

METHODS IN FURTHER CONTROL OF TUBERCULOSIS¹

REPORT UPON AN EXPERIMENT IN A RURAL AREA
CHARACTERIZED BY A LOW TUBERCULOSIS RATE

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I

TEN years ago, at the Fourth Conference of this International Union, it was my privilege to participate in a program similar to the present one in its public health importance for the people of the World. On that occasion, the principal problems which we faced were brilliantly analyzed by our distinguished confrere and leader, Sir Robert Philip.

In 1924, Sir Robert asked three significant questions: "Is the antituberculosis movement effecting its purpose throughout the World? Has the antituberculosis movement diminished the toll exacted from the human race by tuberculosis? Is the game worth the candle?" He proceeded in masterly fashion to analyze the mortality records of Great Britain and the United States. And his analysis showed beyond doubt that the answer to each question is affirmative. The antituberculosis movement is effecting its purpose, perhaps not throughout the world, but certainly in the countries where it is being prosecuted vigorously, wisely, and persistently. The antituberculosis movement has diminished the toll exacted by tuberculosis, and to a measure which far exceeds the predictions of pessimists and even equals the expectations of many optimists. The game is worth the candle, a thousand times over. All this is evident not only to physicians generally and the antituberculosis workers particularly, but to everybody whose sympathy with living beings makes him capable of translating cold, impersonal mortality records into visions of mothers, fathers, and children—the human flesh and blood—saved from the Great White Plague.

¹Address given before the Ninth Conference of the International Union for the Control of Tuberculosis, held at Warsaw, Poland, on September 4-6, 1934, and reprinted from the Proceedings of that Conference.

II

In the United States, as in many other countries, the first stages of the war against tuberculosis are being won. In 1900, tuberculosis was the captain of the Hosts of Death. Today, it holds seventh place among the causes of death. In thirty-three years, the mortality rate from this disease has decreased by 70 per cent.

Even during the past four years the death rate from tuberculosis has continued to decline in spite of an almost unprecedented economic depression. Although there are some disquieting signs that the disease has increased in certain population groups and in some unusually hard-pressed areas, the tuberculosis mortality rate of our country as a whole has not greatly swerved from its downward course. This is impressive evidence, I think, that the decreasing tuberculosis mortality is not the result solely or even chiefly, as some have said, of improvements in the standards of living due to social progress or economic prosperity. On the contrary, it indicates clearly that specific efforts to combat the disease as an infection are successful despite adverse social and economic trends. The facts in the case demonstrate that public health measures are probably the most important weapons in controlling tuberculosis.

The encouraging results which have crowned the labors of sanitarians offer no valid grounds for diminishing our efforts. We have learned that tuberculosis can be controlled. But we have not yet conquered it. Although in the United States the disease now occupies the seventh place in the list of causes of death of the entire population, it is second only to accidents as a cause of death in those ages when men and women ought to be in the prime of adult life. In certain groups of the population, especially the economically underprivileged and those exposed to special occupational hazards, there is still a shocking wastage of human life. Even under conditions which would

ordinarily be considered favorable, a serious tuberculosis problem must be faced in the adolescent and young adult ages.

As we consider the importance of each major cause of death, we must not be guided only by the *size* of a death rate. Nor should we be guided by the relative ease with which mortality from a particular cause can be reduced. We must give adequate weight to the *social significance* of mortality from each of the principal causes. Deaths from organic diseases of the heart, cancer, nephritis and Bright's disease, cerebral hemorrhage, pneumonia, and accidents exceed the deaths from tuberculosis numerically. But these statistically more important causes operate primarily in ages of life which are not crucial to the structure or the well-being of society. Tuberculosis, however, reaps primarily among young adults and the heads of young families.

We must bear these facts prominently in mind. Directed efforts to save and prolong life must be guided by more than choice of the easiest path or of the largest field. Such efforts should be designed to strike at the most important areas, and importance should be measured socially, not statistically. From this point of view we may recognize that tuberculosis is seventh among the leading causes of death, and yet also recognize that it is among the first of the antisocial diseases.

We are beginning a new campaign in the war against the disease, a campaign in which our objectives must be more definite and our methods more specific than they have been in the past. Great assaults and barrages are no longer suitable. The newer tactics must be adapted to a newer strategy.

