

TUBERCULOSIS CONTROL IN THE MULBERRY DISTRICT OF NEW YORK CITY^{1 2}

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AN intensive tuberculosis program was started January 1, 1935 in one of the congested areas of New York City by the Department of Health and the Mulberry Health Center. Health Area 69, the section served by the Mulberry Health Center, lies roughly between Broadway and the east side of the Bowery, extending from East Houston Street on the north to one block south of Canal Street. The special tuberculosis program in this area is being developed primarily to ascertain through epidemiological study of the disease the most effective ways of case-finding and supervision in an Italian community where the morbidity and mortality rates are relatively high.

An excellent description of some of the characteristics of the neighborhood served by the Mulberry Health Center may be found in the study "Idleness and the Health of a Neighborhood" published in 1933.³ The population is relatively homogeneous since "over 98 per cent of the heads of households in April, 1932, were of Italian birth or parentage." Within the past five years there may have been some change in the nativity of the heads of households but it is believed that the population is still predominantly Italian.

The Mulberry Health Center area is a tenement district. Data from the Real Property Inventory⁴ conducted in New York in 1934 reveal some of the social characteristics and living conditions of the area. At the time the inventory was made there were 5,066 families

¹ From the Mulberry Health Center, the Milbank Memorial Fund, and the Bureau of Tuberculosis of the New York City Department of Health.

² Acknowledgments are made to Dr. W. H. Frost of the Johns Hopkins School of Hygiene and Public Health; to Dr. J. Burns Amberson of the Tuberculosis Service of Bellevue Hospital; and to Dr. H. R. Edwards, director of the Bureau of Tuberculosis of the New York City Department of Health, for helpful suggestions and criticisms concerning the presentation and analysis of the data of this study.

³ Berry, Gwendolyn Hughes: *Idleness and the Health of a Neighborhood*. New York Association for Improving the Condition of the Poor, 1933.

⁴ Real Property Inventory—City of New York—Borough of Manhattan, Residential Report, 1934.

in the area occupying 5,033 family quarters. The majority of households (52 per cent) contained four or more persons per household; and less than 10 per cent was classed as one-person households. In 45 per cent of the family quarters there was more than one person per room. Eighty per cent of the family quarters had no central heating plant, 77 per cent had no bathtub or shower, 54 per cent no hot water, and in 48 per cent of the household quarters there was no private indoor toilet.⁵

The data concerning monthly rentals in 1934 throw further light upon the social and economic status of the families living in the district. Eighty-nine per cent paid less than \$30.00 per month for rent, 55 per cent paid less than \$20.00 per month, and for approximately 10 per cent the monthly rental was under \$10.00. The depression may have caused a downward shift in rentals; however, data of rentals obtained in the 1930 census indicate that 79 per cent of the families at that time paid less than \$30.00 per month for rent.

From these data it may be concluded that the families of the Mulberry district on the whole have a relatively low economic status, and the majority of them are living in a generally unfavorable environment, if crowding and housing conditions be taken as an index. Under such circumstances control of tuberculosis in this area offers an especial challenge.

The Mulberry Health Center with its staff of seven field nurses under the direction of Miss Clara R. Price, R.N., represents the Department of Health and the nurses are responsible for the public health nursing care of the tuberculous patients and their families in the district. The local tuberculosis clinic of the Department of Health, directed by Dr. A. A. Feller, is responsible for providing clinic and X-ray examinations for patients referred by the staff of the Health Center.

When the special program was started in January, 1935, the

⁵ It is believed that there has been some improvement in the housing conditions since 1934 but data to indicate the extent of change are not available.

following groups of families were selected for intensive service and study: all families in the district in which there was a known active or arrested case of re-infection type tuberculosis were to be included and the new families in which cases in these categories were discovered were to be added during the period of special study; all families in which a death from tuberculosis had occurred during the period 1928-1934 but in which there were no known active cases January 1, 1935, were to be followed; all families in which there was evidence of primary infection in a child but no known active cases of secondary infection were to be carried and an effort was to be made to locate the source of infection. Families related by blood or marriage to any of the above classes of tuberculous families were to be investigated for case-finding to ascertain whether or not there had been spread of tuberculosis from one family to another. In addition, families in which there were individuals judged by the nurses as suspects were to be investigated.

An effort has been made to ascertain the actual morbidity from tuberculosis in the district through special case-finding surveys and accurate reporting of newly diagnosed cases. Transcripts of clinic examinations of all individuals living in the area who have had a clinic examination are obtained from the various clinics and hospitals and are filed with the family records at the Health Center. Records of hospitalization for all diagnosed cases hospitalized are also obtained. Reports of all tuberculosis cases and deaths in the district are sent from the Branch Office of the Bureau of Tuberculosis to the Mulberry Center. Reports are also secured from the private physicians concerning cases under their care. It is believed that all cases in the district known to official agencies are also known to the Health Center.

Two years have elapsed since the beginning of the special study and it is believed that it is now suitable to take some stock of what is being accomplished so that the program may be modified when it seems advisable and emphasis placed where it is most needed.

TUBERCULOSIS MORTALITY IN THE MULBERRY DISTRICT

Mulberry district is considered one of the areas of high tuberculosis mortality in New York City. The average annual death rate from all forms of the disease during the five-year period 1931-1935 was 115.8 per 100,000 population contrasted with 66.5 for the City.⁶

The tuberculosis death rate in this area is considerably affected by tuberculosis deaths among a floating population, individuals who give a Bowery lodging house as their place of residence.⁷ Thirty-nine deaths from tuberculosis occurred during the period 1931-1935 among unattached men giving lodging houses within the district as their residence. If these deaths be excluded, the rate of 78.1 per 100,000 is probably more accurate for the families of the Mulberry area, and contrasts more favorably with the rate of 66.5 for New York City as a whole.

During the past two years the intensive tuberculosis program has been carried on mainly in the families of this district. The Health Center and the Department of Health are aware of the problem of tuberculosis among the floating population of the lodging houses but so far a practicable method of attacking the problem has not been evolved.⁸

RESULTS OF EXPERIMENTS IN CASE-FINDING

Case-finding has been one of the major objectives of the special

⁶ Resident tuberculosis rate for Health Area 69—data obtained from Annual Reports of Vital Statistics by Health Areas and Health Center Districts, New York City Department of Health. The death rate for New York City (corrected for residence) is the average annual rate for 1933-1935—Annual Reports of Division of Vital Statistics, New York State Department of Health.

