three thousand persons who inhabit the 912,050 square kilometers of Venezuela, are unequally distributed in three areas, each with its particular demographic and geophysical characteristics (See Figure 1). The northwestern region is both coastal and mountainous and has an excellent communications system. It comprises the Federal District and 12 States, and covers an area of 179,094 square kilometers, or about one-fifth of the entire country (19.65%). It has over 6 million inhabitants, or 76.1% of the total population. The central region, or plains area, is composed of 7 States. It possesses a developing communications network, covers an area of 279,006 square kilometers (30.63%), and has a million and a half inhabitants (18.4%). The southeastern region, which is an area of jungles and large rivers, occupies half the territory of the country but has a population of only 453,950 (5.5%). It comprises the State of Bolivar, and the federal territories of Delta, Amacuro, and Amazonas.

A glance at the figure shows that the population is distributed into two areas: one, northern, which is predominantly urban, and the other, central and southern, which is predominantly rural. However, the truth is that "in almost all municipalities in Venezuela the rural population is rather large". As the 1961 census figures show, out of the total of 649 municipalities 523 have a rural population of over 25%. (1)

In Venezuela there are two views as to what is meant by the rural population: the health care concept, and the census concept.

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According to the health care concept, communities with more than 4,000 inhabitants are classified as urban, communities with up to 2,000 inhabitants as rural and communities with between 2,000 and 4,000 as semi-rural (2, 3, and 4). However, as the recent "Study on Health Care Problems of the Scattered Rural Population" (1), shows, the Ministry of Health and Social Welfare adheres to this broad health concept of rural population when implementing its rural water supply, housing, and health posts programs in "communities with less than 5,000 inhabitants."

Nevertheless, in the following brief analysis of the Venezuelan population, which is based on that study, the census concept has been used for obvious reasons: according to that concept rural population means that living in communities with less than 1,000 inhabitants; urban population means that living in communities with 2,500 or more; and intermediate population means that living in communities with between 1,000 and 2,499 inhabitants.

Table I of that study (1) shows that while there has been a clear relative decline in the rural population of Venezuela during the past 25 years there has been an increase in the absolute figures. In 1936 the rural population represented two-thirds of the country's total population (65.3%), whereas in 1961 it was only one third (32.5%).

The increase in absolute figures, so significant for health activities, has not occurred in all the federal entities; in eight of them there has been a decrease.

Table II shows the territorial extent of the rural population; the 649 municipalities covered by the 1961 census are broken down according to the size of the largest community in each municipality and to the proportion of its rural population; it shows that 233 municipalities are strictly rural, and only 41 are strictly urban; the proportion of rural population in the remaining 375 localities varies from 99.9% to 0.1%.

This situation is of considerable interest because it shows that "medical care for the rural population is not a problem limited to certain areas but one that exists throughout almost the entire country." (1).

The degree of dispersion of the rural population is shown in the study in question in Table III, which groups "rural inhabitants according to the size of community in which they live." It shows that 2,349,000 persons live in 23,694 communities with less than 1,000 inhabitants, and that half of these communities (11,101) have less than 50 inhabitants.

Although "between 1950 and 1961 the dispersal of the rural population appears to have decreased, the large numbers of Venezuelans living in small villages or hamlets will continue to pose a medical care problem for many years to come."

2. Epidemiology

Infection: Table IV contains an analysis of the tuberculin tests made in rural and semi-rural areas between 1958 and 1962. They consisted of intradermal injections of 3 T.U. (PPD) RT23, which were read after 72 hours. 63,339 were given in rural areas and 16,164 in semi-rural areas, or 79,503 in all.

The break-down by age groups shows that in the 0-4 group in the rural area the positive percentage is under 2% and in the semi-rural area it ranges between 2% and 3.3%. In the 5-9 age group the highest figure is 13.2% in rural areas, and 35.4% in semi-rural areas. In the adult groups, however, the rates, which increase rapidly and fluctuate in both rural and semi-rural figures, rise as high as 85% and 90%.

The low positivity figures in the first two age groups are very significant for "it is these two groups, especially the 0-4 age group, which are most the sensitive indicators of the degree of tuberculization of a population." (4).

To sum up, these recent figures show that the population of Venezuela in both rural and semi-rural areas is still at the stage of increasing tuberculization.

Table V contains a comparison between infection rates among urban, semi-rural, and rural population during the five-year period 1958-1962.

Morbidity: Table VI shows the rural morbidity in tuberculosis services (secondary networks) in the States of Aragua, Yaracuy, and Miranda, whose case records and registers make it possible to separate the rural from the urban. The Table further shows that in 1961, 1962, and 1963 a total of 56,535 persons went to these services for examination, and that of these 39,168 (69.2%) were urban and 17,367 (30.8%) were rural inhabitants. In the urban group 619 cases (1.58%) were detected, and in the rural group 567 (3.27%). Both these morbidity rates are higher than the national average, which is 1 per 100. The very high rural rate is explained by the greater proportion of persons with symptoms who come for examination in these areas.

The high tuberculosis morbidity rate in rural areas is shown in Tables VII and VIII. Table VII compares the morbidity rate recorded over a five-year period in secondary networks with communities of less and more than 5,000 inhabitants; and shows that morbidity is slightly higher in communities with under 5,000 where the proportion of rural inhabitants is necessarily larger. Table VIII compares the annual rate of new cases detected in tuberculosis dispensaries and in secondary networks and shows that the level of new cases in the secondary networks was slightly higher in 7 of the 12 years under study.

As to the extent of the lesions, a higher proportion of the advanced forms was found in rural (50.5%) than in urban (40.6%) areas.

Mortality: Nowadays, when the general undiagnosed mortality in Venezuela is 25%, the tuberculosis mortality figures are giving a more and more accurate picture of the real situation. In previous years, such as 1944 for example, when the undiagnosed mortality reached 60%, the estimates were necessarily largely deductive.

Although Venezuela has not been overlooked in the rapid decrease in tuberculosis mortality brought about by antibacterial treatment, Figure 2 shows that the decline from a rate of 260 per 100,000 population in 1944 to 21 per 100,000 in 1963, had already begun in the years preceding the advent of the new drugs. This fact is attributable to the increase in the tuberculosis campaigns and the general health services, and the improvement in social and economic conditions which occurred in the country.

To ascertain whether this decrease in mortality was the same for all population groups or was a reflection of what was happening only in urban and semi-urban areas with balanced social and economic conditions and good health care services, the Division of Vital Statistics of the Ministry of Health and Social Welfare prepared the analysis shown in Table IX showing the tuberculosis mortality in communities according to their size.

The Table shows that the large decrease in tuberculosis mortality in the first four urban and semi-urban groups occurred in 1953, the year in which isoniazid was introduced; that in the semi-rural, with between 1,000 to 4,999 population, the first important decrease occurred in 1954; and in the strictly rural communities, with less than 1,000 inhabitants in the year 1955. It further shows that from those dates onwards the mortality rate of the various groups shows a definite tendency to decrease and to level off, which has been maintained uninterruptedly up to the last year of the study (Figure 3).

With the reservations imposed by the well-known migrations of rural tuberculosis patients to the cities, which tends to increase the urban mortality at the expense of the rural mortality, the study in question would seem to indicate that our public health tuberculosis services are taking the benefits of drug treatment to the rural areas.

3. The Tuberculosis Campaign in Rural Areas

Although it has already been stated that, in spite of its variations, the provision of medical care to the rural population is a problem throughout almost the entire country, the problem would not be properly stated if the communities with from 4,999 to somewhat less than 24,999 inhabitants were not considered to be in a similar situation with regard to tuberculosis services.

This intermediate population level, which is so important in almost all Latin American countries, is what made it necessary in Venezuela to create from 1940 onwards a new type of medical officer who would not be the traditional type of TB specialist working in tuberculosis clinics attached to the health units of the larger urban centers.

