CLINIC SERVICE IN THE CONTROL OF TUBERCULOSIS

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ONE of the important results emanating from the epidemiological investigation of tuberculosis should be a critical study of clinic services, since the diagnostic clinic is a vital part of the tuberculosis program. Three years have elapsed since the beginning of the special study of tuberculosis in the Mulberry district of New York which is being carried on by the Department of Health and the Mulberry Health Center of the Association for Improving the Condition of the Poor, and it is now suitable to examine objectively certain phases of the clinic work.

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 the north side of Canal Street. The chief characteristics of this neighborhood have been described in some detail in two previous publications.[2] [3] Briefly stated, the families of the district, mainly of Italian birth or parentage, on the whole have a relatively low economic status and the majority of them are living in a generally unfavorable environment, judged by the degree of crowding and conditions of housing.

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 in the field of tuberculosis nursing, and the nurses are responsible for the home visiting to 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

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

[2] Downes, Jean and Price, Clara R.: Tuberculosis Control in the Mulberry District of New York City. The Milbank Memorial Fund *Quarterly*, October, 1937, xv, No. 4, pp. 319-347.

[3] Burritt, Bailey B.: Social and Economic Problems in the Control of Tuberculosis. The Milbank Memorial Fund *Quarterly*, July, 1938, xvi, No. 3, pp. 287-293.

responsible for providing clinic and x-ray examinations for patients referred by the staff of the Mulberry Health Center.

When the special program was started in January, 1935, the 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 adult pulmonary 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.[4] All families in which there was evidence of primary infection in a child but no known active cases of adult pulmonary tuberculosis 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.

The material presented in this paper is for the most part an analysis and evaluation of the clinic work during one year, 1937, among individuals in the families subject to special study. As a background for forming a judgment of the clinic work during this particular year, it is proper to describe in some detail certain characteristics of each of the groups of families served by the clinic, such as, the extent to which family contacts have been examined and the prevalence of tuberculosis in the families.

DESCRIPTION OF THE FAMILIES SERVED BY THE CLINIC

Examination of Family Contacts. During 1937 clinic service was given in 856 families in the Mulberry district; 309 of these families

[4] The families in which a death had occurred during the period 1928-1934, but in which there were no known active cases January 1, 1935, in most instances were families which had been supervised by the Department of Health, and the group is not limited to cases known of only after a death from tuberculosis had occurred.

have been given intensive service since January 1, 1935. The remaining 547 families have had service over a shorter period of time since they have been added to the special study at some time during the three years, 1935-1937. Table 1 shows the proportion of persons in the 856 families which have had an examination for tuberculosis. The families are classified according to the type of index case in the family which indicates the initial reason the family was carried for intensive supervision and study. From 47 to 75 per cent of all persons in the 856 families had an examination by the end of 1937. The highest examination rates have been obtained in the families presenting the more important tuberculosis problems, namely, in each of the three groups where the index case was a pulmonary death, an active case of adult pulmonary tuberculosis, and an arrested case of adult pulmonary tuberculosis. The examination rates in these groups of families were, respectively, 62, 74, and 75 per 100 individuals. From 82 to 85 per cent of individuals under 20 years of age in these families had an examination and somewhat smaller proportions of those 20 years and older were examined.

An important point illustrated by Table 1 is the fact that in all of these families supervised by the Mulberry Health Center and the tuberculosis clinic of the Department of Health, a sufficient number of persons have been examined to furnish fairly reliable data concerning the amount of tuberculosis in the different family groups. Thus, these data may be used in judging the relative importance of close supervision in the various types of families.

Prevalence of Tuberculous Lesions and Infection in the 856 Families During 1937. The need for periodic re-examination and case-finding in the various groups of families may best be illustrated by showing the prevalence of tuberculosis among the family members. Table 2 shows the diagnosed cases present in the various family groups during 1937. In this table the families in which the index case was one of active pulmonary tuberculosis, and those where the index case was a pulmonary death, have been combined