⁷ In June 1936 a survey was made of the twenty-three lodging houses in the district. All but two are on the Bowery; those two are on Hester Street and Broome Street, just off the Bowery. The twenty-three lodging houses have a total bed capacity of 4,139. These lodging houses or hotels keep registers of patrons, but it is impossible to get accurate information as to the extent to which the bed capacity is used daily or weekly or as to the turnover of the population.

⁸ The problem of tuberculosis among the population of the lodging houses in the district is being carefully studied by the Health Center. All lodging house cases reported from hospitals or other sources in the City are visited by a nurse from the Center. A careful history of education, past occupation, past residence, a history of health previous to the breakdown from tuberculosis, and a history of contact with tuberculosis are secured from the patient. The study will be reported upon when sufficient data are gathered and it is hoped that it will be helpful in future plans for a more effective program of tuberculosis control among this population in the Mulberry district.

tuberculosis study conducted in the Mulberry Health Center district. Various methods are being tried in order to determine which may be employed most effectively in a congested area of a large city. Briefly stated they are as follows:

1. A tuberculin testing survey of grade school children in the district with X-ray examination of positive reactors and the members of their families.

2. Clinic examination of the members of families who are blood relatives of a tuberculous individual but not living in household contact with that individual.

3. Clinic examination of individuals who have had a recent attack of acute respiratory disease such as pneumonia, pleurisy, acute bronchitis, and influenza, and examination of other suspects.

These methods have been tried during the past two years, 1935 and 1936, and it seems entirely proper to examine the results of each as critically as two years' experience will permit.

Case-Finding through Tuberculin Testing of Grade School Children. As stated above, one method of tuberculosis case-finding employed was a tuberculin testing survey. The survey was conducted in May, 1936, among children in the three public schools in the district. An effort was made to have all children who reacted positively to the tuberculin test X-rayed, and as many members of their families as possible were given a clinic examination in order to find the source of infection.⁹

Consent for giving the test to the children was obtained from the parents through home visits made by the nurses and through publicity in the public schools. So effective was this effort that consents were obtained for 64 per cent of the total 3,005 children enrolled in the public schools in the district. Table 1, which shows

⁹ Arrangements for the tuberculin testing survey were made by the Bureau of Tuberculosis of the City Department of Health in cooperation with the Department of Education. The tests were made by one physician in the schools and for the most part the reaction was read in the schools by the same physician. In a few instances readings were made by the nurses in the homes of the children. The intracutaneous test with 0.1 mgm. of Old Tuberculin was given to all children for whom consents were obtained. The tuberculin used in this survey was Old Tuberculin (human) prepared and standardized on guinea pigs by the Laboratories of the New York City Department of Health.

GRADE	PER CENT OF CHILDREN TUBERCULIN TESTED	NUMBER REGISTERED IN PUBLIC SCHOOLS 1935-1936
	Total Public Schools	Total Public Schools
ALL GRADES	64.4	3,005
Kindergarten	31.9	188
First Grade	57.2	299
Second Grade	66.3	291
Third Grade	66.2	284
Fourth Grade	65.2	336
Fifth Grade	71.3	341
Sixth Grade	75.8	363
Seventh Grade	63.3	379
Eighth Grade	70.8	373
Ungraded Class	54.3	151

Table 1. Number of grade school children registered in the public schools and the proportion given the tuberculin test, May, 1936, Mulberry Health Center district, New York.

the total enrollment by grade for each school, indicates that above the second grade the proportion tested ranged from 63 to 75 per cent. There seemed to be some hesitancy on the part of the parents to permit the testing of the very young school children since only 32 per cent of those in kindergarten was tested.¹⁰

The results of the test among children in each of the three schools were fairly uniform. The proportions found positive at various ages are shown in Table 2. For children at all ages, the per cent with a positive reaction ranged from 29 in Public School 130 to 34 for those in Public School 21. When the average rates for all ages are adjusted for differences in the age distribution, the variation between schools is even less; the range is from 30 to 33 per cent.

As has been noted in other tuberculin testing surveys of school children, the prevalence of infection increases with age. From 20 to 23 per cent of the children aged 5 to 9 had a positive reaction to

¹⁰ Kindergarten classes were conducted in two sessions, morning and afternoon, with different children at the two sessions. The tuberculin tests were given in the mornings. Children attending the afternoon session of kindergarten had to make an additional trip to school. This may have influenced the proportion tested.

AGE GROUPS	PER CENT OF CHILDREN POSITIVE TO TUBERCULIN (0.1 mgm. O.T.)				NUMBER GIVEN TUBERCULIN TEST			
	Total Public Schools	Public School 21	Public School 23	Public School 130	Total Public Schools	Public School 21	Public School 23	Public School 130
5-16 Years Adjusted for Age ¹	32.2	33.8 33.4	33.3 31.5	28.8 30.4	1,940	843	535	562
5-9 Years	22.3	23.3	20.0	22.6	695	266	155	274
10-14 Years	36.2	37.3	35.9	34.4	1,176	552	351	273
15, 16 Years	63.8	68.0	72.4	40.0	69	25	29	15

¹Rates adjusted to the age distribution of the total children tested in the public schools.

Table 2. Results of tuberculin testing grade school children in the public schools, April, 1936, Mulberry Health Center district, New York.

tuberculin, and at ages 10-14 from 34 to 37 per cent had a positive reaction. Among children over 14, the rate for the three schools combined was 64 per 100 children tested. However, only sixty-nine children over 14 years of age were tested, a number that is too small to be representative of children of that age in the district or to afford a reliable infection rate.

The varying strength of the tuberculin used in surveys in different places renders a comparison of the results of one with another of somewhat dubious value. However, a tuberculin testing survey of school children in one area of Philadelphia made some ten years ago indicates a prevalence of tuberculous infection among those aged 5-14 only slightly higher than that noted among children in the Mulberry district.¹¹ These data are compared in Table 3.

The children in the Mulberry district who were found to be negative to 0.1 mgm. of Old Tuberculin were not retested in the schools. However, an effort was made by the nurses to have some of the negative reactors retested with 1.0 mgm. at Washington Clinic. Retests were secured for 170 children; twelve, or 7 per cent, had a positive reaction to the test. The age distribution of the 170 children was similar to that of the total children tested in the three

¹¹ Hetherington, H. W.; McPhedran, F. Maurice; Landis, H.R.M.; and Opie, Eugene L.: A Survey to Determine the Prevalence of Tuberculous Infection in School Children. *The American Review of Tuberculosis*, October, 1929, xx, No. 4.