Basis for the doctrine: Immediately after the reorganization of the Ministry of Health and Social Welfare, the Division of Tuberculosis in 1936 was able to begin, with undivided authority and with integrated preventive and curative services, an experiment with the tuberculosis clinics of the general health services. It soon became obvious that this would not be the only way of providing the intermediate population with coverage.

The following principles were proposed as a guide for future action:

- i. - To attain more uniform coverage of the population by reducing the differences as much as possible and by not conducting "patch" campaigns.
- ii - To avoid creating special services independent of the public health organization which is so prevalent in some campaigns. In addition to being uneconomical, owing to duplication of services, their activities are not permanent.
- iii. - To keep in mind that the nature of the tuberculosis campaign does not allow it to be detached from the other health activities such as maternal and child care, nutrition, etc.
- iv. - To acknowledge that because of the importance of tuberculosis as a public health problem, the absence of control activities would constitute a basic flaw in local health services.

These principles led to the incorporation of what was called public health phthisiology into the post graduate courses in public health together with other public health subjects, so as to ensure that in every general health service not only the administrative and epidemiological aspects of tuberculosis control, but also its clinical aspects, would be looked after by the local official himself.

Since by that time the speciality was already well developed, there was some doubt whether three months' training was enough to master the public health subject, which had to be incorporated without disturbing the one-year public health course. However, the new students' knowledge of health administration, statistics, epidemiology, environmental sanitation, nutrition, health education, and so forth, compensated in practice for their elementary training in tuberculosis.

Public Health Phthisiology. This activity was conceived of as simplified phthisiology for the use of sanitarians and was aimed at

opening up new fields of tuberculosis activity in the general health services at the intermediate level, by delegating the responsibility to a local official.

As "fortunately in public health work, perfection is not necessary for the control of the infection," the clinical part was shorn of what was not considered necessary for the end in view, namely case-finding.

In each course, training was given to a limited number of physicians in the gross diagnosis of both normal and pathological fluoroscopies. At the slightest doubt, liberal use was made of 30 x 40 cm x-ray film, sputum examination, simple clinical histories, and consultations with the nearest tuberculosis clinic by sending in the case history and x-ray film, without transferring the patient.

The solid bases of the program on epidemiology and pathology, and practice in home-visits including experience in tuberculin testing, and BCG vaccination, created the necessary attitude for overcoming difficulties that would be encountered in conducting tuberculosis programs with the auxiliary personnel that was available.

During the course they received practical training in public health laboratory techniques and therefore in sputum examinations. Although in this type of service the physician is not usually called upon to perform laboratory examinations, he is able to supervise the auxiliary personnel.

Bacteriological confirmation is considered necessary in tuberculosis work. However, after the introduction of isoniazid, the force of circumstances was such that treatment had to be begun on the basis of clinical, radiological, and epidemiological diagnosis, since the possibilities of the intermediate services are limited to direct examinations. Tuberculin positivity in young family contacts is regarded as evidence of foci of infection.

Work program. From the start the work program was aimed exclusively at case detection in the most productive groups, bearing in mind that "tuberculosis, which is a social disease, will continue to be a family epidemic". (*)

These public health tuberculosis services held three x-ray sessions per week for:

(*) Hilleboe Herman E. - Public health aspects of tuberculosis control: fundamentals of pulmonary tuberculosis and its complications - Springfield, Ill.

1. persons with suspicious symptoms.
2. groups of known contacts; young tuberculin positive children who had been referred from child care services or other sources; and groups constituting a threat, such as teachers(*)).
3. persons in groups 1 and 2 referred from nearby communities which lacked x-ray services, in number previously assigned per session.

The usual preventive procedures were instituted; tuberculin testing of infants and pre-school children and their contacts, which was followed by either BCG vaccination or x-ray examination depending on the results; home visits, simple prophylactic measures, and health education.

First evaluation of the experiment and of the new type of intermediate officer. Once the system was put into practice in seven rural communities, the results were presented in 1943 (11) to the III National Congress on Tuberculosis organized by the Venezuelan Phthisiology Society. The experiment was considered to have been a success, and its application was recommended to the Department of Health.

In view of the urgent need for personnel with which to extend the system and the fact that the rate at which the public health course was turning them out was too slow, the Ministry of Health and the School of Public Health adopted a plan for short-term training, the duration of which after several trials was established at four months. Its aim was to train a new type of health officer to cope with the urgent needs of the large number of communities in our country at the intermediate population level. It was possible to hold two courses of this duration each year.

By means of this course, which was at first called intermediate and later public health clinical course, it was possible to train an officer who had a knowledge of the clinical elements of childcare, pediatrics, acute communicable diseases, venereal diseases, leprosy, tuberculosis and pneumonology, nutritional diseases, and other rural endemic diseases. In recent years cardiovascular diseases, cancer, and elementary notions of mental health have been added. Nowadays the course is almost compulsory for those who want to take the M.P.H course.

The essential thing was that this elementary training in public health was given simultaneously with a program, also basic and elementary, which contained subjects of the course for sanitarians, i.e., epidemiology, statistics, and health administration.

(*) Pregnant women included, whose morbidity at first was high (2% to 3%); today it is one of the lowest.

The candidates were chosen from among young physicians who while serving at health posts had shown an aptitude for service in the rural environment, and the selection had a fundamental bearing on the results obtained in this post-graduate course.

The working document prepared by a large group of university professors as a basis for the discussion of the topic "The physicians that Venezuela Needs" at the recent Second National Seminar on Medical Education, contains the following statement: "Could not these courses in future become the crucible in which the general practitioners that Venezuela needs is forged?"

With this type of polyvalent officer the possibility arose in the intermediate population group of integrating preventive and curative services, at various levels depending on the number of inhabitants. Thus the district health centers are oriented towards the major public health problems (tuberculosis, cardiovascular diseases, early diagnosis of cancer of the cervix), and the rural medical posts in certain small communities are provided with small tuberculosis services with x-ray equipment.

As the responsibility was placed at higher levels, that passive attitude of the rural physician when faced "with yet another case of tuberculosis" about which Mustard (*) complained so much was understandable, but this attitude changed from the moment the local health officer began to see it as "his case", regardless of how limited the resources at his disposal were.

An account of this experiment was presented at the following international meetings: the WHO Expert Committee on Tuberculosis, IV and V Meetings, held in 1949 and 1950; the UIAST Congresses held in Ecuador 1951 (12), and Venezuela 1953, and later at Guatemala (7) in 1962.

In 1952 one of us declined an invitation of the Pan American Sanitary Bureau to teach an international two-month course in Ecuador on tuberculosis control, because the program had the basic defect of being predominantly phthisiological, which was doctrinally different from what has been done in Venezuela.

Scope and administrative status of the intermediate health service. Since this service arose at a time when regionalization was still in an embryonic stage in the country, the executive agencies were called secondary network. This designation showed that they were administratively subordinate to a higher agency, called the primary network.

With regard to tuberculosis activities, the higher level was represented by the tuberculosis dispensary. In this field, a hierarchy

(*) Mustard Harry S. - Rural Health Practice. - New York, 1936

was established in all scientific and administrative matters; for diagnosis, which was either confirmed or not by sending a short report and the x-ray, or which required the presence of the patient when a supplementary examination was necessary; for approval of the proposed treatment, or indication of some change in it; for special controls or discharges for any complications or ineffective treatment; and for hospitalization in a sanatorium. But, above all, the hierarchy found its maximum expression through the periodic meetings of the intermediate level officials with the zone phthisiologist, or by his visits to the secondary network services.

The intermediate population level at which this service is placed offers suitable conditions for health strategy. This level must be converted into a safety zone, which is within our reach, to extend our work to the lower population levels. At this level it is possible to plan integrated health services that will bear dividends, because:

- I - their functions are clearly defined
- II - their officials receive a training which it is easy to impart in a short time and which has proven to be sufficient
- III - their dependence on the primary network, where resources of modern medicine are available, permits supervision and case referral to the specialized services.

The Venezuelan sanitarian, Carlos Luis González, WHO Consultant (13), points to the intermediate level as the weakest link in the health structure in most of the developing countries, and he blames this failing on the fact that "almost everywhere the prime function of direct orientation and supervision is being performed badly or not at all."