Age Group	Total Population	Total Examined	Per Cent Examined
	51 families—index case—active pulmonary tuberculosis 1935-1937		
All Ages	236	175	74.2
0-19 Years	88	75	85.2
20 and Over	148	100	67.6
	47 families—index case—death from pulmonary tuberculosis		
All Ages	217	134	61.8
0-19 Years	87	73	83.9
20 and Over	130	61	46.9
	46 families—index case—arrested case of pulmonary tuberculosis		
All Ages	255	192	75.3
0-19 Years	123	101	82.1
20 and Over	132	91	68.9
	517 families—index case—primary infection in a child		
All Ages	3,205	1,813	56.6
0-19 Years	1,840	1,417	77.0
20 and Over	1,365	396	29.0
	21 families—index case—healed nonpulmonary tuberculosis		
All Ages	148	73	49.3
0-19 Years	78	50	64.1
20 and Over	70	23	32.9
	107 families—index case—blood relative of tuberculous family		
All Ages	481	225	46.7
0-19 Years	207	130	62.8
20 and Over	274	95	34.7
	67 families—index case—suspect tuberculosis[1]		
All Ages	337	173	51.3
0-19 Years	158	96	60.8
20 and Over	179	77	43.0

[1] Individual with recent attack of acute respiratory disease.

Table 1. Per cent of persons examined in 856 families classified according to type of index case in the family, Mulberry Health Center district, New York.

Age Group	Total Population	Total Examined	Diagnosed Cases of Tuberculosis: Rate per 100 — Active Adult Pulmonary Tuberculosis	Rate per 100 — Arrested Adult Pulmonary Tuberculosis	Rate per 100 — Active Non-Pulmonary Tuberculosis	Number of Cases — Active Adult Pulmonary Tuberculosis	Number of Cases — Arrested Adult Pulmonary Tuberculosis	Number of Cases — Active Non-Pulmonary Tuberculosis
98 families—index case—active case or death from pulmonary tuberculosis								
All Ages	453	309	9.4	6.1	0.6	29	19	2
0-9	51	42	0	0	2.4	0	0	1
10-19	124	106	6.6	3.8	0	7	4	0
20-29	114	68	17.6	8.8	0	12	6	0
30-39	41	25	20.0	7.3	0	5	3	0
40-49	43	27	11.1	3.7	0	3	1	0
50+	80	41	4.9	12.2	2.4	2	5	1
46 families—index case—arrested pulmonary tuberculosis								
All Ages	255	192	1.6	20.3	0.5	3	39	1
0-9	35	27	0	0	0	0	0	0
10-19	88	74	0	2.7	1.4	0	2	1
20-29	50	31	6.4	29.0	0	2	9	0
30-39	23	19	5.3	42.1	0	1	8	0
40-49	34	26	0	42.3	0	0	11	0
50+	25	15	0	60.0	0	0	9	0
517 families—index case—primary infection in a child								
All Ages	3,205	1,813	0.2	0.9	0	4	16	0
0-9	652	508	0	0	0	0	0	0
10-19	1,188	909	0.1	0.2	0	1	2	0
20-29	388	89	0	2.2	0	0	2	0
30-39	322	120	0.8	3.3	0	1	4	0
40-49	434	136	0	4.4	0	0	6	0
50+	221	51	3.9	3.9	0	2	2	0
107 families—index case—blood relative of tuberculous family								
All Ages	481	225	1.3	0.9	0	3	2	0
0-9	110	62	0	0	0	0	0	0
10-19	97	68	1.5	0	0	1	0	0
20-29	134	55	0	0	0	0	0	0
30-39	58	16	6.2	6.2	0	1	1	0
40-49	36	13	7.7	7.7	0	1	1	0
50+	46	11	0	0	0	0	0	0
88 families—index case—healed nonpulmonary or suspect tuberculosis								
All Ages	485	246	0.4	1.2	0	1	3	0
0-9	98	63	0	0	0	0	0	0
10-19	138	83	0	0	0	0	0	0
20-29	93	27	3.7	0	0	1	0	0
30-39	47	26	0	0	0	0	0	0
40-49	48	19	0	5.3	0	0	1	0
50+	61	28	0	7.1	0	0	2	0

Table 2. Prevalence of adult pulmonary tuberculosis and active nonpulmonary tuberculosis among examined individuals in 856 families in the Mulberry district, New York, 1937. (In all groups of families the index case, if living, is included.)

since the two groups of families may be considered as comparable with respect to the presence of active adult pulmonary tuberculosis (past or present) in them. There was so little evidence of exposure to infection in the families where the index case was either healed nonpulmonary tuberculosis or a death from nonpulmonary tuberculosis and in those classed as suspect because of an individual with a recent attack of acute respiratory disease that these two groups of families have also been combined into one group.

