A STUDY OF THE INCIDENCE OF TUBERCULOSIS IN STATE INSTITUTIONS IN MINNESOTA

H. A. Burns, M. D.
Superintendent, Minnesota State Sanatorium

The following report contains the results of the investigation of tuberculosis among inmates and employes of institutions under the charge of the Minnesota State Board of Control. For purposes of convenience the institutions have been grouped according to inmates as follows:

A. Insane Hospitals and Asylums (Table IV).
B. Feeble-minded and Epileptics (Table V).
C. Penal Institutions (Table VI).
D. Schools and Orphanages (Table VII).

The work was carried on by the staff of the Minnesota State Sanatorium. Mantoux testing was started September 1, 1934. One member of the staff, detailed to this work, remained constantly in the field, giving the test and reading the reactions. O. T. 1/000 was used. Following this the positive reactors were X-rayed. Paper films were decided upon, with arrangements that in case of necessity or doubt second celluloid films might be supplied upon request. The X-ray work was carried on in the institutions by approved technicians. All plates were sent to the State Sanatorium for reading and recording. The clerical work entailed was all carried on by the Sanatorium staff.

The Minnesota State Board of Control, responsible for the care of state wards, interested itself in a survey to determine the incidence of tuberculosis infection and disease as a preliminary step in the development of a logical control program. The investigation of tuberculosis, both infection and disease, was carried out for the purpose of identifying those infected at the present time and those showing definite evidence of parenchymal disease, as well as those who show the presence of tubercle bacilli in their sputum. It was therefore hoped that this survey would furnish information upon which the Board of Control might build its future tuberculosis control program in Minnesota.

Insane, Feeble-minded and Epileptics

From the study of tuberculosis deaths in state institutions during the six-year period prior to the survey, information was obtained relative to the introduction of tuberculosis into the institutions as well as its spread among the inmates. Five hundred and twenty-eight deaths occurred among the patients in eight institutions caring for the insane, feeble-minded and epileptics during the period from January 1, 1929, to December 31, 1934, as follows:

TABLE I

Year	Patient Population	Total Deaths in Institutions		Per Cent of Deaths Due to Tb.	Tb. Cases Diagnosed
		General	Tb.		
1929	9,987	724	97	13.39	103
1930	10,159	760	82	10.79	102
1931	10,606	683	74	10.83	101
1932	11,127	714	86	12.04	120
1933	11,674	745	94	12.67	176
1934	11,901	883	95	10.75	219

Because of the necessary association in institutional life, exposure from unknown and unisolated positive sputum cases must be greater than would occur from

such cases in the average community. These state wards are closely associated with 15,994 inmates and 2,400 employes. Visiting on the part of friends and relatives, as well as parole cases leaving the institution for home, increases the number of individuals exposed through contact beyond those associated with the case in the institution.

If the institution is a reservoir of infection, the many thousands of visitors associating with unknown inmate cases each year add only to the necessity of protective measures being carried out. It would appear from the incidence of tuberculosis, as well as from the deaths from this disease in state institutions, that these dependents form one of the reservoirs of infection in the state which should be corrected as a part of the State's program of tuberculosis eradication among its citizens. (See graph.)