Thirty or fifty years ago, the primary problem was lessening the gross ravages of tuberculosis. Today the major task is eradicating the last vestiges of a reduced and partially controlled plague. In each situation, whether dealing with a geographical area or a population group, or an unfavorable condition of work or living, the problem of eradication demands special, intelli-

gent study and the circumstances may require specific methods of attack. The extensive method of the broad campaign is largely outworn; the intensive method of the sharp and pointed campaign is full of promise.

It is my privilege today to tell you of an experiment and an experience with this new system of attack upon tuberculosis. Upon the invitation of the local officials, the medical profession, and others, and with the cooperation of the New York State Department of Health and of various unofficial health and welfare agencies, the Milbank Memorial Fund initiated in Cattaraugus County, a rural section of New York State, a program of public health which, in the judgment of qualified experts, was well-balanced and efficient.

In planning the experiment, the officers of the Fund were guided by such public health statesmen as the late Dr. Herman M. Biggs, State Commissioner of Health and a member of our Technical Board; the dearly beloved Dr. William H. Welch of Johns Hopkins University, who was for ten years Chairman of our Advisory Council; Mr. Homer Folks, Secretary of the New York State Charities Aid Association, who has been both a close student and a practical administrator of antituberculosis work; Dr. James Alexander Miller, Professor of Clinical Medicine of the College of Physicians and Surgeons and a noted authority on tuberculosis; and other distinguished members of our Technical Board and Advisory Council.

Dr. Welch had from the beginning a keen interest in the public health program planned for Cattaraugus County and later in the sound evaluation of the findings. Through his kind offices, the United States Public Health Service agreed to cooperate in studying the epidemiology of tuberculosis and made available to us the services of their distinguished statistician, Mr. Edgar Sydenstricker, who is now a member of the Fund's staff.

The situation which we face today in many rural areas of the United States was anticipated some twelve years ago in a rural

health demonstration. The control of tuberculosis was a major objective of the Cattaraugus County experiment. It happened that in this rural section of New York State, the tuberculosis death rate had long been relatively low compared with many other rural areas in this State and elsewhere. Indeed, the mortality from tuberculosis was very little higher in the years 1910-1915 than that which prevailed in rural New York in the more recent period 1925-1930. Thus the present tuberculosis situation in rural communities generally is similar to that which prevailed in Cattaraugus County some twelve years ago, when the health demonstration was initiated in 1923. An opportunity was afforded, more than a decade ago, to inaugurate intensive anti-tuberculosis measures in a population group much less seriously afflicted with tuberculosis than in rural areas generally.

It is my purpose today to analyze this experiment and to appraise frankly its successes and its failures, as a contribution to the science of public health procedure. We believe—and you may agree—that the lessons drawn from this experiment conducted during the past twelve years will be of value in planning antituberculosis work for the great majority of rural areas which have as yet no real health services worthy of the name.

III

Cattaraugus County may be considered typical of many rural areas in the northeastern part of the United States. It has a fairly stable and homogeneous population of 72,000 persons, mainly of native-white stock, engaged chiefly in small industries and in dairying. Forty thousand of the people live in small villages or on farms, and the remainder in two urban centers of 9,000 and 23,000 respectively. The area of the County is 1,343 square miles. It is relatively prosperous by comparison with rural counties of the middle west and south, having in 1926 an average per capita wealth of about \$900. However, many of the people have small means and, judged by American standards, live on a very low economic level. During the course of the

experiment, there have been no important changes in the economic status or in the composition of the population. The people of the County have been seriously affected by the economic depression, but neither more nor less seriously than the people of rural areas generally.

When the campaign against tuberculosis was planned, it was intended that the experiment should provide a test of the results which may be achieved through the intensive application of generally accepted principles in an area where tuberculosis mortality has been relatively low over a long period of years. Early diagnosis, hospitalization, clinic and nursing supervision were to receive adequate emphasis.

We were anxious to test accepted case-finding procedures and, if necessary, to devise new methods specially applicable to a rural area. An effort was made to determine how tuberculosis is disseminated in a rural community and which factors control its transmission.