AGE GROUPS	PER CENT POSITIVE TO TUBERCULIN	NUMBER POSITIVE TO TUBERCULIN	TOTAL TESTED
	0.01 MGM. OF O. T. ²		
TOTAL 5-14 YEARS	39.6	1,052	2,654
5-9 Years	27.8	262	942
10-14 Years	46.1	790	1,712
RETESTS 0.1 MGM. O. T.			
TOTAL 5-14 YEARS	52.6	1,397	2,654
5-9 Years	36.2	341	942
10-14 Years	61.7	1,056	1,712

¹Data taken from the following: Hetherington, H. W.; McPhedran, F. Maurice; Landis, H. R. M.; and Opie, Eugene L.: A Survey to Determine the Prevalence of Tuberculous Infection in School Children. *The American Review of Tuberculosis*, October, 1929, xx, No. 4.

²It is believed that the results of testing with 0.01 mgm. of Old Tuberculin in the Philadelphia study are more nearly comparable with results obtained in the New York survey with 0.1 mgm. of O.T. It is generally recognized that the tuberculin used in the studies conducted by the Henry Phipps Institute was of greater strength than that used in other studies of a similar nature.

Table 3. Prevalence of tuberculous infection among school children in Philadelphia.¹

public schools. If this per cent, 7, be applied to the total 1,316 children found negative, it is estimated that some ninety-two additional children with tuberculous infection would have been discovered had all negative reactors been retested with 1.0 mgm. of Old Tuberculin. Retesting would have modified the average infection rate among the children in the three schools only slightly, raising it from 33 to 36 per 100 children tested.

Three hundred and twenty-six, or 80 per cent, of the total children living in the district who had a positive reaction to tuberculin had an X-ray of the chest at Washington Clinic by the end of 1936. No cases of re-infection type tuberculosis (adult pulmonary) were discovered among the children X-rayed.

The chief purpose of the tuberculin testing of grade school age children is to discover the unknown infectious cases in the community through the examination of the family contacts of the child who has acquired tuberculous infection. If through an intensive campaign against the disease it is believed that many of the cases

in the community are already known at any given time, it is logical that such a survey should lead back into or identify the families of the known as well as the unknown. The intensive program in Mulberry Health Center district makes it possible to test the validity of this assumption.

During 1936, as shown in Table 4, there were 175 families in the Mulberry district carried by the Health Center because of the presence of one or more cases of active or arrested adult pulmonary tuberculosis (re-infection type) in the family or a history of a death from pulmonary tuberculosis. In seventy-eight of the families the only case in the family was one classed as arrested when the final diagnosis was made and only two of these cases gave a history of illness from tuberculosis.

There were no grade school age children in fifty-two, or 30 per cent, of the 175 known tuberculous families. As shown by Table 4, these families had only infants or preschool age children or only young adults over grade school age or were composed only of adults over 30 years of age. Obviously these families would not be directly discovered through a tuberculin survey of grade school children.

In 123 of the known tuberculous families there were grade school age children in the family. The children in sixty-four of these families attended the public schools in which the special survey was conducted and those in the remaining fifty-nine families attended either one of the two parochial schools in the district or the Children's Aid School.¹² The two parochial schools and the Children's Aid School were not included in the tuberculin testing survey; consequently a survey conducted only in the public schools of this particular district might be expected to reveal about one-third of the known tuberculous families. Actually, in twenty-two of the families in which the children attended public schools, the children have remained negative to tuberculin even with repeated tests during 1935 and 1936.

¹² The Children's Aid Society conducts a kindergarten and nursery school in the Mulberry Health Center district.

CLASSIFICATION OF FAMILIES	Total Families	FAMILIES NEW SINCE 1935			FAMILIES KNOWN BEFORE 1935		
		Index Case Active Pulmo- nary Tubercu- losis	Index Case Death from Pulmo- nary Tubercu- losis	Index Case Arrested Case of Pulmo- nary Tubercu- losis	Index Case Active Pulmo- nary Tubercu- losis	Index Case Death from Pulmo- nary Tubercu- losis	Index Case Arrested Case of Pulmo- nary Tubercu- losis
TOTAL FAMILIES	175	18	15	18	28	36	60
No Grade School Age Children in Family	52	7	6	2	12	16	9
No Children in Family	0	0	0	0	0	0	0
Only Infants or Pre- school Children							
Positive to O.T.	1	0	0	0	1	0	0
Negative to O.T.	4	1	0	0	2	0	1
All Children							
Young Adults over School Age (17-29 Years)	33	3	6	0	5	15	4
Family All Older Adults (over 30 Years)	14	3	0	2	4	1	4
Grade School Age Children in Family	123	11	9	16	16	20	51
In School Survey							
Positive to O.T.	42	4	2	7	5	11	13
Negative to O.T.	22	2	0	4	2	1	13
Not in School Survey							
Positive to O.T.	24	2	3	2	3	6	8
Negative to O.T.	18	0	1	1	4	1	11
Not Tested	17	3	3	2	2	1	6

Table 4. Total known tuberculous families in Mulberry Health Center district during 1936, classified according to the presence of children of grade school age in the family.

As was stated above, one of the main purposes of the tuberculin testing survey of school children is to find the infectious case through the examination of the family contacts of the child who

has acquired tuberculous infection. By the end of 1936, 223 contacts in seventy-eight of the 218 newly discovered families in which there were positive reactors had a clinic examination. One active case of re-infection type disease (adult pulmonary tuberculosis) was discovered or a rate of 0.4 per 100 persons examined. This case was an eighteen-year old girl with a negative sputum in whom the disease was classed as in the minimal stage. Five cases of arrested tuberculosis (re-infection type) were diagnosed on X-ray among the contacts. None had a history of ever having had active disease.¹³

From this analysis it seems clearly evident that a tuberculin testing survey of grade school age children and examining of family contacts will detect or lead to a smaller proportion of the active infectious cases in a community such as the Mulberry Health Center district than is commonly believed. A relatively high proportion of the known tuberculous families are missed on such a survey because there are no grade school age children in the family. Also, only one active case of tuberculosis was discovered among the contacts in seventy-eight families in which there were children positive to the tuberculin test.

Case-Finding in Related Families. It is an established fact that the family contact makes an important contribution to the incidence of active disease in the community. It has been noted also that active disease develops most frequently among young adult contacts at the ages when they may be establishing new family units. Consequently it seemed logical to search for cases of active tuberculosis among the close blood relatives of known tuberculous individuals in the district even though the members of the related family do not live in the household of the tuberculous family. Furthermore, in an Italian community such as the Mulberry district, there is frequent visiting among the relatives in the district

¹³In addition, an arrested case of pulmonary tuberculosis with a history of illness five years previous to 1936 was reported by one of the families. There was no record either in the Branch Office or the Central Office of the Bureau of Tuberculosis that the case had ever been reported and so far the diagnosis of pulmonary tuberculosis has not been verified by a clinic examination.

and the contact between the related families may be considered as important.