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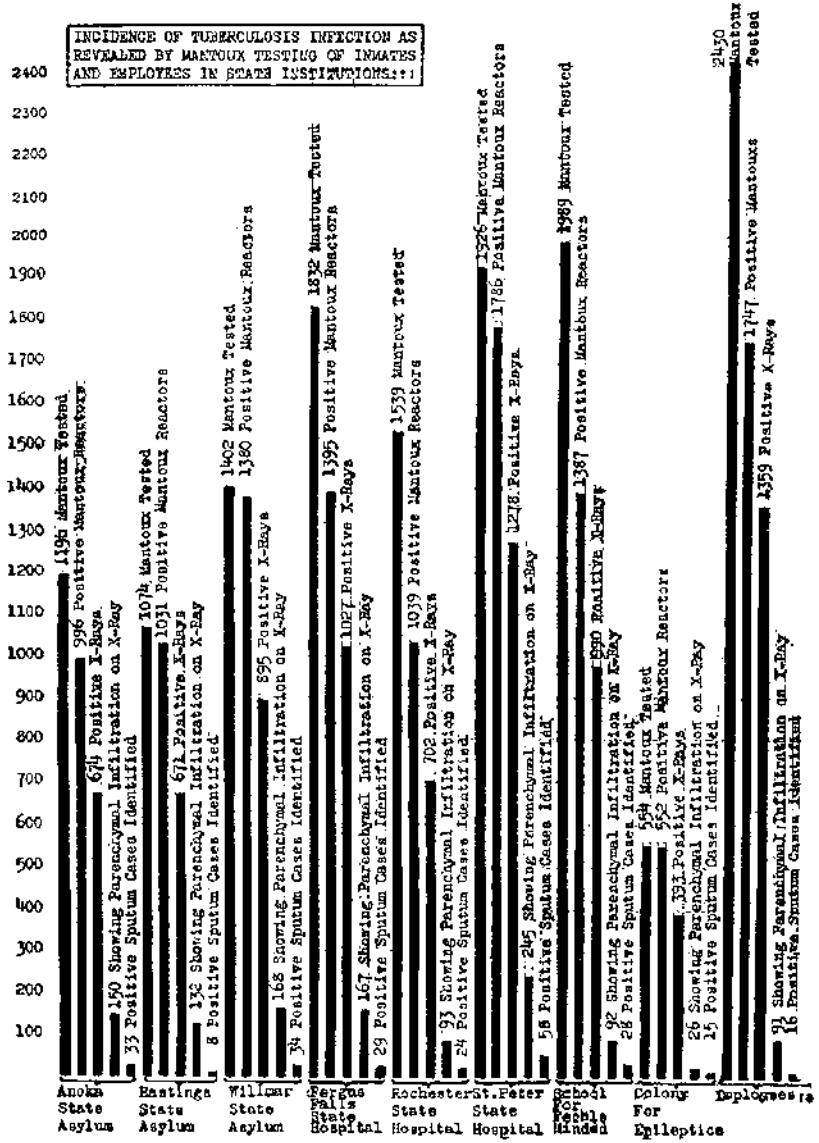

To determine a possible relationship between the reported deaths and the existing cases, these deaths during the past six years were studied. (Table II.) Five hundred and thirty-eight deaths were tabulated according to their employment in the institution. Four hundred and sixty-one did no work; fourteen did occupational therapy; seven worked in the laundry; forty-three were occupied in ward work; one did tailoring; six worked on the farm, one in the kitchen, three in the dining room and one in the bakery.

The total duration of known tuberculosis illness occurring among inmates of different age groups and at variable periods of time following commitment suggested the cause for the increased infection rate as well as case rate among this group. Thirty-three per cent of the deaths occurred one year or less following the admission of the individuals concerned. Thirty-six per cent of those who died within this period were forty-five years of age or over. It would appear that tuberculosis is frequently brought into the institution through new commitments.

Fifty-one per cent of the deaths among inmates who were twenty-five years of age or over were committed five years or more before clinical tuberculosis first became manifest. This group represents chronic unrecognized cases bringing the disease with them from the outside, and new cases developing as a result of contact with the unknown cases in the institution.

The study of death reports would point to the fact that protection of the patient body in the future can be accomplished to a large extent by diagnosing the cases before or immediately following commitment, and providing the necessary isolation quarters for clinical cases where their association with the uninfected can be prevented.

It is apparent that the problem develops from two main roots: the introduction of cases through commitments and the development of new cases through exposure in the institution. The protection of the institution against the tuberculosis patient's admission can be easily accomplished through the Mantoux testing of all admissions and X-raying of all positive reactors, including both patient inmates and employes. Protection against the cases developing after admission requires a medical service whose major duty it is to diagnose such cases throughout the period of the individual's residence. This entails a very complicated administrative set-up which might be simplified by considering tuberculosis in this group as the major problem. This would require a separate administrative set-up.