When the experiment was begun in 1923, a County Health Department was established with bureaus for tuberculosis, other communicable diseases, laboratory services, and visiting nursing. The staff of the nursing bureau included one nurse for every 4,000 persons in the rural part of the County. A county-wide school hygiene program, under the auspices of the school authorities, was initiated in 1923 in cooperation with the County Department of Health. In 1926, a Bureau of Maternity, Infancy, and Child Hygiene, with a whole-time director, was added, and a Bureau of Sanitation was created in 1929.

The following services for the control of tuberculosis have been available:

- I. Regularly scheduled diagnostic clinic service, with facilities for X-ray service and tuberculin tests, has been available in all sections of the County to aid in the discovery of positive cases, for periodic re-examination of such cases, and for the examination of all family contacts of positive cases.

II. The consultation services of a specialist in tuberculosis have been available to the physicians of the County at all times, either in their offices, at the clinics, or in the patients' homes. Portable X-ray as a diagnostic aid has been at the disposal of the consultants.

III. Sanatorium facilities have been provided. The capacity of the local sanatorium was increased in 1924 from thirty to fifty beds, the equipment and facilities were improved, and physicians have been urged to suggest sanatorium care for those patients who need institutional treatment.

IV. Visiting nurse service has been constantly available. The nursing staff included fifteen visiting nurses under the supervision of a nursing director and three nursing supervisors. The service is distributed among eight health districts, each staff nurse covering a limited area and devoting a substantial portion of her time to antituberculosis work.

These four services contribute not only to the direct task of discovering cases and furnishing care, but to the indirect function of increasing the physician's awareness of tuberculosis as a community problem and of improving his knowledge of tuberculosis and his diagnostic skill, and of educating the public on means of controlling the disease.

Popular health education has been conducted through the newspapers, the distribution of popular health literature, and through lectures and motion pictures. These educational media have stressed the importance of early diagnosis and the annual health examination, and have otherwise attempted to educate the people. In addition, the program included a plan for social welfare to secure adequate economic relief for the tuberculous families. A staff of three social workers was organized and their work was closely correlated with that of the public health nursing service.

IV

The results which have been achieved may be reviewed only briefly. First, I would report upon the extension of sanatorium

care. During the six years before the experiment was begun (1917-1922), the average annual number of patients treated in the institution was sixty-four; during the last six years (1928-1933), the annual average was 105. The average number of minimal cases treated annually has slightly more than doubled, twenty-six in the later period compared with twelve in the earlier. Even more significant is the fact that at the end of 1933 there were known to be forty patients with positive sputum in the County, and of these thirty-five were (or had been) in sanatoria. During the year 1933, twenty-five new patients were found to have positive sputum and twenty-two of these were in sanatoria at the end of the year or received sanatorium care during the year. Institutional care, utilized especially for the positive sputum cases, undoubtedly has had and will continue to have far-reaching effects in reducing the dissemination of tubercle bacilli in the community.

Careful home supervision has been afforded all patients with active or quiescent disease who did not wish to accept or did not require sanatorium treatment. This supervision has been carried out by the public health nurse in cooperation with the practicing physician. Emphasis has been placed upon bed rest, well balanced and adequate diet, and "fresh air." The patient and the family have been instructed on the dangers of infection and the importance and the means of observing sanitary precautions. The nurse has advised and assisted the family when adjustments in family life have been necessary to relieve the patient of physical and mental strain. Effort has been constantly made to keep the family as a unit and to minimize the spread of infection even though the patient remained at home for care and treatment.

v

The first requisite of a modern program for the prevention and control of tuberculosis is location of the foci of infection or the finding of the cases of disease. The generally accepted meth-

ods of case-finding have been: (1) The examination of family contacts, especially child contacts, of cases known through the case and death records and the examination of suspects referred by the public health nurses; (2) the examination of individuals referred by physicians for diagnosis; and (3) the examination of children of school age and other special population groups.

All of these procedures have been used in Cattaraugus in an effort to ascertain the method most effective in a rural area.