The highest prevalence of active adult pulmonary tuberculosis, 9.4 per 100 individuals examined, was noted in the ninety-eight families supervised because of active tuberculosis, either present or in the past, in the family. There the rate of prevalence of active disease was slightly more than forty times as high as the lowest rate, 0.2 per 100, observed in the 517 families where the index case was a child with primary infection. Three active cases were present during 1937 among members of the forty-six families selected for supervision because of a case of arrested pulmonary tuberculosis. Two of these were reactivated index cases formerly classed as arrested; the other was a secondary case in the family. The rate of prevalence of active disease among individuals in these families, 1.6 per 100, was similar to the rate, 1.3, noted in families where the index case was a blood relative of a tuberculous individual. In these two groups of families the rates were from six to eight times the lowest rate, 0.2 per 100, observed in the 517 families where the index case was a child with primary infection.[5]

The prevalence of apparently healed or arrested pulmonary tuberculosis was much higher in families supervised because of active adult pulmonary tuberculosis, and in those supervised because of arrested tuberculosis, than in any of the other groups of families where the rates of prevalence for the most part were approximately

5 Accurate data on prevalence of tuberculosis can be obtained only through examination of all members of the family. It is believed that the prevalence rates shown here and based upon the examined population are indicative of the differences in the amount of tuberculosis present in the various groups of families.

1 per 100 individuals examined.[6] Active cases of nonpulmonary tuberculosis were present only in families selected for supervision because of a case of adult pulmonary tuberculosis.

The prevalence of tuberculous infection and of lesions of primary infection among individuals under 20 years of age who were examined in the various groups of families throw further light upon the need for intensive service. Table 3 shows the proportion of individuals by age that was positive to the tuberculin test.[7] The highest rate of infection, 68.0 per 100, was found among individuals in the ninety-eight families supervised because of a present active case or history of an active case of adult pulmonary tuberculosis. In the other groups of families the rates varied from 26 to 54 per 100 individuals tested.

In general, the rate of lesions of primary infection among individuals under 20 years of age showed a variation among the groups of families similar to that noted for tuberculous infection.[8] As shown in Table 4, the highest rate, 21.6 per 100 individuals examined, was noted in the ninety-eight families where the infection rate was highest.[9] Conversely, the lowest rates of lesions of primary infection prevailed in the groups of families where the rate of infection was lowest, namely, in the eighty-eight families where the index case was one of healed nonpulmonary tuberculosis or suspect

[6] The relatively high prevalence of arrested adult pulmonary tuberculosis in the 46 families—index case—arrested pulmonary tuberculosis is due to the fact that the families were selected on the basis of the presence of such lesions in some member of the family.

[7] The intracutaneous test with 0.1 mgm. of Old Tuberculin was usually the first test given. If the result of the first test was negative, the dosage was gradually increased. The maximum amount of Old Tuberculin given was 1.0 mgm. The tuberculin used in the clinic was Old Tuberculin (human) prepared and standardized on guinea pigs by the Laboratories of the New York City Department of Health.

[8] All of the cases with a positive reaction to tuberculin and a chest x-ray have been carefully reviewed and checked by Dr. A. A. Feller in order to insure comparable readings of the x-rays and a reliable diagnosis.

[9] The rate of lesions of primary infection in the 98 families may be compared with the rate noted by Opie *et al* among individuals at the same ages in approximately 500 tuberculous families in Philadelphia. There the rate was 30.1 per 100 some ten years ago contrasted with the rate of 21.6 per 100 in the Mulberry families at the present time. *See* McPhedran, F. Maurice and Opie, Eugene L.: The Spread of Tuberculosis in Families. *The American Journal of Hygiene,* November, 1935, xxii, No. 3, pp. 565-643.