Tuberculosis inmates should be segregated from those who show no evidence of tuberculosis other than the positive skin reaction. This group is again divided into two groups: those who have evidence of old parenchymal infiltration on X-ray and those who show in addition the presence of tubercle bacilli in the sputum. The former group must be periodically examined for additional signs of disease and for the presence of tubercle bacilli in the sputum. Such cases when found must be included in the positive sputum group. There must be constant screening of this segregated negative sputum group in order to pick out promptly the individual who is breaking down with clinical as well as symptomatic tuberculosis. It is also essential that the positive sputum cases be identified promptly in order that effective isolation may be established without delay.

The vital problem in handling the tuberculous revolves about the positive sputum cases. Such a case developing among the inmates of the state schools and penal institutions may be very easily handled since their numbers are few and the facilities for their prompt isolation are adequate. The need for added isolation facilities for the positive sputum cases developing among the inmates of the state hospitals and asylums and schools for the feeble-minded and epileptics constitutes a very serious problem, not only because of the number of such cases but also because

of their mental condition. This class will require absolute isolation because of their inability to cooperate, which makes contagious technique difficult as a part of an administrative set-up in a domiciliary institution. To make it possible to carry out a reasonably careful technique it will be necessary to add trained attendants in order that the sputum and discharges from this group of patients can be completely collected and promptly destroyed. In order to control tuberculosis in the state hospitals at the present time facilities for the isolation of 245 patients showing tubercle bacilli in the sputum are necessary. It is also necessary to provide efficient segregation for 1,164 inmates whose skin reaction was positive and whose X-ray showed definite evidence of parenchymal involvement.

The relationship between infection as shown by the positive skin reaction and the development of parenchymal infiltration as revealed by the X-ray, as well as the relationship of this group to the number showing the presence of tubercle bacilli in the sputum, has been studied. Among the 11,617 inmates in the state hospitals and asylums and schools for the feeble-minded and epilepties, 82 per cent reacted positive to the skin test. 9.2 per cent of the total group showed evidence of parenchymal infiltration on X-ray, while 11.2 per cent of the positive reactors showed evidence of pulmonary disease. Tubercle bacilli were demonstrated in 1.9 per cent of the inmates. These positive sputum inmates represent 2.4 per cent of those reacting positive to the skin test, and 21.3 per cent of those whose X-ray gave evidence of parenchymal infiltration. It is assumed that the death rate will be constant in the future as it has been during the past six years as shown in Table I. If this is true, then .75 per cent of the total inmates will die of tuberculosis during the next year; .92 per cent of the positive reactors to the Mantoux test; 8.2 per cent of the individuals with parenchymal disease and 38.4 per cent of those with positive sputum will likewise die of tuberculosis during the next 12-month period.

Table X gives in detail the bacteriological study of sputum and stools examined from both inmates and employes. Because of the large number of deteriorated individuals in the state hospitals and asylums who were unable to give specimens of sputum, it was decided to collect both sputum and stools uniformly.

The hydrocarbon flotation, as well as the direct smear method, was used in searching for tubercle bacilli. Three negative specimens of sputum were obtained before the case was considered a non-carrier.

Of the total cases 8.8 per cent were found to have tubercle bacilli in the stool specimen, while only 2.4 per cent of the total cases were found positive on direct smear examination of sputum. The highest incidence of positive findings occurred in the flotation examination of sputum, which gave 13.4 per cent positive of the total cases of tuberculosis in the state hospitals and asylums.