No records of tuberculosis cases or death were available earlier than for the year 1914 and, for the most part, the existing records were incomplete. For example, in 1914 there were recorded fifty-five deaths and only seven cases. However, such records as were available were utilized in a case-finding survey started in 1923 among families known to have had a tuberculosis case or death. During 1924, 2,434 persons were examined in the diagnostic clinics, and 249, or 10 per cent, were found to be tuberculous. This represents in part a round-up of the old cases in the County. Nevertheless, 106 of the 249 were new cases showing active clinical tuberculosis. Since then, the number of new persons examined in the clinics each year has varied from 700 to 1,100 with approximately 13 per cent diagnosed in each year as tuberculous.

The examination of the family contacts of recognized cases has been a major activity; and special emphasis has been placed upon the examination of children in the tuberculous families. In concentrating efforts upon the control of tuberculosis in childhood, we have been following the advice given to us in 1907 by Sir Robert Philip when we were designing an earlier experiment under the auspices of the New York State Committee on Tuberculosis and Public Health, and have been adhering to the dictum which Sir Robert laid down before this International Union in 1924: ". . . give especial care to the child as the potential seedling of tuberculosis."

At the end of 1931, there were 314 cases of tuberculosis car-

ried on the current roster. These cases either were active or had recently been active. Seventy-three per cent of the 396 contacts under age twenty, and 59 per cent of the 429 contacts over age twenty were examined in the diagnostic clinics.

The role of the practicing physician in the discovery of cases cannot be too greatly stressed. He should be instrumental in securing prompt and early diagnosis of tuberculosis by referring to the diagnostic clinics all those who come under his care and show suspicious signs. He should assist also in securing the examination of family contacts. The increasing cooperation of the physicians in Cattaraugus County is shown by the fact that the cases which they have referred to the clinics have increased from 14 per cent of the total clinic cases in 1923 to an average of 40 per cent during the period 1928-1932.

The practicing physicians have been the most fruitful agency in locating the significant cases. Two hundred and ninety cases were diagnosed during the five-year period 1928-1932; 57 per cent of these were referred by physicians, 32 per cent (mainly family contacts) by public health nurses, and 11 per cent by all other agencies. Moreover, the diagnosed cases referred by physicians have yielded 77 per cent of all cases of adult pulmonary tuberculosis. Excluding the cases of childhood tuberculosis (primary infection) discovered during the five-year period, among the cases referred to the clinics by physicians, one in each nine was found to be tuberculous, but among the cases referred by nurses only one in each forty-five was found to be tuberculous. It is therefore clearly evident that the practicing physicians in the County refer to the clinic a highly selected group of individuals for the diagnosis of significant infection.

The findings may be expressed more forcibly in terms of cost of diagnosis. The examination of cases referred by practicing physicians cost \$22.92 per positive diagnosis; the cost for cases which were referred by public health nurses was \$45.95 per positive diagnosis; and for cases from all other sources, \$115.18.

Emphasis is now being placed upon the examination of special population groups which may contain apparently well persons who are disseminating the disease. Special surveys of school children and of adults, mainly in rural parts of the County, have revealed a low rate of infection and disease. In 100 village and rural schools, 9.3 per cent of 1,308 children were found positive to tuberculin (Mantoux). In an urban area, only 18 per cent of 400 children (ten to nineteen years of age) gave positive reactions. Relatively few of the positive reactors showed evidence of primary infection (well calcified), and no active clinical cases of tuberculosis, either primary infection or adult pulmonary type, were found. Some 840 persons of whom 55 per cent were twenty years of age or older, drawn mainly from farm families, were given careful X-ray examinations. One clinical case of active tuberculosis was discovered in this group, and this case was already under the care of a physician though unknown to the Health Department.

These findings indicate small returns for large expenditures of energy and money. We therefore conclude that the examination of such population groups (without prior selection in respect to probable exposure to infection) is not an efficient procedure for the discovery of cases in a sparsely settled rural area where opportunities for contact with tuberculosis are limited.

These case-finding surveys conducted in the rural parts of the County and in one urban area have demonstrated that the prevalence of tuberculous infection is low in Cattaraugus County. Even among the children examined in the regular diagnostic clinics during the past six years, 75 per cent of whom were urban and 10 per cent of whom had been exposed to positive sputum in the home, the prevalence of infection has averaged only 16 per cent. Among those under sixteen years of age who were not known to have been exposed to positive sputum in the home, the prevalence of infection has declined from 19 per cent in 1928 to 3 per cent in 1933. Dr. John H. Korn, director of the Bureau

of Tuberculosis, has estimated that among those who are under nineteen years of age in the entire population of the County, 12 or 13 per cent are infected.