This explains why the utmost importance was given in Venezuela to the development of the intermediate service group, which at present numbers one hundred units.

In a study of 14 Latin American countries, Dr. R. Valladares, the Regional Adviser on Tuberculosis of the PASB, reported that the intermediate level of 18,061,682 persons distributed in slightly over 3,000 communities represents 13,4% of the total population.

All these reasons lead to the conclusion that it is at that level that most of the efforts should be concentrated.

The two lower population levels: the tertiary and quaternary networks. These population sectors, to which this document properly refers, cannot be reached with any type of permanent tuberculosis service unless intermediate services have already been organized. Two different population levels are included:

1. communities with from 2,500 to 4, 999 inhabitants.
2. communities with less than 2,500 down to the numerous sectors which have less than 200 inhabitants.

The population study presented showed the situation in Venezuela. In the same 14 Latin American countries mentioned, it is estimated that 54.8% of the population or some 73 million persons, live at this lower level and that of these over 60% live in groups with the lowest population density.

To cover the most important communities of the first group, there are 486 rural medical posts in Venezuela with a total of 500 medical officers. The rural post is the simplest cell in the institutional network which is under the direction of a physician assisted by auxiliary nursing personnel. Its purpose is to provide both curative and preventive services to the population. Up to 1958 the medical officers who served in rural posts received two weeks of training in a rural center to learn health organization and its administration, and to be informed of the programs of preventive medicine. Nowadays, with a department of preventive and social medicine at each of the six existing schools of medicine in the country, it is hoped that graduates will be better trained and more ready than in the past to collaborate in public health activities.

As regards the tuberculosis campaign, only those rural posts which are able to carry out the following program are considered tertiary networks:

1. technical and administrative liaison with the public health tuberculosis service of the secondary network.
2. availability of facilities in the secondary network for the x-ray examination of already defined groups.
3. tuberculin tests and BCG vaccinations.
4. surveillance of ambulatory treatment with drugs received from the secondary network for patients of the area.
5. home visits, and health education.

Since the case-finding method has been productive up to now, it was decided to extend it gradually, provided the structure of local services makes the surveillance of detected cases and the continuation of their treatment possible. That is why no use was made of ambulant teams, except for the purpose of epidemiological studies.

Direct microscopic examination for case-finding in rural posts that have no x-ray facilities, has not been possible owing to the lack

of suitable laboratory personnel. Under the existing local conditions and with the auxiliary personnel available, the handling of sputa and subsequent manipulations are considered to be dangerous. The trials made have not been very productive, owing to the particular psychology of the population, which is always disposed to cooperate by coming for an x-ray, but is not willing to cooperate in the correct collection of sputum specimens.

The question is somewhat different with regard to the culture method for testing the sensitivity of the bacillus to the drugs; the extension of the method is considered a goal to be attained.

Under the present laboratory conditions in the country it has not been possible to make cultures with the Loewenstein-Jensen medium except in the primary networks, and the problem of suitable transport from the secondary networks has not yet been solved. Tests made by Iturbe in the Guajira region, which is a few hours distant from Maracaibo, called for special arrangements to ensure that the results were satisfactory, and it was therefore not possible to put the method into general use.

Tests are being made in Aragua state at the present time with the Sula freeze-dried medium, provided by the Research Institute of Prague, in accordance with WHO standards. Because its preparation is centralized, it lasts longer, it is simpler to handle the immediate seeding of the laryngeal swab taken by the physician, and the problem of multiplication of associated microbial flora can be eliminated. With the Loewenstein-Jensen medium the seeding can only be done by a laboratory technician in the central laboratory. The rural physician can take a swab without risk; the treatment of the swab is a short and simple operation, as is the seeding; and the transportation of the seeded tube to the central laboratory is also within the realm of our present possibilities. If the results are favorable, a great step forward will have been made, because in addition to making it possible to extend the tests for bacillus sensitivity to drugs, it can also be used as a supplement to case-finding at rural medical posts that do not have x-ray facilities.

The concept of simplified medical services or minimum rural health infrastructure. The problem posed by a scattered rural population in all health fields recently led us in Venezuela to institute what is called simplified medical services. To be consistent with the terminology that was adopted twenty years ago, it has been called the quaternary network.

It simply means the provision to the rural population of care for the simplest and most common medical cases which are readily recognized by suitably trained and closely supervised auxiliary personnel. It is exercised in the health post at the lowest level which in Venezuela is represented by the rural dispensary. It is staffed by auxiliary nursing personnel and by the professional health workers attached to the nearest rural health post. During his visits which he makes at varying intervals

he gives consultations on treatment but the case load is so heavy that the results are frustrating. There are just over one thousand such services in the country.

By means of a manual of procedures which sets out clearly and simply a minimum preventive and curative program and three-month training course given at a rural health center for groups of not more than 12 nursing auxiliaries by a graduate nurse who is trained in teaching and supervision and who devotes her time exclusively to the training of such groups the last health outpost is being added to the country's health armamentum.

The simplified medical service has the following characteristics:

- 1) preventive medicine is not separated from curative medicine;
- 2) the only kind of curative activity offered is the routine treatment of common and readily recognizable diseases;
- 3) a minimum integrated service should be offered at the lowest local level.
- 4) there should be suitable supervision; and
- 5) the procedure should basically serve to establish an organized system of referral to levels where medical service is to be found.

These experiments and concepts are in keeping with the doctrine which in the recent paper already mentioned on the "Minimum requirements of rural health services to support malaria eradication programs" Carlos Luis González presented under the designation of "rural health infrastructure". He defined it as "the organic lower level units capable of providing basic health services to satisfy the rural population's most urgent health needs, within the limits imposed by the available local resources." It is interesting to note the admission that even campaigns such as that against malaria could not be consolidated and their results maintained without the existence of a minimum integrated health program.

Sharing the opinion of this author, we acknowledged the need during the experiment to distinguish static from dynamic activities. While the nursing auxiliary does very well in the former, we experimented in dynamic activities such as surveillance of drug treatment and BCG vaccination with special personnel, for example, field workers from the leprosy, yellow fever, and plague campaigns. One of the latest cooperative ventures, which might well prove to be the most promising for the simplified medical services, is that initiated with auxiliary personnel of the veterinary medicine services, which come under the Ministry of Agriculture and Stockraising. This numerous well-disciplined auxiliary

personnel with better means of transport and communications than those of the Health Department come under the authority of veterinarians. In many cattle raising areas of the country the veterinarian is the only university graduate to come in contact with the rural worker, who is used to seeing the good results to be obtained with vaccinations against the most common zoonoses.

The courses mentioned above have also been opened to Catholic and Protestant missionaries, and to the military personnel of the National Guard in rural and border areas. In addition to their own functions, these groups hold literacy classes and have some elementary knowledge of nursing, which facilitates training in our courses. The regions in which they are stationed are without any health infrastructure, and they provide their own means of transport and communication.

In recounting this Venezuelan experiment to establish permanent minimum medical care services for the scattered rural population, we do not intend to imply that this system would be suitable for other Latin American countries. It is rather a matter of doctrine as to the need of a minimum permanent service, and the selection of the most suitable personnel for it. We are aware of the interesting experiments of Professor Leo Eloesser (15), in Mexico with rural midwives, for example, and we have heard of experiments in other countries of the hemisphere which will no doubt be presented on this occasion, such as those in the Navajo Indian reservations in North America, conducted under the direction of Kurt W. Deuschle, with the universities of Cornell and Kentucky (16).

The minimum tuberculosis program at the rural dispensary, which is staffed with a nursing auxiliary or with voluntary personnel from other agencies who have been trained for the quaternary networks, is as follows:

- i. Help in selecting suspicious cases, with symptoms, for referral for examination and to arrange for their transportation to the place indicated.
- ii. Supervision of the maintenance of drug treatment in the area.
- iii. Tuberculin testing and BCG vaccination by the scarification method and with the lyophilized product.
- iv. Inspections and minimum program of health education.