Employes: Two thousand, four hundred and thirty employes were examined under conditions similar to those carried out in the examination of inmates. Seventy-two per cent of the total employes reacted positive to the skin test; 3.7 per cent of the total employes were found on X-ray to have parenchymal tuberculosis. This group represents 5.2 per cent of the positive reactor group of employes. There were .66 per cent of the total employes who were found to have tubercle bacilli present in their sputum. These positive sputum employes represent .92 per cent of the positive reactors and 1.7 per cent of the parenchymal cases found among the employes.

Summary: Many problems concerning the epidemiological control of tuberculosis were brought out as a result of the work entailed in this survey. Several questions involving the administrative control of the disease become important in outlining measures of control applicable to these institutions.

It is apparent that institutions in which people live for a prolonged period of time may become more heavily infected with tuberculosis than would be the case in the community in which the individual committed originally resided. Unless definite control measures are taken such institutions may become reservoirs of infection. One of the chief sources of infection in the institutions studied has been the home neighborhood, since it is evident that a large proportion of the cases admitted came into the institution without a diagnosis of tuberculosis and without the institution having an opportunity to protect itself against the exposure incidental to the admission.

Conclusions: *The ideal administrative set-up would include the skin testing* of all individuals coming into institutional life, either as inmate or employe, followed by the X-raying of all positive reactors. Those already a part of the institution who show evidence of parenchymal involvement with negative sputum should be segregated and re-checked at stated intervals in order that reactivating or missed cases of positive sputum may be found before much exposure has occurred. This part of the institutional control work can well be cared for by the present personnel, except for the Mantoux testing and the reading of the X-ray plates, which should be carried on permanently under the auspices of the Director of the Division of Tuberculosis, State Board of Control.

The most serious public health problem involved relates to the positive sputum case. At the present time there are 245 such cases found as a result of the survey. Others will be found by re-checking the segregated negative sputum inmates and still others in the future will be found during the process of commitment. Adequate handling of this group of inmates determined the success of any control program applicable to state institutions. The protection of the institutions against the committed insane who also suffer from tuberculosis has not been given due consideration. As a part of all such commitments a skin test and X-ray should be considered obligatory. With this as a part of the routine, all negative and positive sputum pulmonary tuberculosis cases would be identified and segregated or isolated before association in the institution could be established.

The care of positive sputum cases should not be the responsibility of a domiciliary institution. The communicable disease problem superimposed upon the mental problem results in the former becoming of paramount importance. The isolation of the tuberculous inmates in an institution separate from the one specializing in the domiciliary care of the mental case should be provided in order that contagious technique can be given first place in the management of the sick and in order that the public health problem involved may not be overlooked in the institutional routine. *For this reason facilities should be provided making it possible for* the institution to remove from its jurisdiction positive sputum cases, accepting their return as soon as they have convalesced to a point where there is no longer a public health problem involved.

In order to prevent the employment of tuberculous individuals, skin testing and X-raying of positive reactors has been made a routine incidental to employment. Employes will be checked periodically in the future by routine Mantoux testing and X-raying of positive reactors.