Age Group	Total Tuberculin Tested	Total Positive	Per Cent Positive
	98 families—index case—active case or death from pulmonary tuberculosis		
0-19	122	83	68.0
0-4	5	3	60.0
5-9	35	21	60.0
10-14	45	31	68.9
15-19	37	28	75.7
	46 families—index case—arrested pulmonary tuberculosis		
0-19	85	41	48.2
0-4	8	2	25.0
5-9	18	7	38.9
10-14	31	15	48.4
15-19	28	17	60.7
	517 families—index case—primary infection in a child		
0-19	1,400	762	54.4
0-4	92	23	25.0
5-9	430	174	40.4
10-14	599	357	59.6
15-19	279	208	74.6
	107 families—index case—blood relative of tuberculous family		
0-19	134	35	26.1
0-4	24	5	20.8
5-9	48	8	16.6
10-14	48	16	33.3
15-19	14	6	42.9
	88 families—index case—healed nonpulmonary tuberculosis or suspect tuberculosis		
0-19	163	43	26.4
0-4	19	0	0
5-9	56	12	21.4
10-14	60	15	25.0
15-19	28	16	57.1

Table 3. Proportion of individuals positive to tuberculin by age in 856 families in the Mulberry district, New York.

Age Group	Total Population	Total Examined[1]	Diagnosed Primary Infection from Chest X-ray	Rate Per 100 Persons
	98 families—index case—active case or death from pulmonary tuberculosis			
0-19	175	148	32	21.6
0-4	15	7	0	0
5-9	36	35	9	25.7
10-19	124	106	23	21.7
	46 families—index case—arrested pulmonary tuberculosis			
0-19	123	101	14	14.0
0-4	10	7	0	0
5-9	25	20	3	15.0
10-19	88	74	11	14.9
	517 families—index case—primary infection in a child			
0-19	1,840	1,417	223	15.7
0-4	185	101	7	6.9
5-9	467	407	58	14.2
10-19	1,188	909	158	17.4
	107 families—index case—blood relative of tuberculous family			
0-19	207	130	8	6.1
0-4	57	22	0	0
5-9	53	40	1	2.5
10-19	97	68	7	10.3
	88 families—index case—healed nonpulmonary tuberculosis or suspect tuberculosis			
0-19	236	146	8	5.4
0-4	37	20	0	0
5-9	61	43	2	4.6
10-19	138	83	6	7.2

[1] Examined population includes: individuals negative to 1.0 mgm. of Old Tuberculin; among positive reactors only those x-rayed are included; among persons not tested, only those x-rayed are included.

Table 4. Prevalence of lesions of primary infection among individuals under 20 years of age in 856 families in the Mulberry district, New York.

tuberculosis, and in the 107 families where the index case was a blood relative of a tuberculous family.

If the main objective of anti-tuberculosis work is the prevention of the spread of infection, it is clearly evident from the data presented in Tables 2, 3, and 4 that the problem of control among the Mulberry families is centered in the ninety-eight families where the prevalence of active adult pulmonary disease is greatest, where, also, the prevalence of infection and lesions of primary tuberculosis is greatest.

APPRAISAL OF CLINIC SERVICE

Aside from testing the clinic physician's diagnostic ability there are two bases for study of the work of a tuberculosis clinic: one, the volume of clinic service and its distribution; the other, the quality of clinic service as revealed by the content of that service. In this particular investigation, the volume and quality of certain services have been studied.

Volume of Clinic Work. In order to evaluate the volume of clinic service, it is proper to express quantity in three terms: namely, visits to clinic, number of examinations, and number of different individuals examined. These terms may then be related to one another. In 1937, 1,172 members of the 856 families were examined at the tuberculosis clinic. Approximately three-fourths of the group (860 individuals) had had one or more clinic examinations in previous years; the remaining 312 individuals were examined for the first time during 1937. The total, 1,172 individuals had 1,490 clinic examinations, or an average of 1.3 examinations per person.[10] Visits to clinic numbered 2,324, or an average of 1.5 visits per examination.[11]

[10] The clinic examination may include: (1) tuberculin test, (2) physical examination, (3) x-ray, and (4) sputum test. Children under 16 are given the tuberculin test starting with 0.1 mgm. of Old Tuberculin and the dosage is gradually increased to 1.0 mgm. if the successive tests have a negative result. Those whose reaction to the test is positive are x-rayed. Examination of adults includes physical examination of the chest and a chest x-ray and sputum examination if sputum is available.