The lessons from these experiments in case-finding are clear. The facts which have been uncovered lead to the following administrative policies for the control of tuberculosis in rural areas:

1. Seek the cooperation and interest of the practicing physicians in the early diagnosis of tuberculosis.
2. Provide an adequate clinic and consultation service throughout the area.
3. Emphasize the need for examination and medical supervision of all persons, adults and children, known to be in contact with positive sputum cases.
4. Prevent the further spread of tubercle bacilli in the community by the hospitalization of all positive sputum cases as promptly as possible and until they are sputum-negative.
5. Search for the unrecognized foci of infection through the examination of a limited circle of contacts to each case rather than by a general survey of entire population groups.

VI

An experiment conducted over ten years is not ready for final evaluation. Nevertheless, provisional conclusions emerge from the records.

The experiments in case-finding and in the improvement of the technique of diagnosis have resulted in the discovery of many healed and latent cases. For example, in 1924, 249 cases were diagnosed, and of these 57 per cent were classed as healed cases of tuberculosis; in 1933, 116 cases were diagnosed and 66 per cent were healed. A careful check of these cases is made each year, and with special attention to those among persons who are under twenty years of age and who show X-ray evidence of latent primary infection. So far, none of the cases showing healed tuberculosis on first diagnosis has become active; practically all of the individuals are well and working. Consequently,

the present policy of the Bureau of Tuberculosis is to concentrate upon the active or recently active case.

If the supervision of family contacts has been effective in the prevention of repeated infection, there should appear a decline in the number of active cases. The high point in the discovery of active cases was reached in 1924 when there were 106. Since then, the number of new cases reported each year has fallen from sixty-eight in 1925 to forty in 1933, as shown in Table 1. The decline in the number of new active cases is all the more significant because it has occurred in spite of increasingly intensive efforts to find new and unknown cases.

Furthermore, there has been a marked improvement in the reporting of active cases of minimal tuberculosis. In 1923 and 1924, from 15 to 20 per cent of the total active pulmonary cases reported were classed as minimal (including primary infection). Since

1924, from 28 to 42 per cent of the total cases have been diagnosed in the minimal stage. The significance of this change hardly needs comment since the importance of discovering tuberculosis in the minimal stage, in order to make treatment and preventive work effective, is generally accepted.

Early reporting of tuberculosis is important both in respect to supervision of the case and the protection of those in contact with infected persons. Any serious neglect of this activity will be reflected in the tuberculosis mortality.

VII

A classification of the tuberculosis deaths which occurred during the period 1926-1933, divided according to the length of time the case was known before death occurred, is shown in

Table 1. New active cases of tuberculosis reported in each year in Cattaraugus County, 1923-1933.

Year	Number of Active Cases
1923	46
1924	106
1925	68
1926	65
1927	67
1928	65
1929	56
1930	38
1931	60
1932	50
1933	40

YEAR	TOTAL DEATHS	LENGTH OF TIME CASE WAS KNOWN					
		After Death		Less Than 6 Months	6 Mos. but Less Than 1 Year	1-3 Yrs.	3 Yrs. or Longer
1926-1929	127	35	32 ¹	31	10	29	22
1930-1933	102	27	16 ¹	26	8	16	25

¹Excluding death of nonresidents.

Table 2. Tuberculosis deaths, showing extent of time between the reporting of the case and death, Cattaraugus County, 1926-1933.

Table 2. Increased use by nonresidents of hospital facilities located in Cattaraugus County somewhat obscures the fact that there has been an improvement in the reporting of cases before death. If we exclude deaths of nonresidents who appear in the records as terminal cases only, the number of tuberculosis deaths in which the diagnosis is made at termination for the four years 1926-1929 is thirty-two, compared with sixteen for the more recent period 1930-1933. The decrease is no doubt largely due to an improvement in the cooperation of the practicing physicians in reporting cases.