One hundred and nine families in which there was a blood relative of a tuberculous individual in the community were investigated for tuberculosis. Fifty-two per cent of the 507 individuals in these families had a clinic examination. Three unknown cases of active pulmonary tuberculosis (re-infection type) were discovered among the examined population or a rate of 1.1 per 100.

A brief description of these cases may be of interest: (1) An active tuberculous lesion in the minimal stage was noted in a male (head of household) aged 44. Sputum has remained negative but subsequent X-rays indicate spread of the disease. This individual was examined because he had been in frequent contact with a cousin who died of pulmonary tuberculosis in 1933.

(2) Active tuberculosis in the minimal stage was diagnosed in a female aged 33 (wife in family). Sputum has remained negative. This woman was examined because a twenty-six-year old married sister living in the district had active pulmonary tuberculosis with a positive sputum in 1933 and 1934.

(3) A female aged 60 was examined and diagnosed as probable bronchiectasis. Sputum was negative. Later she went to Columbus Hospital ill with lobar pneumonia and malignancy of the intestinal tract and died there. During her illness, her sputum was found positive for tubercle bacilli. This case was examined because of relationship to a family in which the children were positive to tuberculin.

Case-Finding through Examination of Individuals Who Have Recently Had an Acute Respiratory Illness. At times the onset of secondary tuberculous infection manifests itself as an attack of acute respiratory illness such as pneumonia, pleurisy, or what seems to be influenza. Consequently, it was considered advisable to urge a clinic examination for all adults who had recently had a disabling illness from pneumonia, pleurisy, influenza, or acute bronchitis. Cases in the district given nursing care by the Henry Street Nursing

Service for any of these diseases were promptly reported to the Mulberry Health Center for follow-up after recovery. When the Health Center nurses visited these families a history of symptoms and of illness suffered by other members of the family was secured. All members of the family with suggestive history of illness or symptoms were urged to have a clinic examination.

During 1935 and 1936, 157 persons, or 49 per cent of the members of sixty-two families carried because of a case of acute respiratory illness, were examined at Washington Clinic. One case of active re-infection type tuberculosis in the minimal stage was discovered in an eighteen-year old girl, or a rate of 0.63 per 100 persons examined. It is of interest to point out the fact that in 1934 this particular case had been employed as a houseworker in a family in the district where the wife was ill with infectious tuberculosis.

The results of the three methods of case-finding, a tuberculin survey of grade school age children and examination of family contacts of the positive reactors, examination of blood relatives of tuberculous families, and examination of individuals with a history of recent attack of acute respiratory disease, are summarized briefly in Table 5. It is of interest to note that the examination of family contacts of positive reactors discovered through the tuberculin testing survey of grade school children was the least productive method

Table 5. Results of three case-finding methods in Mulberry district.

CLASS	ACTIVE CASE RATE PER 100 PERSONS EXAMINED	NUMBER OF		NUMBER OF FAMILIES
		Cases of Active Secondary Infection	Family Members Examined	
Tuberculin Testing Survey	0.4	1	223	78
Related Families	1.1	3	264	109
Individuals with Recent Attack of Acute Respiratory Illness or Suspicious Symptoms	0.6	1	157	62

of finding new active cases of re-infection type tuberculosis. The rate, 1.1 per 100, among members of families related to a tuberculous individual is almost three times the rate 0.4 noted among contacts of positive reactors and approximately twice as high as the rate of active disease discovered among individuals with a recent attack of acute respiratory disease or suspicious history. The fact that four of the five cases of re-infection type tuberculosis discovered by these methods were classed in the minimal stage when diagnosed is also of interest.

CASE-FINDING AMONG CONTACTS IN TUBERCULOUS FAMILIES

Examination of family contacts in the known tuberculous families is an accepted procedure in the control of tuberculosis. The need for periodic re-examination and case-finding in these families may best be illustrated by showing the actual incidence of active adult pulmonary tuberculosis (re-infection type) among the contacts. Close observation, both by the clinic and by the nursing service, in 385 tuberculous families in the Mulberry Health Center district makes it possible to note with a reasonable degree of accuracy the occurrence of clinically active disease among the family members during the two years of intensive service, 1935 and 1936.¹⁴

The families are classified according to the type of index case in the family. The index case is the case which formed the basis of selection of the family for intensive service. Thirty-seven families were carried because of a death from pulmonary tuberculosis which had occurred sometime during the period 1928-1934. No cases of active clinical tuberculosis were present in these families when the special tuberculosis study was started. In thirty-five families the index case in each was one of active clinical pulmonary tuberculosis

¹⁴ Periodic re-examination of a high proportion of the family contacts makes it possible to report that all of the cases of clinically active disease which occurred among contacts during the two years 1935 and 1936 were individuals classed as negative on previous examinations. It is believed that the chances of missed cases with clinical symptoms among the unexamined contacts are relatively slight. These families have been visited by the nurses on the average from twelve to seventeen times a year and the nurses usually know of any illness, suspicious or otherwise, in the family.

CLASS	37 FAMILIES INDEX CASE DEATH FROM PULMONARY TUBERCULOSIS 1928-1934	35 FAMILIES INDEX CASE ACTIVE PULMONARY TUBERCULOSIS 1935	64 FAMILIES INDEX CASE ARRESTED PULMONARY TUBERCULOSIS	249 FAMILIES INDEX CASE CHILD WITH PRIMARY INFECTION
Total Persons	181	165	301	1,559
Per Cent Examined	71.0	79.4	77.1	75.3

Table 6. Per cent of household contacts examined in 385 families, classified according to the type of index case and observed during 1935 and 1936 in the Mulberry Health Center district, New York.

(re-infection type). Sixty-four families were carried because some sign of healed re-infection type tuberculosis was noted on the chest X-ray of an individual in the family. In 249 families the index case was a child with a lesion of primary infection revealed either by a chest X-ray or by a positive reaction to the tuberculin test.

Table 6 shows the total household contacts and the proportion examined. In the four groups of families the proportion examined ranges from 71 per cent of the household contacts in families where a death from pulmonary tuberculosis had occurred to 79 per cent of the contacts in families where the index case was one of active clinical disease.