[11] A careful distinction should be made between a clinic visit and an examination. An

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It is of considerable interest to compare the various groups of families supervised by the clinic with respect to the distribution among them of the volume of clinic service. A discussion of the volume of clinic work, however, needs to be prefaced by a description of the examinations made in 1937 with respect to the extent to which they were classed as re-examinations of persons previously examined or were classed as first examinations. Table 5 shows these data for each group of families. It is clearly evident that for the most part the examinations made in 1937 were of persons previously examined in the tuberculosis clinic. The proportion of re-examinations was lowest, 69 per cent, in the eighty-eight families supervised because of a case of suspect tuberculosis or a case of healed nonpulmonary tuberculosis, and was highest, 94.2 per cent, in the forty-six families in which the index case was one of arrested pulmonary tuberculosis. In each of the groups of families there was a higher proportion of first examinations among adults 20 years of age and over than among individuals under 20 years of age. This is a gratifying result since emphasis has been placed upon securing an examination of all young adults over 20 years of age.

The most striking fact brought out by Table 5 is that in every group of families the clinic examinations in 1937 were largely re-examinations of persons previously examined. This indicates a high degree of attainment in clinic supervision for the families where the need for close public health supervision was great and for those selected for special study and observation, even though the need was not great, such as families where the index case was primary infection in a child. However, it is most difficult to see any justification even for purposes of case-finding in continuing the re-examinations, year after year, of persons in the families where the index case was an individual with a recent attack of acute respiratory

examination may include a number of clinic visits; for example, a visit for a tuberculin test, a visit for the reading of the test, and an x-ray if the result is positive. The total visits to clinic also includes those classified as "miscellaneous" and which do not involve an examination, such as a conference with the physician concerning hospital care.

Age Group	Total Clinic Examinations in 1937	Per Cent	
		Re-examination	First Examination
	98 families—index case—active cases or death from pulmonary tuberculosis		
All Ages	237	84.0	16.0
0-19	128	85.9	14.1
20 and Over	109	81.6	18.4
	46 families—index case—arrested pulmonary tuberculosis		
All Ages	155	94.2	5.8
0-19	92	96.7	3.3
20 and Over	63	90.5	9.5
	517 families—index case—primary infection in a child		
All Ages	823	75.7	24.3
0-19	635	79.4	20.6
20 and Over	188	63.3	36.7
	107 families—index case—blood relative of tuberculous family		
All Ages	121	82.6	17.4
0-19	66	84.8	15.2
20 and Over	55	80.0	20.0
	88 families—index case—healed nonpulmonary tuberculosis or suspect tuberculosis		
All Ages	145	69.6	30.4
0-19	90	71.1	28.9
20 and Over	55	67.3	32.7

Table 5. Clinic examinations, first examinations, and re-examinations, among individuals in 856 families in the Mulberry district, New York.

disease or even in many instances in the families where the index case was a blood relative of a tuberculous individual, since the rate of tuberculous infection was found to be exceedingly low in both

groups of families. Certain individuals and families may be selected from these groups for continued supervision, but study and observation of the prevalence of tuberculosis have demonstrated that close clinic supervision for many of these families is inappropriate.

The extent to which individuals are being re-examined in the clinic may be further illustrated by Table 6 which shows for each group of families the proportion of individuals examined more than once during 1937. The proportion examined more than once during the current year was highest in the two groups of families, namely: (1) where the index case was an active case or death from adult pulmonary tuberculosis, and (2) where the index case was arrested pulmonary tuberculosis, though the need for re-examination cannot be assumed to be identical for the two groups of families. In these two groups approximately one-third of the individuals considered was examined more than once during 1937 contrasted with from 15 to 23 per cent in this category among the other groups of families. It is of interest to point out also that in most of the groups of families, the proportion of individuals examined more than once during the current year was higher among those under 20 years of age than among adults 20 years of age and older. Again, close supervision as indicated by the proportion of individuals examined more than once during 1937 may be questioned for many of these families. It is difficult to justify a second clinic examination within one year for individuals in families where the tuberculosis problem was not acute.