The work of Delgado Blanco and Quevedo Segnini (8) in rural areas in Venezuela confirms what has been seen elsewhere about the need and utility of simplifying BCG vaccination in scattered rural population to enable it to be introduced as a permanent protective measure.

Coverage of the population with the method employed, and the network system.

Tables X and XI show the theoretical coverage of the population by the services at present in operation. Today tuberculosis is regarded as an infectious disease in which it is possible to extinguish up to 95% of the foci if properly treated. Thus the only practical yardstick we have for determining failures is the number of cases lost to treatment.

An analysis of this factor for the three areas whose coverage is dealt with here gives the figures appearing in Tables XII and XIII.

Possibilities of improvement and outlook for tuberculosis work in rural areas

Although none of the concepts stated here on auxiliary personnel are new, and although there is a marked trend even in the developed countries to increase the number of such personnel without waiting to solve the problem of medical care through the attainment of a suitable ratio of physicians to population, the lack of interest in this matter not only in Venezuela, but in most countries of Latin America as well, is truly remarkable.

In Venezuela, where the ratio is about 1 physician for every 1,500 inhabitants (leaving aside the question of distribution) the ratio is 0.5 graduate nurses and about 1.7 auxiliary nurses per physician. In accordance with certain economic standards, the required minimum in order to make the best possible use of the physician's services would be 2 graduate nurses and 4 auxiliary per physician. There is even a greater shortage of assistants for x-ray technicians, rehabilitation workers, and especially for clinical laboratory technicians. This last-mentioned shortage explains the situation previously described with regard to tuberculosis bacteriology.

One of us has stated (14) that not only the number but also the types of auxiliary personnel needed are the only means for extending the new forms of medicine to the rural areas, where it is neither reasonable nor possible for the professional health worker to work directly.

One of the most urgent recommendations that can be made to the agencies responsible for community health and the universities, is to adopt a more aggressive and nationalistic policy in this regard.

What are the best methods of diagnosing, treating, and preventing tuberculosis in rural areas? The plain answer is that this will vary from country to country and will depend on its degree of development, and the financial and personnel resources available for the campaigns.

Soundly designed research conducted through pilot studies anywhere in the world on tuberculosis in the developing countries are very useful. These studies are concentrated in the following points:

- i. better case-finding methods
- ii. better drug regimens to ensure maintenance
- iii. better prophylactic procedures

Rather than enter into discussions which may be premature because they have not yet stood the test of time, consideration will rather be given to the first results for adopting the standard of conduct that is applicable to the possibilities of Venezuela.

It is not a matter of discussing the merits of microscopy versus x-ray or vice-versa as the best means for case finding, but rather a matter of selecting that which can be developed and maintained permanently, and also of making a study of its productivity in rural areas. The regimen in a country where for financial reasons the State can offer only isoniazid free of charge and the patients do not accept combinations will be different from that in other countries which can offer all the drugs, or the country where isoniazid is under the control of the health authorities and not sold in pharmacies. (*) Nor should there be any discussion on the most effective method for protecting the population with BCG vaccination, but rather the selection of a method which is safe and can be used by all types of auxiliary personnel.

Carlos Luis González rightfully quotes Manuwa, who stated: "in health planning, the pitfall to be avoided is to permit the best to become the enemy of the good."

The point at issue is that methods for tuberculosis campaigns in rural areas should not be recommended unless they are based on supervision by higher and intermediate structures, for what is essential is to ensure local maintenance, however rudimentary the service may be.

4. BCG application in rural areas

In Venezuela BCG vaccination in rural areas is at present carried out through the public health services of the Division of Tuberculosis (secondary and tertiary networks), and is also an important activity of the leprosy campaign being conducted by the Division of Public Health Dermatology.

(*) In Venezuela it is distributed gratis and is not sold in pharmacies.

Begun shortly after the establishment of the networks, vaccination against tuberculosis in rural areas was carried out under the normal limitations imposed by the short lifespan of the liquid vaccine and the technical demands of intradermal administration. But today, with lyophilized BCG and the adoption of the scarification method both for vaccination and for investigating tuberculin allergy (8), it is possible to penetrate rural areas and make permanent use of the services of auxiliary personnel attached to the rural medical posts and dispensaries (tertiary and quaternary networks).

Since 1951, when the III Pan American Leprology Conference held in Buenos Aires recommended BCG vaccination in leprogenic areas, after the "immunological correlations between tuberculosis and leprosy". (9) had been confirmed, the two above-mentioned Divisions agreed on a cooperative plan by means of which the National Tuberculosis Institute undertook to provide the necessary amounts of Danish PPD and BCG vaccine, and the Leprosy Division undertook to administer them intradermally, according to the standards of the Tuberculosis Division.

This joint plan of action, which has been in effect ever since that time --and is not the only example of joint action in the Venezuelan public health administration-- has taken BCG vaccinations permanently to an important sector of the rural population.

The campaign's importance is evidenced by the number of vaccinations performed during 1962 and 1963, which are comparable to those performed in preceding years, as follows:

<u>Year</u>	<u>BCG in the general population</u>	<u>BCG in the child population (0-15 years)</u>	<u>Total</u>
1962	47.849	324.384	372.233
1963	123.302	289.369	412.671

5. Examples of the system of networks

A schematic and graphic presentation of the organization and performance of tuberculosis networks in the health areas of Aragua, Yaracuy, and Miranda is given below.

TABLE I

URBAN, INTERMEDIATE, AND RURAL POPULATION OF VENEZUELA
 IN ACCORDANCE WITH THE FOUR MOST RECENT CENSUSES

Population	Absolute figures (in thousands)				Relative figures (%)			
	1936	1941	1950	1961	1936	1941	1950	1961
Urban	972	1.207	2.412	4.705	28,9	31,3	47,9	62,5
Intermediate	196	310	298	373	5,8	8,1	5,9	5,0
Rural	2.196	2.334	2.325	2.445	65,3	60,6	46,2	32,5
TOTAL.....	3.364	3.851	5.035	7.524	-	-	-	-

TABLE II

MUNICIPALITIES RECORDED IN THE 1961 CENSUS, BY SIZE OF LARGEST COMMUNITY,
 AND BY PROPORTION OF RURAL POPULATION

Population of largest community	Percentage of rural population						Totals
	100	75,0 a	50,0 a	25,0 a	0,1 a	0	
		99,9	74,9	49,9	24,9		
Under 1,000	233	-	-	-	-	-	233
1,000 to 2,499	-	54	57	32	7	2	152
2,500 or more	-	8	53	86	78	39	264
TOTALS	233	62	110	118	85	41	649

TABLE III

TOTAL POPULATION OF VENEZUELA (1961 CENSUS),
BY SIZE OF COMMUNITY

Size of community	Absolute Figures		Relative Figures	
	Communities	Population (in thousands)	Communities	Population
Scattered Population	-	97	-	1,3
Under 50 inh.	11.101	287	45,9	3,8
From 50 to 99 "	5.497	391	22,7	5,2
From 100 to 199 "	4.157	584	17,2	7,7
From 200 to 499 "	2.372	697	9,8	9,3
From 500 to 999 "	567	390	2,3	5,2
From 1,000 to 2,499 "	256	373	1,1	5,0
From 2,500 to 4,999 "	103	366	0,4	4,9
From 5,000 up "	124	4.339	0,5	57,6
TOTALS	24.177	7.524		