TABLE II—DEATHS IN STATE INSTITUTIONS IN RELATION TO LENGTH OF RESIDENCE

AGE	Total Deaths	TIME IN THE INSTITUTION PRIOR TO DEATH																												
		Months			Years																									
		—1	1-3	4-11	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	25+
—19	18	1	...	2	2	4	3	3	1	....	2	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
19-24	51	1	4	5	8	10	4	6	5	1	4	1	....	2	..	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....
25-29	69	2	3	8	9	7	7	2	6	1	6	7	7	1	1	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....
30-34	68	..	5	4	4	5	10	16	6	3	2	7	4	3	4	4	....	....	....	....	....	....	....	1	....	....	....	....	....	....
35-39	58	3	....	4	4	6	8	8	2	4	4	....	1	3	1	....	5	3	1	....	....	....	....	1	....	....	....	....	....	....
40-44	50	3	1	4	2	7	2	4	2	1	3	6	2	2	1	2	....	2	2	1	2	1	....	....	....	....	....	....	....	....
45-49	47	2	4	2	2	2	2	3	2	5	3	2	4	1	2	3	1	1	....	....	1	1	1	....	1	....	1	....	....	1
50-54	39	5	5	1	3	5	1	3	1	1	1	2	....	....	1	2	1	2	....	1	1	....	....	....	....	1	1	1	....	....
55-59	34	2	2	2	....	5	2	3	....	1	3	..	2	1	2	....	1	....	1	....	1	....	2	....	....	....	1	1	1	1
60-64	28	1	1	3	.	1	..	1	....	2	1	1	1	....	1	1	1	2	1	2	1	..	2	2	....	....	....	..	1	2
65-69	30	2	1	2	1	1	2	....	....	1	....	1	1	1	2	....	1	....	1	2	1	2	.	1	1	1	....	....	....	3
70-74	16	2	....	....	....	....	1	2	....	....	....	....	2	....	....	1	....	....	1	1	....	..	..	2	....	....	....	1	....	3
75-79	16	....	....	....	1	....	1	.	....	....	1	1	2	1	.	....	1	....	....	....	1	..	.	....	1	....	....	....	2	4
80-84	6	..	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	1	....	2
85+	9	..	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	..	....	....	1	1	....	1	....	4
Total	539	24	26	38	36	63	43	41	26	21	30	28	26	15	15	13	12	10	7	8	8	4	5	7	6	3	3	5	4	22

TABLE III—INCIDENCE OF TUBERCULOSIS INFECTION AND DISEASE ACCORDING TO AGE GROUP AMONG INMATES AND EMPLOYES

AGE GROUP	INMATES			EMPLOYES			INMATES & EMPLOYES	
	Positive Mantoux	Negative Mantoux	Per Cent Positive	Positive Mantoux	Negative Mantoux	Per Cent Positive	Second Infection Tuberculosis	Per Cent Positive*
0-4	3	25	10%	.....	.....	.....	1	33%
1-4	13	73	15%	.....	.....	.....	.....	.....
5-9	50	177	20%	.....	.....	.....	1	2%
10-14	217	647	25%	.....	.....	.....	7	3.2%
15-19	493	910	35%	4	7	36%	19	3.8%
20-24	926	709	56%	211	190	53%	51	4.5%
25-29	1,008	313	76%	109	120	47%	78	7.0%
30-34	1,049	225	82%	241	77	76%	99	7.7%
35-39	1,087	158	87%	223	60	79%	103	7.9%
40-44	1,229	150	89%	200	60	77%	156	10.9%
45-49	1,313	137	90%	184	35	84%	140	9.4%
50-54	1,118	157	87%	157	47	77%	121	9.5%
55-59	905	116	86%	132	33	80%	116	11.2%
60-64	738	167	81%	71	24	75%	93	11.5%
65-69	553	92	85%	55	12	82%	85	14.0%
70-74	402	116	77%	18	6	75%	61	15.2%
75-79	234	60	79%	4	.....	100%	39	16.4%
80 plus	155	56	73%	.....	.....	.....	33	21.3%
Not Given	91	20	82%	28	12	70%	14	11.8%
Total	11,584	4,408	72%	1,637	683	70%	1,221	9.2%

*Second Infection Tuberculosis.

TABLE IV—TUBERCULOSIS SURVEY OF STATE INSTITUTIONS
MANTOUX AND X-RAY EXAMINATIONS

Group A—Insane Hospitals and Asylums—Inmates.