Table 7 shows the number of families in each group in which there were children in the family under 15 years of age and the proportion of the children tested and the proportion for whom a positive reaction to tuberculin was noted. The rate of infection, 83.9 per 100, was highest in families carried for close observation because of a death from pulmonary tuberculosis. In the other three groups of families the rates were similar, ranging from 43.2 among children in the families where the index case was one of active pulmonary tuberculosis to 47 and 48 per 100 in families where the index case was either an arrested case of re-infection type tuberculosis or a case of primary infection in a child. It is interesting to note that the infection rates in the latter three groups of families were not significantly higher than the estimated average rate of 36 per 100 noted

CLASSIFICATION AS TO TUBERCULIN TEST	23 FAMILIES INDEX CASE DEATH FROM PULMONARY TUBERCULOSIS 1928-1934	21 FAMILIES INDEX CASE ACTIVE PULMONARY TUBERCULOSIS 1935	48 FAMILIES INDEX CASE ARRESTED PULMONARY TUBERCULOSIS	249 FAMILIES INDEX CASE CHILD WITH PRIMARY INFECTION
TOTAL CHILDREN 0-14 YEARS OF AGE	53	54	133	711
Per Cent Tested with O.T.	66.0	86.3	92.1	90.9
Per Cent Positive to Tuberculin	83.9	43.2	47.9	46.6
Per Cent Positive Adjusted for Age ¹	82.4	43.2	48.3	46.3

¹Rates adjusted to age distribution of children 0-14 years of age in the total 341 families.

Table 7. Per cent of children (0-14 years of age) positive to the intracutaneous tuberculin test in 341 families, classified according to the type of index cases, observed during 1935 and 1936 in the Mulberry Health Center district.

on the tuberculin testing survey of children of the same ages in the three public schools of the district.¹⁵

Table 8 shows the incidence of active pulmonary tuberculosis (re-infection type) among contacts in each of the four groups of families during the two years 1935-1936.¹⁶ No cases of active adult pulmonary tuberculosis occurred among the contacts in the sixty-four families in which the index case was an individual found to have X-ray evidence of a healed pulmonary lesion (re-infection type). The incidence of active disease among contacts in the thirty-seven families observed because of a death from adult pulmonary tuberculosis (2.0 per 100) was more than forty times the incidence

¹⁵In the families observed because of an active case of adult pulmonary tuberculosis, twenty of the thirty-five index cases were known to have positive sputum; in those observed because of a death from pulmonary tuberculosis the assumption is that practically all the index cases had positive sputum; in the families observed because of arrested pulmonary tuberculosis, there was no history of illness from tuberculosis except for two of the index cases. One of these was known to have had a positive sputum.

¹⁶In all families in each group the index case which formed the basis of selection of the family is excluded from the observed population.

CLASS	37 FAMILIES INDEX CASE DEATH FROM PULMONARY TUBERCULOSIS 1928-1934	35 FAMILIES INDEX CASE ACTIVE PULMONARY TUBERCULOSIS 1935	64 FAMILIES INDEX CASE ARRESTED PULMONARY TUBERCULOSIS	249 FAMILIES INDEX CASE CHILD WITH PRIMARY INFECTION
Active Pulmonary Tuberculosis—Rate per 100 Person Years	2.0	0.3	0	0.03
Number of Cases of Active Pulmonary Tuberculosis	7	1	0	1
Population Observed (Person Years)	343	320	580	2,862

Table 8. Incidence of active tuberculosis during 1935 and 1936 among family contacts in 385 families classified according to the type of index case, in the Mulberry Health Center district of New York.

(0.03 per 100) observed in the 249 families carried because of a case of primary infection. In the families with an active case of adult pulmonary tuberculosis the rate of occurrence of active re-infection type disease, 0.3 per 100 persons observed, was also considerably higher than the rate among household contacts in the 249 families observed because of a child with primary infection.¹⁷ It may be concluded from these data, even though limited to a short period of observation, that it is exceedingly important to follow and periodically re-examine the household contacts in families where there is or has been a case of active pulmonary tuberculosis.

The wisdom of continued close observation of families selected

¹⁷ It would be more suitable to show the incidence of secondary cases of active adult pulmonary tuberculosis for the two groups of families (thirty-seven families, index case death from pulmonary tuberculosis and thirty-five families, index case active adult pulmonary tuberculosis) combined since both groups are comparable. However, it is desired to emphasize the need for continued supervision of the contacts in families where a death from tuberculosis has occurred.

If the two groups are combined, the average annual incidence of active disease is 1.2 per 100 person years. This rate, though covering a period of only two years, is similar to the rate noted by Downes in eighty-three tuberculous families in Cattaraugus County and by Putnam in some 500 families in Philadelphia.

Downes, Jean: A Study of the Risk of Attack among Contacts in Tuberculous Families in a Rural Area. *The American Journal of Hygiene*, November, 1935, 22, No. 3.

Putnam, Persis: Tuberculosis Incidence among White Persons and Negroes Following Exposure to the Disease. *The American Journal of Hygiene*, November, 1936, 24, No. 3.

on the basis of an individual with X-ray evidence of healed lesions of re-infection type tuberculosis and no history of illness from the disease, for the purposes of case-finding, may be questioned. There is no indication of an unusual amount of tuberculous infection among the children under 15 years of age in these families and there are no cases of healed re-infection type lesions among the examined contacts. However, it may be of interest for the purposes of special study to follow the index cases for a period of years in order to see whether any of them become reactivated or break down with clinical disease. It will also be of interest to follow the 249 families in which the index case was a child with primary infection over a longer period of time but it should be emphasized that families in this class do not need the close public health supervision that families with exposure to active adult pulmonary tuberculosis require.

VOLUME AND COST OF TUBERCULOSIS SERVICE IN MULBERRY DISTRICT

The volume of tuberculosis service, both clinic and nursing care, in the Mulberry district has shown an increase in 1936 contrasted with 1935. During 1935, 521 families were supervised by the nurses of the Center because of a tuberculosis problem or for case-finding; in 1936 a total of 830 families had some nursing service. The increase in 1936 is due largely to the addition to the case-load of families in which one or more children were found positive to the tuberculin test through a survey of grade school age children in the public schools of the district during that year.

Clinic service, also, increased in volume in 1936. In 1935, 1,243 persons referred by the Health Center were examined at Washington Clinic; in 1936, 1,587 persons were examined, or an increase of 28 per cent over the number examined in 1935. In 1935, the 1,243 persons made 2,991 clinic visits, or an average of 2.4 visits per person, contrasted with 2.1 visits per person in 1936. Seven hundred and seven X-rays of Mulberry patients were taken in 1935 compared with 1,029 in 1936; this represents an increase of 46 per cent.