TABLE IV

TUBERCULIN TESTS (INTRADERMAL PPD) IN RURAL AND SEMIRURAL AREAS

VENEZUELA 1958-1962

RURAL AREA								
Communities	Tests read	% positive reactors						
		0 - 4	5- 9	10-14	15-19	20-29	30-39	40 and over
YUMARE	1.562	-	13	27,5	39	62,4	70,1	78,2
BELEN	768	1,1	13,2	31,9	38,5	-	-	-
PARAGUAÍPOA y YAGUASIRU	3.104	1,9	10	25,3	45,3	44,8	47,9	69,2
CARABOBO	57.905	1,8	8,9	20,8	45,5	65,8	85,6	90,5
TOTAL	63.339	-	-	-	-	-	-	-
SEMI-RURAL AREA								
Communities	Tests read	% positive reactors						
		0 - 4	5- 9	10-14	15-19	20-29	30-39	40 and over
MACARAO	985	-	35,4	45,2	48	-	-	-
TACARIGUA	2.859	2	13	27,1	51,5	63,7	79,5	87,3
CHIVACOA	1.577	6	15,1	28,5	45,6	52,7	73	78,6
CUMANACOA	9.068	-	15,7	28,2	48,7	68	80,3	85,5
SINAMAICA	1.675	3,3	27	46,6	62	69,8	70	85,2
TOTAL	16.164	-	-	-	-	-	-	-

TABLE V

RATE OF POSITIVE TUBERCULIN TESTS (INTRADERMAL PPD) IN THE
RURAL, SEMI-RURAL, AND URBAN AREAS OF VENEZUELA, 1958-1962

Areas	Tests read	%	
		0 - 15 years	15 years and over
Rural	63.339	10,50	67,96
Semi-rural	16.164	24,49	71,28
Urban	201.700	38,09	-
"	7.814 (1958)	-	87

TABLE VI

NEW TUBERCULOSIS CASES (ALL FORMS) DETECTED IN THE URBAN
AND RURAL AREAS OF THE STATES OF ARAGUA, YARACUY,
AND MIRANDA 1961 - 1963

Area	Persons examined	%	New cases detected	
				%
Urban	39.168	69,2	619	1,58
Rural	17.367	30,8	567	3,27
TOTAL	56.535	100	1.186	2,1

TABLE VII

FIVE-YEAR RATE OF NEW TB CASES (ALL FORMS) DETECTED IN SECONDARY
NETWORKS WITH A POPULATION OF LESS OR MORE THAN 5,000
VENEZUELA, 1958 - 1962

Population	Persons Examined	New Cases detected	%
- 5,000 pop.	68.051	980	1,43
+ 5,000 pop.	169.199	2.233	1,31

TABLE VIII

ANNUAL RATE OF NEW TB CASES (ALL FORMS) IN THE POPULATION EXAMINED
AT TUBERCULOSIS SERVICES (PRIMARY AND SECONDARY NETWORKS)
VENEZUELA, 1951 - 1962

Year	Rate per 100 examined		
	Total new cases	Primary Network (1)	Secondary Network (2)
1951	1.313	1.31	1.35
1952	1.019	1.05	.78
1953	1.058	1.10	.78
1954	1.060	1.08	.89
1955	.955	.94	1.00
1956	.887	.87	.94
1957	.880	.93	.69
1958	.961	1.00	.79
1959	.952	.93	1.05
1960	.984	.92	1.44
1961	1.113	1.06	1.41
1962	1.040	1.02	1.32
AVERAGE	1.018	1.02	1.04

- (1) Consists of Tuberculosis dispensaries
(2) Public Health Tuberculosis Services

TABLE IX

Estimated Tuberculosis Mortality (all forms) per 100,000 population for the period
1950 to 1962, by population groups

Communities of	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
100,000 pop. and over	92,5	89,7	81,7	53,4	46,7	38,0	32,6	33,4	33,5	30,0	29,3	23,6	20,7
40,000 to 99,999 pop.	151,0	138,0	125,4	106,4	76,2	62,9	50,1	47,3	44,1	40,1	36,4	32,7	30,6
15,000 to 39,999 "	136,8	121,1	131,8	104,1	90,7	68,6	63,0	62,3	59,0	51,6	48,7	29,0	23,9
5,000 to 14,999 "	183,2	164,6	138,9	114,4	95,4	68,8	65,5	64,9	41,3	43,4	38,0	27,3	22,3
1,000 to 4,999 "	129,4	149,0	121,8	109,7	82,9	71,4	49,0	47,0	41,8	37,0	29,8	26,7	22,7
under 1,000 "	120,1	111,8	116,1	108,4	102,3	74,8	62,4	55,1	41,8	38,4	34,1	24,9	24,1

TABLE X

POPULATION (1) LIVING IN COMMUNITIES THAT ARE HEADQUARTERS
OF TUBERCULOSIS NETWORKS
VENEZUELA - 1963

Network	Population (in thousands)	%
Primary	3.662	45,2
Secondary	1.459	18,0
Tertiary and Quaternary	997	12,4
None	1.975	24,4
TOTAL:	8.093	100

(1) Estimate at 1 July.

TABLE XI

DEVELOPMENT OF TUBERCULOSIS SERVICE NETWORKS AT FIVE-YEAR TERMS
VENEZUELA - 1963

Year	No. Networks			Population (1) in thousands		
	Primary	Secondary	Tertiary	Entire Country	Covered by networks	%
1947	20	9	-	4.585	1.224	26,7
1952	26	15	33	5.422	1.880	34,7
1957	32	61	220	6.637	3.360	50,6
1962	36	77	208	7.850	4.900	62,4
1963	38	79	258	8.093	6.118	75,5

(1) Estimate at 1 July (excluding Indian population in jungle areas) using the 1941, 1950 and 1961 census.

TABLE XII

Annual average, first home visit, cases lost to control, and contacts examined in the states of Aragua, Yaracuy, and Miranda 1961 - 1963

State	First home visit	Cases lost to control	New contacts examined	Contacts reexamined
ARAGUA	159 (82,4%)	120 (20,3%)	499 (18,1%)	722 (19,4%)
YARACUY	179 (91 %)	103 (14,6%)	644 (65,3%)	599 (20,4%)
MIRANDA	229 (74,6%)	239 (27,4%)	988 (68,7%)	652 (16,8%)

TABLE XIII

Annual average of PPD readings in persons under 15 years of age, and BCG vaccinations of tuberculin-negative persons and newborn children, in the states of Aragua, Yaracuy and Miranda, for the period 1961 - 1963

State	PPD Readings	PPD Negative	BCG vacc. of negatives	BCG Vacc. of newborn(*)
ARAGUA	11.355 (69,5%)	7.181 (63 %)	4.821 (81,7%)	2.252 (17,4%)
YARACUY	9.124 (90,5%)	7.287 (80 %)	6.035 (83 %)	2.820 (39,4%)
MIRANDA	14.671 (89,5%)	9.873 (67,2%)	8.206 (83 %)	2.913 (14,1%)

- (*) As a result of the recent introduction of the lyophilized product and the scarification technique these figures should improve. The obstacle to BCG vaccination in rural areas has been the short life span of the fresh vaccine and the intradermal technique used in permanent campaigns under a horizontal health organization.