AGE GROUP	Positive Mantoux		Negative Mantoux		No. Not X-Rayed		No. of X-Rays		X-Ray Negative		X-Ray Calc. Gl.		X-Ray Prim. N.		X-Ray Pleurisy		2nd Inf. Tb.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
20-24	134	90	72	48	1	2	133	88	52	38	68	41	1	2	3	1	12	9
25-29	272	127	65	32	4	2	271	125	111	50	128	58	3	2	5	1	28	16
30-34	350	220	54	61	1	5	349	215	144	79	167	101	11	4	8	4	33	31
35-39	384	327	47	58	3	2	381	325	135	119	203	156	10	6	6	6	39	45
40-44	500	411	38	66	4	3	496	408	170	114	268	228	14	11	9	18	66	57
45-49	582	465	49	72	4	3	578	462	208	171	289	230	27	14	14	20	73	44
50-54	565	393	61	71	3	2	562	391	211	149	253	189	21	16	25	14	58	47
55-59	458	345	53	56	5	1	453	344	159	128	238	167	10	9	23	10	44	51
60-64	349	315	52	63	4	2	345	313	112	101	177	167	12	13	23	16	44	40
65-69	311	211	44	44	4	1	307	210	121	73	146	94	16	5	9	14	37	39
70-74	223	170	60	50	3	0	220	170	64	66	110	75	11	5	18	10	38	25
75-79	128	100	31	29	5	3	123	97	35	35	61	43	3	5	8	1	20	18
80 plus	80	72	32	22	2	0	78	72	20	18	32	35	4	3	8	3	18	15
Not Given	25	19	11	6	0	0	25	20a	7	10	15	6	1	0	1	1	5	3
Total	4,362	3,265	669	673	40	26	4,322	3,240	1,549	1,151	2,180	1,596	144	95	180	117	515	440

a One patient with negative Mantoux X-rayed.

TABLE V—TUBERCULOSIS SURVEY OF STATE INSTITUTIONS
MANTOUX AND X-RAY EXAMINATIONS

Group B—Feeble-minded and Epileptics—Inmates.

AGE GROUP	Positive Mantoux		Negative Mantoux		No. Not X-Rayed		No. of X-Rays		X-Ray Negative		X-Ray Calc. Gl.		X-Ray Prim. N.		X-Ray Pleurisy		2nd Inf. Tb.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
5-9	7	11	15	48	....	.....	7	11	6	5	1	6	....	....	.....	.....	.....	.....
10-14	89	47	69	81	2	1	87	46	42	10	39	35	1	1	1	.....	5	1
15-19	129	147	54	108	.....	.....	129	147	49	44	74	90	1	4	3	2	5	11
20-24	145	169	16	59	3	7	142	161	44	48	85	96	3	2	3	3	5	13
25-29	132	122	1	36	4	4	128	118	35	45	85	67	1	1	4	1	7	4
30-34	101	107	4	38	2	4	99	103	27	27	61	69	2	6	2	2	11	7
35-39	80	111	3	18	2	.....	78	111	29	25	42	83	1	1	2	2	7	1
40-44	61	107	1	18	1	1	60	106	16	31	39	66	2	3	4	2	4	7
45-49	69	89	.....	12	2	2	67	87	20	19	39	58	1	4	3	5	6	7
50-54	36	42	.....	10	1	.....	35	42	13	6	19	35	1	2	.....	1	2	1
55-59	21	32	1	4	....	....	21	32	5	5	13	22	2	....	....	2	4	3
60-64	22	27	.....	7	1	.....	21	27	8	6	12	17	.....	1	1	1	1	3
65-69	4	12	.....	3	.....	.....	5a	12	4	1	1	9	.....	.....	.....	.....	.....	2
70-74	5	1	....	1	....	....	5	1	....	1	5	....	1	....	.....	.....	....	.....
75-79	1	3	.....	.....	....	....	1	3	....	1	1	2	....	....	....	....	....	.....
80 plus	2	.....	.....	2	.....	.....	2	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....
Not Given	4	5	.....	.....	.....	.....	4	5	.....	1	3	4	.....	1	....	.....	1	1
Total	908	1,031	164	445	18	19	891	1,012	298	275	520	659	16	26	23	21	58	80

a One X-rayed, not Mantouxed.

TABLE VI—TUBERCULOSIS SURVEY OF STATE INSTITUTIONS
MANTOUX AND X-RAY EXAMINATIONS

Group C—Penal Institutions—Inmates.