It is of considerable interest to know how much it costs to give an intensive service to tuberculous families in a congested district of a large city. Furthermore, it is of interest to see the volume of service given to various groups of families and this analysis can be presented most strikingly when put on a cost basis.¹⁸

In order to make a critical appraisal of volume of service on a cost basis, it is necessary to group the families served by the Health Center and the clinic according to the importance of the tuberculous problem in the family or the initial reason for going into the family. Table 9 shows the cost to Mulberry Health Center of their service during 1935 and 1936 in the families grouped according to the index case, which indicates the initial reason for giving tuberculosis service to the family. The population base used in the analysis of cost by family groups is expressed in units of time, instead of numbers of families; that is, a month of service for each family is the unit of time. Such a procedure eliminates the bias which would be introduced if individual families carried for various time periods were given equal weight.¹⁹ Only in this way can the cost data be used to show accurately how expensive it is to supervise groups of families, and also where the service has been concentrated.²⁰

Table 9 shows that service for the various groups of families cost

¹⁸ Beginning January 1, 1935, detailed daily records of time in hours and minutes were kept by the nurses so that it is possible to know how much time was spent on each family during the year. The system of time-keeping was worked out by Dr. Gwendolyn H. Berry, statistician of the New York Association for Improving the Condition of the Poor.

¹⁹ For example, the nursing visits per month of care per family gives a more accurate picture of service than the average number of nursing visits per family, when some families may have been carried two months, three months, six months, or nine months, during the year.

²⁰ The method of arriving at the amount of money spent on the various groups of families by Mulberry Health Center is as follows: Seventy-one per cent of the money paid out for house, general, clerical, and statistical expenses was allocated to tuberculosis work. Also two-thirds of the expense of supervision and one-half the cost of a nutritionist were allocated to tuberculosis work in 1935. The procedure was the same for 1936 except that the percentage of the costs allocated to tuberculosis was 82 instead of 71. (The preschool clinic run by the Mulberry Health Center was taken over by the Department of Health in 1926.)

Data of nurses' time were tabulated for the different groups of families. Money spent on tuberculosis work was allocated to families on the basis of the amount of time and service given to those families during the year.

CLASSIFICATION OF FAMILIES	NUMBER OF FAMILIES	MONTHS OF SERVICE	MONEY SPENT BY MULBERRY HEALTH CENTER	COST PER MONTH OF SERVICE PER FAMILY	COST PER FAMILY PER YEAR
TOTAL FAMILIES—ALL CLASSES	521	5,309	\$21,983.35	\$4.14	\$49.68
Index Case—Death from Pulmonary Tuberculosis	51	350	1,099.17	3.14	37.68
Index Case—Active Pulmonary Tuberculosis	39	295	1,824.62	6.19	74.28
Index Case—Arrested Pulmonary Tuberculosis	58	539	1,868.58	3.47	41.64
Index Case—Primary Infection in a Child	249	2,960	13,365.88	4.52	54.24
Index Case—Non-pulmonary Tuberculosis	17	161	549.58	3.41	40.92
Index Case—Blood Relative of Tuberculous Family	75	730	2,176.35	2.98	35.76
Index Case—Individuals with Recent Attack of Acute Respiratory Disease	32	274	1,099.17	4.01	48.12
1936					
TOTAL FAMILIES—ALL CLASSES	830	6,289	\$24,935.54	\$3.96	\$47.52
Index Case—Death from Pulmonary Tuberculosis	46	407	1,246.78	3.06	36.72
Index Case—Active Pulmonary Tuberculosis	44	391	2,069.65	5.29	63.48
Index Case—Arrested Pulmonary Tuberculosis	56	523	2,119.52	4.05	48.60
Index Case—Primary Infection in a Child	517	3,686	15,160.80	4.11	49.32
Index Case—Non-pulmonary Tuberculosis	19	161	623.39	3.87	46.44
Index Case—Blood Relative of Tuberculous Family	94	778	2,468.62	3.17	38.04
Index Case—Individuals with Recent Attack of Acute Respiratory Disease	54	343	1,246.78	3.63	43.56

Table 9. Cost of service given by Mulberry Health Center to families classified according to the index case in the family, 1935 and 1936.

from \$36.72 to \$63.48 per family per year during 1936. The families in which the index case was one of active pulmonary tuberculosis received the most intensive service in both years; the cost per family

per year was \$74.28 in 1935 and \$63.48 in 1936. Families carried because of a death from pulmonary tuberculosis which occurred during 1928-1934 received the least service of any group of families. It is quite reasonable and logical that families in which there is a known active case of pulmonary tuberculosis (re-infection type) should receive special emphasis. However, in view of the fact that families carried because of a death from pulmonary tuberculosis had a very high incidence of active adult pulmonary tuberculosis, they too should receive special emphasis.

Table 10 which shows the percentage difference in the amounts of service given to each group of families compared with those carried because of a death, indicates even more strikingly where the emphasis in the tuberculosis work has been placed. Families in which the index case was arrested pulmonary tuberculosis received from 10 to 32 per cent more service in 1935 and in 1936 than did families in which the index case was a death; families in which the index case was primary infection in a child (childhood type or a

Table 10. Comparison of annual cost per family in the different groups with cost for families in which the index case was a pulmonary tuberculosis death.

CLASSIFICATION OF FAMILIES	AMOUNT THE ANNUAL COST PER FAMILY IN EACH CLASS EXCEEDED THE COST FOR FAMILIES IN WHICH INDEX CASE WAS A PULMONARY TUBERCULOSIS DEATH		PER CENT EXCESS ¹	
	1935	1936	1935	1936
	TOTAL FAMILIES—ALL CLASSES			
Index Case—Death from Pul. Tb.				
Index Case—Active Pul. Tb.	\$+36.60	\$+26.76	+97.1	+72.9
Index Case—Arrested Pul. Tb.	+ 3.96	+11.88	+10.5	+32.4
Index Case—Primary Infection in a Child	+16.56	+12.60	+43.9	+34.3
Index Case—Non-Pulmonary Tb.	+ 3.24	+ 9.72	+ 8.6	+26.5
Index Case—Blood Relative of Tuberculous Family	- 1.92	+ 1.32	- 5.1	+ 3.6
Index Case—Individuals with Recent Attack of Acute Respiratory Disease	+10.44	+ 6.84	+27.7	+18.6

¹Minus means cost was less than in families in which the index case was a death from pulmonary tuberculosis.