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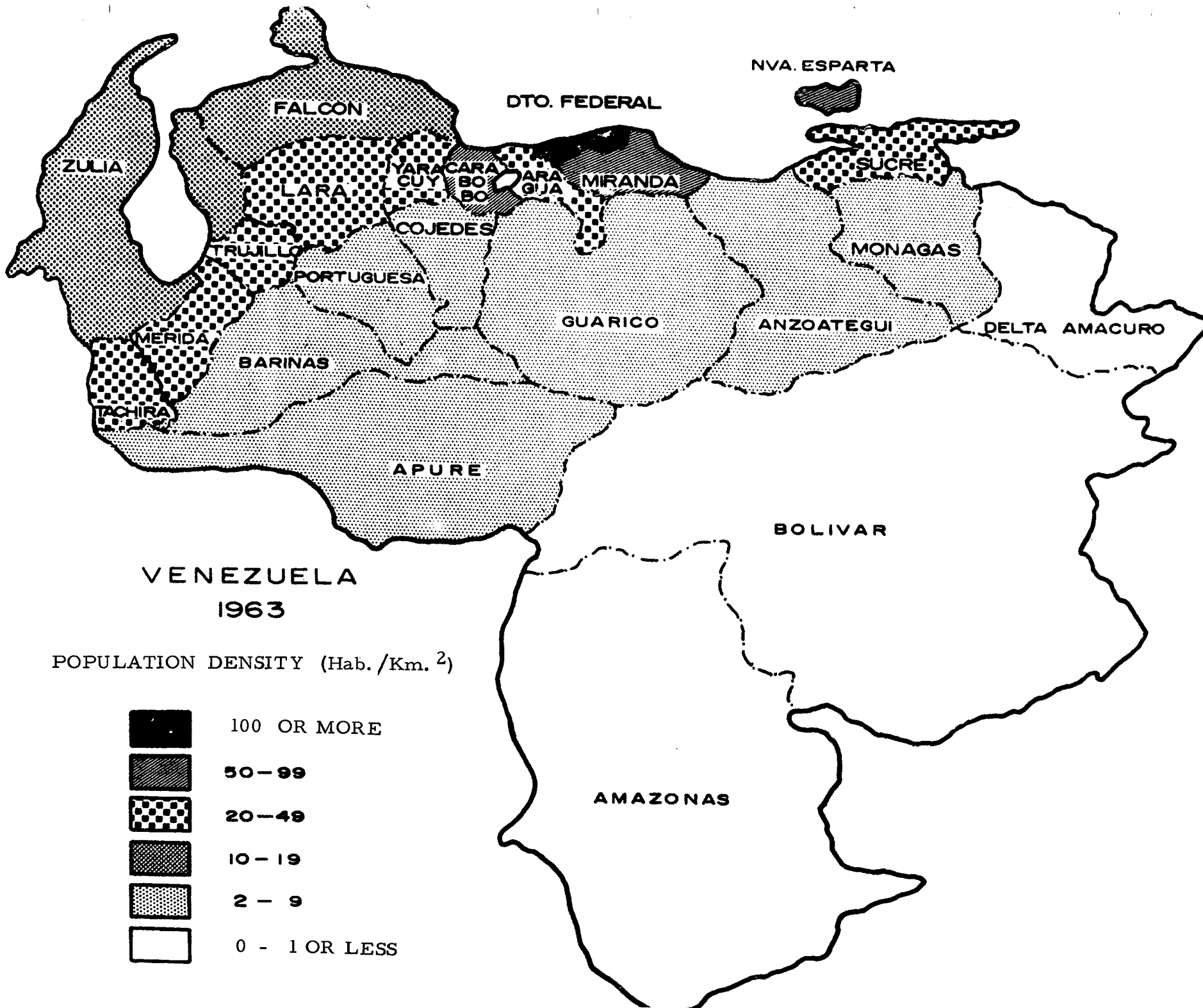


FIGURE 1

TRENDS IN TUBERCULOSIS MORTALITY PER 100,000 POPULATION
IN VENEZUELA (ALL FORMS) FOR THE YEARS 1942 - 1963

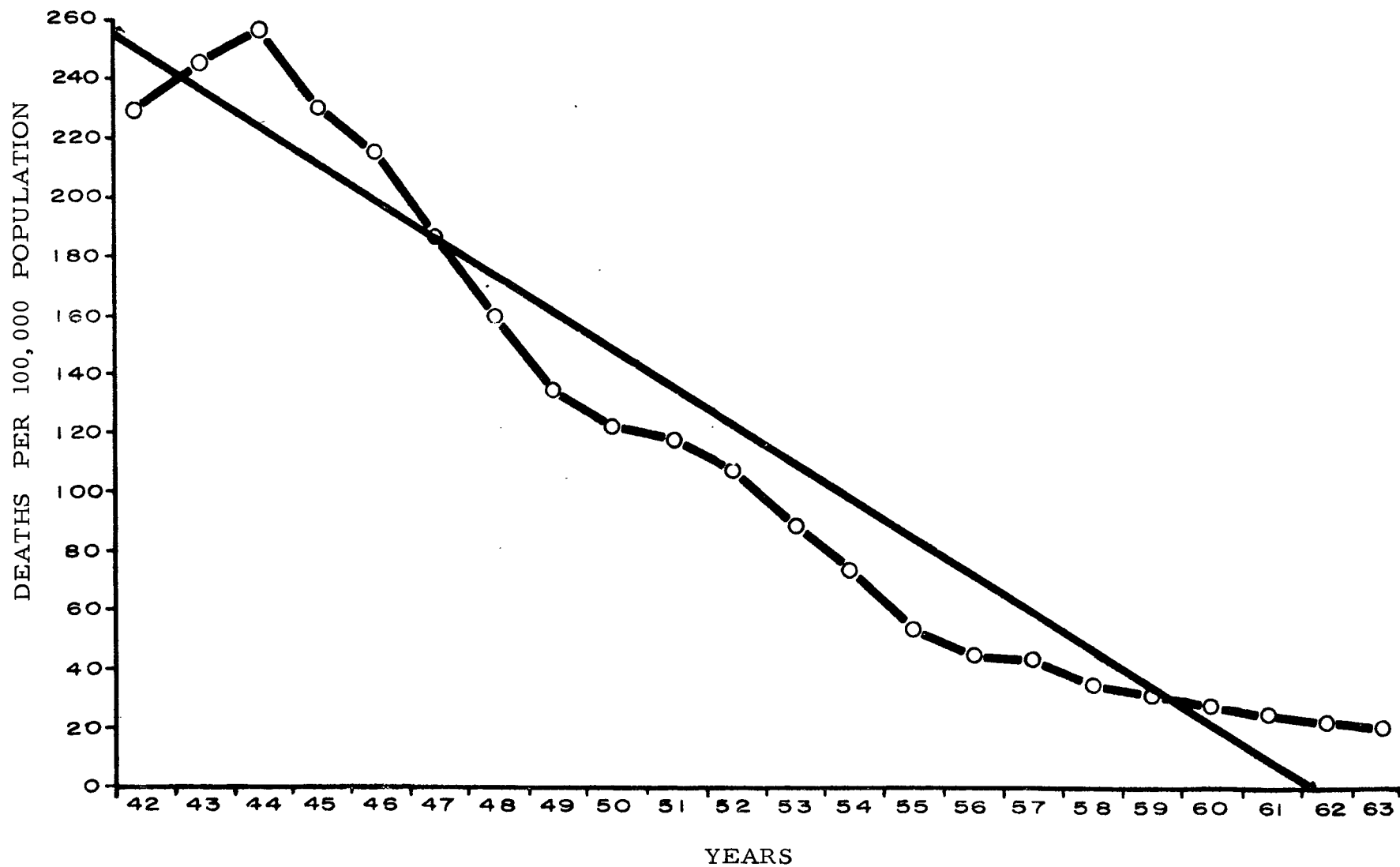
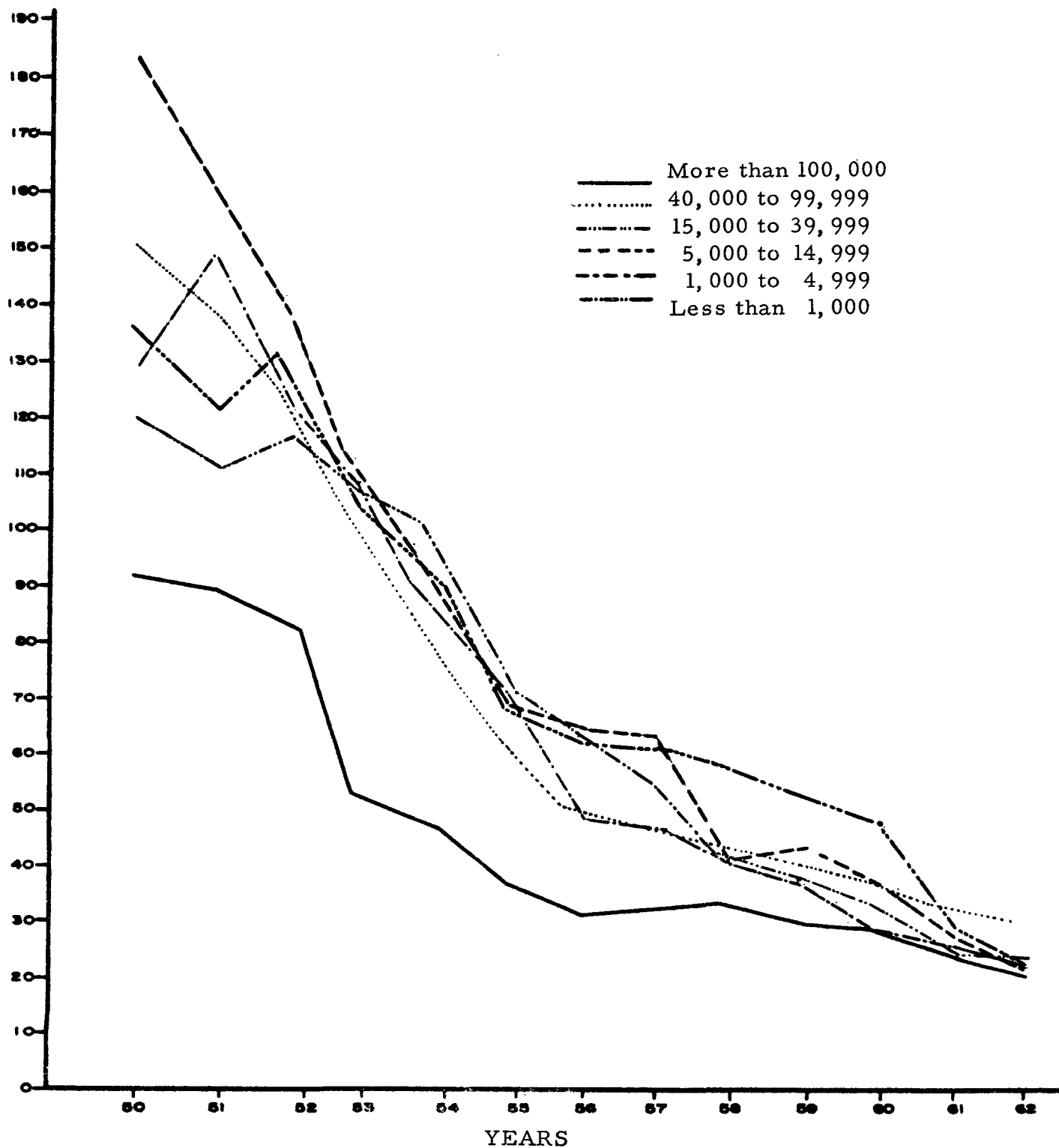