An inference which may be drawn from Tables 5 and 6 is that when a system of clinic procedure, such as re-examination of clinic cases, is established it tends to operate as a routine regardless of the need. It is obvious that time and money can be saved by less frequent re-examination of individuals who do not need such examinations.

Table 7 shows the number of examinations, clinic visits, and the number of different individuals by broad age groups examined in

Age Group	Total Individuals Examined During 1937	Per Cent Examined	
		Once During 1937	More Than Once During 1937
	98 families—index case—active case or death from pulmonary tuberculosis		
All Ages	150	66.0	34.0
0-19 Years	76	60.5	39.5
20 and Over	74	71.4	28.4
	46 families—index case arrested pulmonary tuberculosis		
All Ages	99	66.7	33.3
0-19 Years	57	63.2	36.8
20 and Over	42	71.4	28.6
	517 families—index case primary infection in a child		
All Ages	722	83.0	17.0
0-19 Years	565	82.8	17.2
20 and Over	157	83.4	16.6
	107 families—index case blood relative of tuberculous family		
All Ages	93	85.0	15.0
0-19 Years	50	82.0	18.0
20 and Over	43	88.4	11.6
	88 families—index case nonpulmonary or suspect tuberculosis		
All Ages	108	76.9	23.1
0-19 Years	70	77.1	22.9
20 and Over	38	76.3	23.7

Table 6. Proportion of individuals having more than one clinic examination in 1937.

the different types of families arranged according to the index case, or the initial reason for supervision of the family. The average

Age Group	Total Persons Examined During 1937	Examinations		Visits to Clinic	
		Number	Number Per Person	Number	Visits Per Examination
	98 families—index case—active pulmonary tuberculosis 1935-1937, or a death from tuberculosis				
All Ages	150	218	1.4	332	1.5
0-19 Years	76	114	1.5	184	1.6
20 and Over	74	104	1.4	148	1.4
	46 families—index case—arrested case of pulmonary tuberculosis				
All Ages	99	150	1.5	243	1.6
0-19 Years	57	93	1.6	154	1.6
20 and Over	42	57	1.4	89	1.6
	517 families—index case—primary infection in a child				
All Ages	722	869	1.2	1,331	1.5
0-19 Years	565	684	1.2	1,056	1.5
20 and Over	157	185	1.2	275	1.5
	107 families—index case—blood relative of tuberculous family				
All Ages	93	114	1.2	171	1.5
0-19 Years	50	61	1.2	94	1.5
20 and Over	43	53	1.2	77	1.4
	88 families—index case—healed nonpulmonary tuberculosis or suspect tuberculosis				
All Ages	108	139	1.3	247	1.8
0-19 Years	70	89	1.3	169	1.9
20 and Over	38	50	1.3	78	1.6

Table 7. Clinic examinations and visits to clinic among examined individuals in 856 families, Mulberry Health Center district, New York.

number of examinations per individual in the different groups of families ranged from 1.2 in the families where the index case was

a child with primary infection to 1.5 examinations per individual in families where the index case was arrested pulmonary tuberculosis. In general, the number of examinations per individual examined was somewhat higher in families where the need for re-examinations may be assumed to be greater. There was very little variation among the different groups of families with respect to the average number of visits to clinic per examination. On the average there were from 1.5 to 1.6 visits per examination. An exception was noted in the eighty-eight families (twenty-one families—index case—case or death from nonpulmonary tuberculosis, and sixty-seven families —index case—recent attack of acute respiratory disease) where there was an average of 1.8 visits per examination. The relatively high average number of visits per examination among individuals in this group of families was no doubt due in part to the greater frequency of first examinations among them, since a first examination necessitates at least two visits to the clinic.

The data presented in Tables 5, 6, and 7, bearing upon the volume of clinic work, have clearly indicated that an examination of volume alone, that is, number of individuals examined, number of examinations and number of visits to clinic, will not fully reveal the quality of the clinic work. There is need to know what individuals are being served by the clinic and whether or not the same individuals are being examined year after year. For example, in the ninety-eight families where the index case was an active case or death from adult pulmonary tuberculosis, only one-third of the total members of the families was examined during 1937, and 75 per cent of this number had been examined in previous years.