From five to ten cases in each year were known less than six months before death. This group is largely composed of those who wait until they are seriously ill with tuberculosis before seeking medical treatment. No substantial improvement in the early reporting of fatal cases is indicated by the records. Since almost one-third of the total deaths in each year are in this class, we recognize the existence of a serious problem for which a solution must be found, lest the present program remain limited in its effectiveness.

VIII

The further evaluation of the Cattaraugus experiment carries us into a study of the trend of mortality from tuberculosis. We must ask the question: Have the directed efforts effected a reduction in the death rate? A suitable control area is not available for comparison. However, the period prior to the beginning of

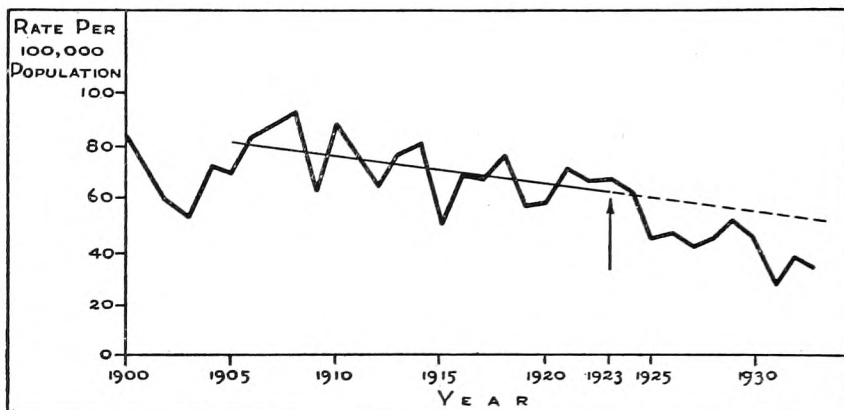


Fig. 1. Mortality from tuberculosis in Cattaraugus County, 1900-1933. (Excluding Indians and nonresidents dying at the J. N. Adam Memorial Hospital, Perrysburg.)

intensive antituberculosis work may be compared with the later years.

The tuberculosis mortality in Cattaraugus County (Figure 1) has been relatively low for thirty years or more. According to the United States Census enumerations, even as long ago as 1880 and 1890 the death rates from "consumption" were only 132 and 108, respectively. Furthermore, before 1924, there was only a slight tendency for the death rate to decline, as is indicated by the fitted trend line in Figure 1. Since 1923, the tuberculosis death rate has declined from an average rate of 66 per 100,000 during the five years 1920-1924 to 39 per 100,000 during 1929-1933. This decline of 41 per cent represents a significant departure from the expected trend, as is clearly shown in Figure 1. Attention may again be called to the fact that the decline has continued despite economic recession.

Perhaps of even greater significance is the fact that the decline in tuberculosis mortality in Cattaraugus County has taken place largely in the early ages of life where the death rate has been comparatively high. The average annual rates in each period during 1916-1924 are compared with the corresponding rates during 1925-1933 in Figure 2.

The mortality among children under five years of age is slightly higher in the later than in the earlier period, but the number of deaths in this age period is very small and the change can hardly be considered significant. On the other hand, a very marked improvement in the mortality of children and adolescents has occurred, the decrease at ages 5-9 being 79 per cent and at ages 10-19, 53 per cent. A 52 per cent decrease in the mortality for the age period 20-29 is especially significant because the mortality rate was highest in these early adult years during the pre-experimental period. With increasing age, the relative decrease in mortality declines until, at sixty years and over, some increase appears.

The mortality records confirm the judgment formed from the morbidity records, that antituberculosis work in Cattaraugus County has been effective in the partial control of the disease.