FIGURE 2

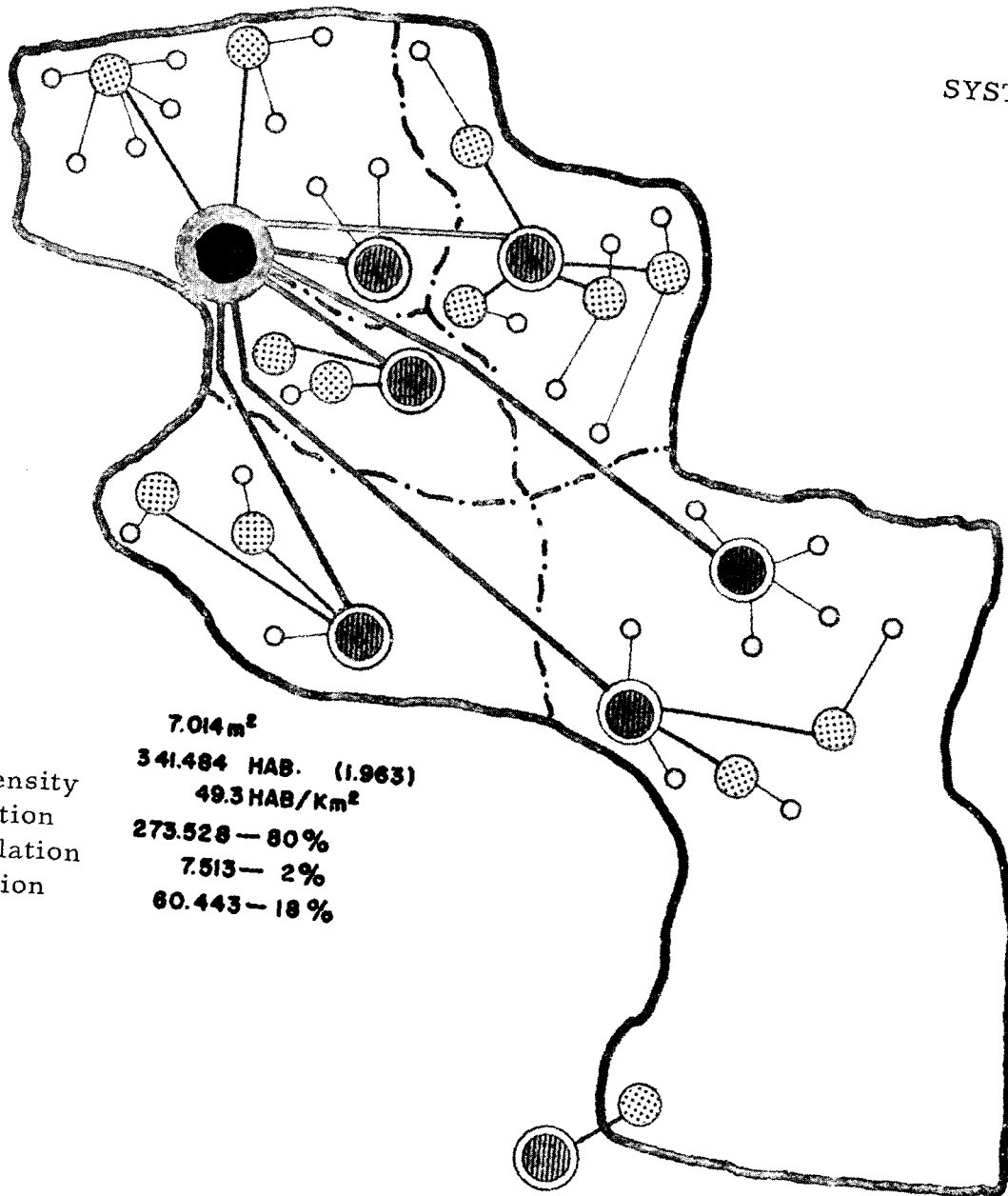
FIGURE 3

ESTIMATED TUBERCULOSIS MORTALITY (ALL FORMS) PER 100,000 POPULATION IN THE PERIOD 1950-1962, BY YEAR AND BY POPULATION LEVEL.



ARAGUA STATE

SYSTEM OF TUBERCULOSIS CONTROL NETWORKS



- Primary 1
- ▨ Secondary 6
- Tertiary 13
- Quaternary 27
- - - - Health Districts 5

POPULATION COVERED BY THE NETWORKS

Primary	150.700	HAB
Secondary	109.252	"
Tertiary and Quaternary	77.754	"