Content of the Clinic Examination. One method of studying the quality of the clinic work is to inquire into the content of the examination itself. Table 8 shows the total individuals by age groups who were examined during 1937 in each group of families classed according to the index case and the proportion which had an examination consisting of certain specified services. For example,

Age Group	Total Persons Examined in 1937	Percentage Distribution of Individuals According to the Content of the Examination						Column 7 Proportion of Individuals Whose Examination Included an X-ray of Chest
		Column 1 Tuberculin Test Only	Column 2 Tuberculin Test and Physical Examination of Chest	Column 3 Tuberculin Test, Physical Examination of Chest, and X-ray of Chest	Column 4 Tuberculin Test and X-ray of Chest	Column 5 Physical Examination of Chest and X-ray of Chest	Column 6 Only Physical Examination of Chest	
	98 families—index case—active pulmonary tuberculosis							
All Ages	150	2.0	2.0	0.6	3.3	72.0	20.0	75.9
0-19 Years	76	3.9	3.9	1.3	6.6	55.3	28.9	63.2
20 and Over	74	0	0	0	0	89.2	10.8	89.2
	46 families—index case—arrested pulmonary tuberculosis							
All Ages	99	1.0	7.1	4.0	0	66.7	21.2	70.7
0-19 Years	57	1.8	12.3	7.0	0	52.6	26.3	59.6
20 and Over	42	0	0	0	0	83.7	14.3	85.7
	517 families—index case—primary infection in a child							
All Ages	722	13.8	1.1	2.5	5.8	49.9	26.9	58.2
0-19 Years	565	17.7	1.4	3.2	7.4	41.9	28.3	52.5
20 and Over	157	0	0	0	0	78.3	21.6	78.3
	107 families—index case—blood relatives of tuberculous family							
All Ages	93	17.2	5.4	1.1	0	51.6	24.7	52.7
0-19 Years	50	32.0	10.0	2.0	0	28.0	28.0	30.0
20 and Over	43	0	0	0	0	79.1	20.9	79.1
	88 families—index case—healed nonpulmonary tuberculosis and suspect tuberculosis							
All Ages	108	21.3	3.7	2.8	8.3	46.3	17.6	57.4
0-19 Years	70	32.9	5.7	4.3	12.9	22.9	21.4	40.1
20 and Over	38					89.5	10.5	89.5

Table 8. Percentage distribution of individuals in 856 families according to the content of the clinic examination in 1937.

an examination of a child might include only the tuberculin test

provided he were negative to 1.0 mgm. of Old Tuberculin, or an examination might include the tuberculin test, physical examination of the chest, and an x-ray of the chest. It is generally agreed that a tuberculosis clinic must include the x-ray as a part of the clinic examination if a high standard of work is to be maintained. Therefore, it is of considerable interest to point out the fact as indicated in Column 7 of Table 8 that from 53 to 76 per cent of the individuals who had a clinic examination in 1937 had an x-ray of the chest. On the other hand, Column 6 shows that far too high a proportion of the examined individuals had only a physical examination of the chest.[12] The proportions in this class in the different groups of families are generally similar and ranged from 18 to 27 per cent of those examined. These proportions were especially high among individuals under 20 years of age. There is nothing in the data to suggest that this type of examination occurs as a chance variation which may have been due to accident or oversight on the part of the clinic physician since such examinations occur in fairly similar proportions in all groups of families considered. An examination of this type may be considered as wasteful of clinic personnel and of the patient's time.

It is the general policy of the tuberculosis clinic to include the sputum test as a part of the clinic examination of every adult. Therefore, it is of interest to know, as indicated in Table 9, the extent to which the sputum test was utilized as a diagnostic aid in examination of individuals over 19 years of age in all groups of families. At these ages the proportion of examinations including the sputum test varied from 10 per 100 examinations in families where the index case was arrested adult pulmonary tuberculosis to 30 per 100 in families where the index case was suspect tuberculosis or healed nonpulmonary tuberculosis. These results are far

[12] It has been a policy of the Bureau of Tuberculosis in all clinics under its supervision to require an x-ray of every person 16 years or older at the time of the first admission; also of every person under that age with a positive tuberculin or obvious respiratory symptoms. Thus, it is assumed that most of those adults, and also the children with positive tuberculin, re-examined in 1937, had been x-rayed prior to that time.

from the standard set by the clinic; however, this no doubt is in part due to the difficulty of securing from every clinic patient a specimen of sputum satisfactory for examination.