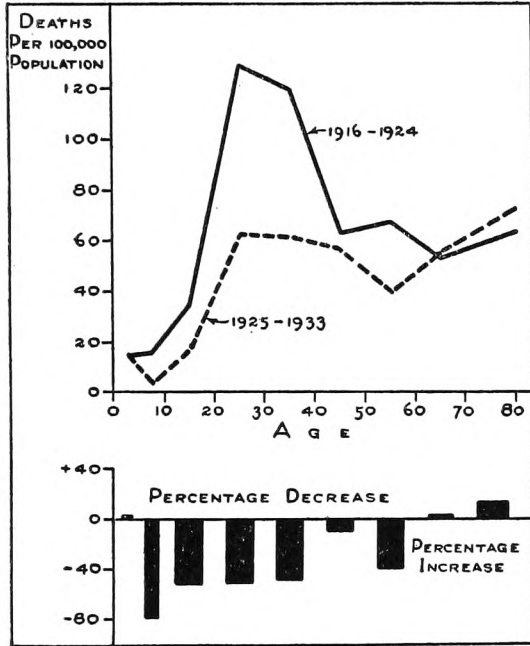


Fig. 2. Mortality from tuberculosis in Cattaraugus County by age groups, 1916-1924 and 1925-1933. (Excluding Indians and nonresidents dying at the J. N. Adam Memorial Hospital, Perrysburg.)

IX

In this brief report I have only attempted to present an aeroplane view of the procedures which have been followed and the results which have been achieved in this experiment. From more complete study of the records than I can review here, we are

warranted in concluding that the program of tuberculosis control in Cattaraugus County has had certain positive results. The intensive search for cases of active disease, the hospitalization of positive sputum cases, the protection of the family through clinic examination and the educational work of the public health nurse, the increased cooperation of the practicing physician, all have contributed in effecting a decrease in active cases of disease and a substantial reduction in the mortality from tuberculosis. The study of methods of case-finding in this rural area has clearly demonstrated the fact that we cannot depend entirely upon *a priori* methods, but must seek those which give practical results in a given area.

It appears evident that as morbidity and mortality from tuberculosis decline, case-finding becomes more and more an epidemiological problem and requires diligent and painstaking search for the source of infection of each case.

Cattaraugus County has served as a field laboratory. We know of no comparable experiment. We commend it to your interest and invite your comments and criticism. Certain specified objectives have been achieved; we hope to achieve others. We dare even to hope that our undertaking will serve as a challenge to sanitarians in other communities and in other countries and that they will be stimulated to newer and more effective means of controlling or even eradicating tuberculosis.

The value of this experiment in public health administration rests not merely in the fact that tuberculosis mortality and morbidity have been decreased, but also in the fact that accepted methods of control have been tried and tested and that new methods are being invented according as the need arises. We are confident that in this experimentation we shall forge new and powerful weapons for our armamentarium against tuberculosis in a rural area.

The United States is in itself a vast country and even its rural parts are heterogeneous and diverse. We are fully aware that

public health procedures developed in one community may not be entirely applicable in another. Furthermore, the procedures in tuberculosis control which may be effective in the United States may not be completely serviceable in another country. Nevertheless, the epidemiology of tuberculosis has common characteristics everywhere, and the principles of effective public health administration are substantially the same in all progressive countries. The lessons which are being learned in Cattaraugus County will contribute to the further conquest of tuberculosis in rural areas of the United States. We trust they will receive application in other countries as well.

In addition to the specific lessons which flow from the Cattaraugus experiment, there are certain broad implications which should be recognized. Within a few years after our antituberculosis program was undertaken, it became evident that this project could not be carried forward *sui generis*. An attack upon tuberculosis involves public education in healthy living; it requires visiting nurses to deal intimately with the needs of the people of the community; it calls for institutional facilities and for coordinated relations with other activities in both the prevention and the cure of disease. Perhaps more than any other communicable disease, the control of tuberculosis challenges preventive medicine on all fronts. Education, prevention, diagnosis, and cure are all involved.

Obviously, an effective campaign against this disease must be an integral part of a general public health movement. No such directed effort as the problem requires can be made where public health administrative machinery is lacking or deficient. In the United States it is still unfortunately true that most of our rural areas are without local public health administration worthy of the name. Even in 1932 there were less than 600 counties with whole-time county health officers in a total of over 3,000 counties. And there were only three or four counties with such health departments as modern public health science dictates.

If the Cattaraugus experiment teaches us anything, it teaches us that an effective campaign against tuberculosis in rural areas can only grow apace with a substantial movement for efficient public health practices in rural areas generally. Tuberculosis must continue to be—as it long has been—the rallying point around which we design and build the essentials of a program for preventive medicine and the conservation of public health.