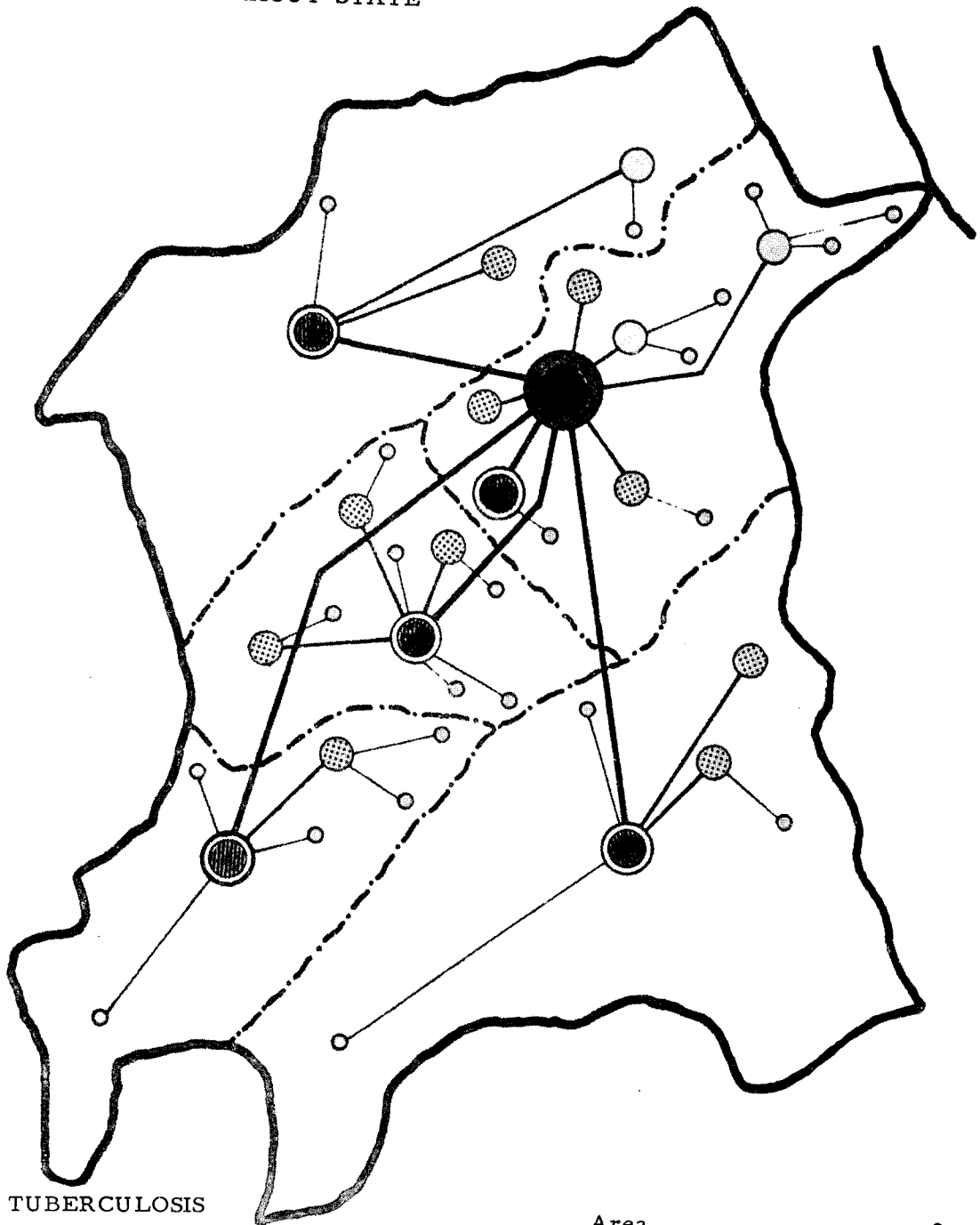
Area
Population
Population density
Urban population
Interm. population
Rural population

7.014 m²
341.484 HAB. (1.963)
49.3 HAB/Km²
273.528 — 80%
7.513 — 2%
60.443 — 18%






FIGURE 4

FIGURE 5

YARACUY STATE



SYSTEM OF TUBERCULOSIS NETWORKS

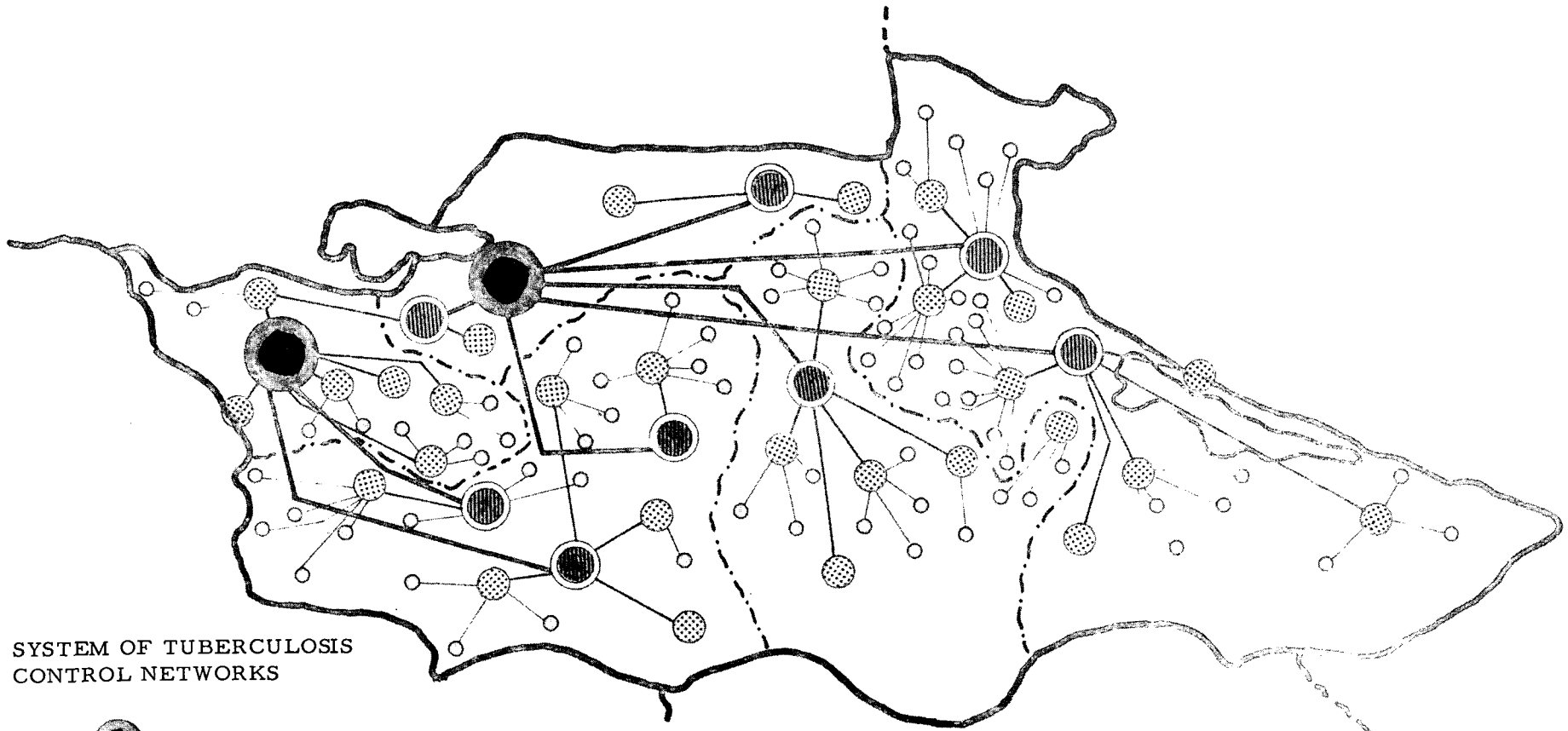
-  Primary 1
-  Secondary 5
-  Tertiary 12
-  Quaternary 23
-  Health Districts 5

POPULATION COVERED BY THE NETWORKS






Primary	31,649 HAB
Secondary	78,969 "
Tertiary	69,994 "
Quaternary	

Area	7,100 Km ²
Population	189,089 HAB (1963)
Population density	26.1 HAB/Km ²
Urban population	93,469 — 50,5%
Interm. population	9,439 — 5,1%
Rural population	82,179 — 44,4%

MIRANDA STATE



SYSTEM OF TUBERCULOSIS CONTROL NETWORKS

-  Primary 2
-  Secondary 8
-  Tertiary 29
-  Quaternary 73
-  Health districts 5

POPULATION COVERED BY THE NETWORKS

Primary	129.712 HAB
Secondary	143.821 "
Tertiary	136.942 "
Quaternary	

Area	7.950 Km ²
Population	541.753 HAB. (1963)
Population density	68 HAB/Km ²
Urban population	381.394 — 70,4%
Interm. population	12.460 — 2,3%
Rural population	147.899 — 27,3%

FIGURE 6