Cost of Clinic Service. The special study of tuberculosis has included an appraisal of service on a cost basis. Table 10 shows the total estimated cost of clinic service during 1937 and the cost per examination in the families served by the Health Center and the clinic grouped according to the index case. The average cost per examination in the different groups of families varied from $1.56 in families where the index case was a blood relative of a tuberculous family to $1.78 in the eighty-eight families mainly composed of those supervised because of suspect tuberculosis. Generally the average cost per examination was somewhat higher for individuals 20 years of age and older than for those in the younger age group. This was due to the fact that an x-ray of the chest which increases the cost of the examination was included more frequently as a part of the examination of adults than among individuals in the younger age group.

Table 9. Proportion of examinations among individuals 20 years of age and older which included the sputum test as a part of the examination.

Classification of Families	Total Number of Examinations	Per Cent Including Sputum Test
98 Families—Index Case—Active Case or Death from Pulmonary Tuberculosis	104	21.0
46 Families—Index Case—Arrested Pulmonary Tuberculosis	57	10.5
517 Families—Index Case—Primary Infection in a Child	185	22.4
107 Families—Index Case—Blood Relative of Tuberculous Family	53	14.3
88 Families—Index Case—Healed Nonpulmonary or Suspect Tuberculosis	50	30.0

The data shown in Table 10 may be used to estimate the annual costs to the Department of Health if all members of the families where the need for a clinic examination is greatest were examined

Age Group	Estimated Cost of Clinic Service[1]	Cost Per Examination
	98 FAMILIES—INDEX CASE—ACTIVE CASE OR DEATH FROM PULMONARY TUBERCULOSIS	
ALL AGES	$ 354.92	$1.63
0-19 Years	189.06	1.66
20 and Over	165.86	1.59
	46 FAMILIES—INDEX CASE—ARRESTED PULMONARY TUBERCULOSIS	
ALL AGES	251.82	1.68
0-19 Years	154.70	1.66
20 and Over	97.12	1.70
	517 FAMILIES—INDEX CASE—PRIMARY INFECTION IN A CHILD	
ALL AGES	1,396.62	1.61
0-19 Years	1,090.70	1.59
20 and Over	305.92	1.65
	107 FAMILIES—INDEX CASE—BLOOD RELATIVE OF TUBERCULOUS FAMILY	
ALL AGES	178.28	1.56
0-19 Years	91.96	1.51
20 and Over	86.32	1.63
	88 FAMILIES—INDEX CASE—HEALED NONPULMONARY TUBERCULOSIS OR SUSPECT TUBERCULOSIS	
ALL AGES	247.30	1.78
0-19 Years	147.92	1.66
20 and Over	99.38	1.99

[1] The 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 $ .90 and with x-ray as $1.36.

Table 10. Cost of clinic service for families in the Mulberry district classified according to the index case.

once a year. In the ninety-eight families where the index case was an active case, or death from pulmonary tuberculosis, the estimated cost of examining all members of the family would be $738.39 per year; and in the forty-six families where the index case was arrested pulmonary tuberculosis the estimated cost would be $428.40, or a total of $1,166.79, for both groups of families. Actually $606.74 (estimated) was spent for examinations in these families during 1937 and the individuals examined included only 35 per cent of the total members of the families.

It is believed that the data presented in this study have clearly indicated the value to the public health administrator of a critical appraisal of the work of the tuberculosis clinic. Consideration of the volume

of clinic work and its distribution among individuals in families in the Mulberry district in relation to the tuberculosis problem in the family has revealed the need for a change in the present distribution of clinic services. Less emphasis should be placed upon the examination of individuals in families where the tuberculosis problem is not acute. Study of the content of the clinic examination has raised the question of the suitability, even in the case of re-examined individuals, of an examination consisting only of the physical examination of the chest.

In conclusion, it is appropriate to emphasize the fact that the epidemiological study of tuberculosis should provide not only accurate knowledge of how the disease acts in its environment, using environment in its broadest sense, but should also serve as a stimulus for the collection of data, such as are presented in this study, which may be used by the public health administrator as a basis for planning more practical and effective procedures for control of the disease.