CLASSIFICATION OF FAMILIES	NUMBER OF FAMILIES	MONTHS OF SERVICE GIVEN TO FAMILIES	ESTIMATED COST OF CLINIC SERVICE	COST PER MONTH OF SERVICE PER FAMILY	COST OF CLINIC SERVICE PER FAMILY PER YEAR
TOTAL FAMILIES—ALL CLASSES	521	5,309	\$3,017.12	\$0.57	\$6.84
Index Case—Death from Pulmonary Tuberculosis	51	350	232.44	0.66	7.92
Index Case—Active Pulmonary Tuberculosis	39	295	322.58	1.09	13.08
Index Case—Arrested Pulmonary Tuberculosis	58	539	386.66	0.72	8.64
Index Case—Primary Infection in a Child	249	2,960	1,578.04	0.53	6.36
Index Case—Non-pulmonary Tuberculosis	17	161	87.44	0.54	6.48
Index Case—Blood Relative of Tuberculous Family	75	730	239.84	0.33	3.96
Index Case—Individuals with Recent Attack of Acute Respiratory Disease	32	274	170.12	0.62	7.44
1936					
TOTAL FAMILIES—ALL CLASSES	830	6,289	\$3,460.44	\$0.55	\$6.60
Index Case—Death from Pulmonary Tuberculosis	46	407	140.46	0.34	4.08
Index Case—Active Pulmonary Tuberculosis	44	391	218.36	0.56	6.72
Index Case—Arrested Pulmonary Tuberculosis	56	523	340.08	0.65	7.80
Index Case—Primary Infection in a Child	517	3,686	2,377.40	0.64	7.68
Index Case—Non-pulmonary Tuberculosis	19	161	75.80	0.47	5.64
Index Case—Blood Relative of Tuberculous Family	94	778	175.12	0.22	2.64
Index Case—Individuals with Recent Attack of Acute Respiratory Disease	54	343	133.22	0.39	4.68

¹The cost of clinic service for each group of families is based on the actual number of clinic visits made by individuals in the families in each group and the number of X-rays taken of individuals in each group. The Department of Health estimated the cost of a clinic visit without X-ray as \$1.90 and with X-ray as \$1.36.

Table 11. Cost of clinic service for families in the Mulberry district classified according to the index case in the family, 1935 and 1936.¹

positive reactor) received from 34 to 44 per cent more service. In

many of the families carried by Mulberry Health Center during the two years, case-finding has been the main objective. The results so far indicate the advisability of a shift in emphasis, that is, less service in certain groups of families and more service in others.

The cost of clinic service per family per year is shown in Table 11 for each group of families. The costs per family during 1935 ranged from \$3.72 per family where the index case was a blood relative of a tuberculous individual to \$13.08 per family where the index case was one of active pulmonary tuberculosis. During 1936 the costs per family ranged from \$2.64 for families where the index case was a blood relative of a tuberculous family to \$7.80 for families where the index case was one of arrested tuberculosis. In general the clinic costs per family were lower for all family groups in 1936 than in 1935, the one exception was in families where the index case was one of primary infection in a child; these families received more clinic service in 1936 than in the previous year. There was a marked decrease in clinic service per family in those in which a death occurred and in families carried because of an active case of tuberculosis. When the examination of a high proportion of the contacts has been attained, the cost of clinic service per family per year will over a period of years decrease unless an arbitrary routine for the re-examination of family contacts be laid down and strictly adhered to.²¹

ACCOMPLISHMENT IN CERTAIN PROCEDURES

One of the important procedures for the control of tuberculosis is the examination of family contacts. Securing examination of contacts in the Mulberry district has been the responsibility of the nurses of the Health Center. The effectiveness of their work in this respect is revealed by the extent to which the family contacts in certain of the tuberculous families have been examined. These data

²¹ The policy of the Bureau of Tuberculosis is that recommendation for re-examination be left largely to the discretion of the clinic physician and the frequency of re-examination is generally governed by the condition of the patient at the time of examination and the nature of his contact with tuberculosis.

AGE GROUPS	TOTAL CONTACTS	PER CENT OF CONTACTS EXAMINED		
		By January 1, 1935	By December 31, 1935	By December 31, 1936
35 FAMILIES—INDEX CASE—ACTIVE PULMONARY TUBERCULOSIS—JANUARY 1, 1935				
ALL AGES	165	58.8	77.0	79.4
0-9	26	65.4	92.3	96.0
10-19	48	68.7	83.3	86.4
20-29	31	48.4	71.0	74.2
30+	56	53.6	69.6	70.6
Unknown Age	4			
37 FAMILIES—INDEX CASE—PULMONARY DEATH—PRIOR TO JANUARY 1, 1935				
ALL AGES	181	49.7	64.1	71.0
0-9	25	60.0	80.0	85.7
10-19	62	58.1	74.2	78.2
20-29	41	31.7	43.9	59.5
30+	53	49.1	60.4	65.3
Unknown Age	0			
64 FAMILIES—INDEX CASE—ARRESTED CASE OF PULMONARY TUBERCULOSIS ¹				
ALL AGES	301	46.8	64.8	77.1
0-9	68	45.6	75.0	89.1
10-19	116	55.2	71.6	82.1
20-29	38	42.1	52.6	62.9
30+	77	39.0	51.9	64.2
Unknown Age	2			
184 FAMILIES—INDEX CASE—PRIMARY INFECTION ²				
ALL AGES	1,169	55.5	67.6	78.8
0-9	310	56.5	74.5	91.1
10-19	413	63.9	76.0	86.8
20-29	112	46.4	49.1	58.7
30+	334	47.3	56.9	63.8

¹Diagnosed as arrested prior to January 1, 1935.

²Positive reaction only, or positive reaction to O.T. and lesion of primary infection in a child noted before January 1, 1935.

Table 12. Per cent of contacts examined during stated periods in 320 families classified according to type of index case in the family Mulberry Health Center district, New York.

are shown in Table 12. The 320 families are classified in four groups

according to the type of index case in the family which indicates the reason the family was carried for intensive supervision and study. The per cent of contacts examined in the various groups of families is shown by age for successive time periods during 1935 and 1936. From 71 to 79 per cent of all family contacts in the 320 families had an examination by the end of 1936. This is a higher record of achievement than is usually attained in the examination of contacts in tuberculous families. From 86 to 96 per cent of the children under 10 years of age had an examination; somewhat smaller proportions of those 10-19 years of age were examined. In general the age group 20-29 showed the lowest proportion of contacts examined. These are the ages when examination is exceedingly important because tuberculosis occurs most frequently at this period. In the future more emphasis should be placed on securing examination of these young adults even though they are the most difficult to reach.

An important point illustrated by Table 12 is the fact that it takes more than one year of intensive nursing service to secure a high proportion of contact examinations. For example, in 1935 there were sixty-five new families opened for supervision because of a case of primary infection; by the end of 1936, 64 per cent of the contacts had been examined. During the same year thirty-two new families were opened for supervision because of a case of pulmonary tuberculosis and by the end of 1936 only 54 per cent of the contacts were examined. The proportion of contacts examined in these new families, with a possible period of service varying from twelve to twenty-four months, is equal to the best recorded accomplishment in the examination of contacts.²² However, even better results

²² In the Bellevue-Yorkville district, 54 per cent of the contacts in forty-three families in which the primary case was adult pulmonary tuberculosis was examined. *See*: Downes, Jean and Barnard, Margaret Witter: Tuberculosis Administration in the Bellevue-Yorkville Health Center District of New York City. The Milbank Memorial Fund *Quarterly*, July, 1936, xiv, No. 3, pp. 242-257.

In Cattaraugus County 62 per cent of the contacts in 118 families in which there was an active case of tuberculosis was examined. *See*: Downes, Jean: A Study of the Effectiveness of Certain Administrative Procedures in Tuberculosis Control. The Milbank Memorial Fund *Quarterly*, October, 1936, xiv, No. 4, pp. 317-327.

AGE GROUPS	TOTAL CONTACTS EXAMINED	NUMBER OF EXAMINATIONS IN 1935				NUMBER OF EXAMINATIONS IN 1936			
		None	One	Two	Three or More	None	One	Two	Three or More
37 FAMILIES—INDEX CASE—PULMONARY DEATH WHICH OCCURRED PRIOR TO JANUARY 1, 1935									
0-19 Years 20 Years and Over	69	13	29	21	4	34	17	10	8
	53	20	17	8	4	32	16	5	0
35 FAMILIES—INDEX CASE—ACTIVE PULMONARY TUBERCULOSIS JANUARY 1, 1935									
0-19 Years 20 Years and Over	69	9	13	26	19	19	17	16	17
	60	14	26	13	7	30	17	8	5
64 FAMILIES—INDEX CASE—ARRESTED ADULT PULMONARY TUBERCULOSIS JANUARY 1, 1935									
0-19 Years 20 Years and Over	166	28	51	50	20	48	28	51	39
	71	26	21	11	5	31	26	11	3

Table 13. Frequency of clinic examinations during 1935 and 1936 among contacts in 136 tuberculous families in the Mulberry district. (Families classified according to the index case in the family.)

might be obtained and more rapidly if the private physician and the clinic physician will take more responsibility in teaching the patient the importance of the examination of the family contacts.

The frequency of the examination of family contacts in these families during 1935 and 1936 is of considerable interest and is shown for each of the first three groups of families in Table 13. In each group ([1] families in which the index case was a death from pulmonary tuberculosis, [2] families in which the index case was active pulmonary tuberculosis, [3] families in which the index case was arrested tuberculosis), individuals under 20 years of age have been examined with greater frequency in both years than have adults over that age. On the whole, contacts in the families carried because of a death from pulmonary tuberculosis were examined

less frequently during the two-year period than the contacts in the other two groups of families. In the families carried because of an active case the majority of the examined contacts under 20 years of age had two or more examinations a year. Certainly the frequency of examination of contacts in all of these groups of families indicates that many of the examined contacts have been kept under close observation by the clinic. This reflects an interest on the part of the clinicians and intensive service by the nurses.

An indication of the intensive service given by the nurses to the families in the Mulberry district may be revealed by the frequency of nursing visits. Table 14 shows the number of nursing visits per family per year based on months of service and number of visits in 1936 for families classified according to the index case. Families in the various groups received from twelve to seventeen visits per year

Table 14. Number of visits per family made by the nurses in the Mulberry district during 1936. (Families classified according to the index case in the family.)

CLASSIFICATION OF FAMILIES	NUMBER OF MONTHS OF SERVICE	NUMBER OF VISITS MADE BY NURSES ¹	NUMBER OF NURSING VISITS PER MONTH OF SERVICE PER FAMILY	NUMBER OF VISITS PER FAMILY PER YEAR
TOTAL FAMILIES—ALL CLASSES	6,289	7,405	1.18	14.2
Index Case—Death from Pulmonary Tuberculosis	407	408	1.00	12.0
Index Case—Active Pulmonary Tuberculosis	391	567	1.45	17.4
Index Case—Arrested Pulmonary Tuberculosis	523	639	1.22	14.6
Index Case—Primary Infection in a Child	3,686	4,466	1.21	14.5
Index Case—Non-pulmonary Tuberculosis	161	191	1.19	14.3
Index Case—Blood Relative of Tuberculous Family	778	757	1.00	12.0
Index Case—Individual with Recent Attack of Acute Respiratory Disease	343	377	1.10	13.2

¹Visits include home visits, office visits, and visits on behalf of patients.

of service; the average for all classes was fourteen visits per year. Families in which there was a case of active adult pulmonary tuberculosis received the most intensive service in terms of visits. It may be recalled that when time consumed by visits is taken into account, as shown in the tables dealing with cost of service, the emphasis placed on families with active tuberculosis is even more marked.

CONCLUSIONS

A more complete understanding of the problem of tuberculosis in the Mulberry district has been gained during the two years of special study. The need for better control of the disease is not confined to the Italian families constituting the major proportion of the population, for tuberculosis in a floating population in the lodging houses of the district contributes considerably to the mortality.

The experiments in case-finding have revealed the fact that unknown cases of active adult pulmonary tuberculosis are not easily discovered even in a congested area of a large city where the mortality from the disease is relatively high. A comparison of the effectiveness of the three methods of case-finding experimented with indicates the unsuitability of at least one of them, tuberculin testing of grade school children, for this particular area. Examination of the blood relatives of known tuberculous individuals is a logical procedure, especially when the contact has been frequent. The examination of individuals who have had a recent attack of the more serious acute respiratory diseases needs more study as a case-finding measure. Both of these methods need greater refinement through more careful discrimination as to individuals selected for examination.

The observed incidence of active pulmonary tuberculosis (secondary infection) among contacts in tuberculous families during the past two years in the Mulberry district confirms the soundness of the public health policy of close supervision of families in which there is or has been recently a case of active disease. In fact, the data

concerning the various methods of case-finding indicate clearly the need for a more selective service in tuberculosis control, a service concentrated on active pulmonary cases and their immediate contacts.

The analysis of the volume of service on the basis of cost for the families grouped according to the tuberculosis problem in them when related to the need for service indicates that a shifting of emphasis in the future program of tuberculosis work in this area is desirable. The service has been too intensive in families where the problem is not acute.

The accomplishment of the Health Center in respect to the examination of contacts in the tuberculous families of the district is evidence of what can be done through intensive service. A high proportion of the contacts have been examined and have been kept under close clinic supervision.

In conclusion it should be stated that the purpose of the special tuberculosis study in the Mulberry district is to evolve a program for better control of the disease in a congested area of a large city, a program which will be suitable for the use of public health agencies. Experimentation must be the dominant motive in the study and a critical appraisal of results from time to time is essential.