AGE GROUP	Positive Mantoux		Negative Mantoux		No. Not X-Rayed		No. of X-Rays		X-Ray Negative		X-Ray Calc. Gl		X-Ray Prim. N.		X-Ray Pleurisy		2nd Inf. Tb.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
10-14	....	4	....	34	.....	.....	....	3	.....	1	....	2	.....	.....	.....	.....	.....	.....
15-19	37	46	109	209	.....	.....	37	46	8	16	29	28	1	1	1	1	0	1
20-24	358	18	446	38	.....	1	358	17	98	6	252	11	5	3	15	.....	5	.....
25-29	342	10	173	4	.....	.....	342	10	140	6	185	4	11	....	12	.....	11	.....
30-34	265	4	62	4	.....	.....	265	4	148	2	104	2	11	.....	7	.....	10	.....
35-39	180	5	29	3	.....	1	180	4	110	2	63	2	6	.....	7	.....	3	.....
40-44	147	3	25	2	.....	.....	147	3	69	3	63	....	9	.....	9	.....	5	.....
45-49	104	4	8	1	.....	.....	104	4	67	1	33	3	4	.....	3	.....	3	.....
50-54	81	1	18	2	.....	.....	81	1	37	1	33	.....	6	.....	9	.....	6	.....
55-59	10	....	2	....	.....	.....	10	.....	25	.....	21	....	6	.....	3	.....	3	.....
60-64	25	.....	44	1	.....	.....	25	.....	9	.....	13	.....	3	.....	2	.....	1	.....
65-69	15	....	....	1	.....	.....	15	.....	4	.....	8	.....	1	.....	2	.....	1	.....
70-74	3	....	3	2	.....	.....	3	.....	1	.....	1	.....	.....	.....	1	.....	.....	.....
75-79	2	.....	.....	.....	.....	.....	2	.....	1	.....	1	.....	1	.....	.....	.....	.....	.....
80 plus	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Not Given	31	....	2	...	....	.....	31	...	8	.....	20	...	3	....	1	.....	3	.....
Total	1,610	94	911	301	.....	2	1,610	92	725	38	826	52	67	4	73	1	51	1

TABLE VII—TUBERCULOSIS SURVEY OF STATE INSTITUTIONS
MANTOUX AND X-RAY EXAMINATIONS

Group D—Schools—Inmates.

AGE GROUP	Positive Mantoux		Negative Mantoux		No. Not X-Rayed		No. of X-Rays		X-Ray Negative		X-Ray Calc. Gl.		X-Ray Prim. N.		X-Ray Pleurisy		2nd Inf. Tb.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
0-4	3	...	11	8	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
1-4	1	2	13	9	...	1	3	1	1	1	....	.....	.....	.....	.....	.....	.....	.....
5-9	7	4	100	41	.....	.....	7	5	2	2	5	3	1	..	.....	.....	.....	.....
10-14	11	18	270	110	.....	.....	44	22	2	5	41	17	1	1	.....	.....	1	.....
15-19	78	38	279	103	1	.....	83	42	12	7	70	34	1	...	1	.....	1	1
20-24	5	5	14	15	.....	.....	7	5	1	1	6	4	.....	.....	.....	.....	.....	.....
25-29	2	.....	.....	1	.....	.....	2	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....
30-44	2	...	2	...	...	...	2	.....	.....	.....	2	.....	.....	...	.....	.....	.....	.....
Not Given	4	1	.....	.....	...	...	...	1	1	...	3	1	.....	.....	.....	.....	2	1
Total	111	68	689	290	1	1	159*	76*	20	16	129	59	3	1	1	.....	2	1

* Twenty patients X-Rayed who had negative Mantoux or no Mantoux.

TABLE VIII—TUBERCULOSIS SURVEY OF STATE INSTITUTIONS
MANTOUX AND X-RAY EXAMINATIONS

Employes.

AGE GROUP	Positive Mantoux		Negative Mantoux		No. Not X-Rayed		No. of X-Rays		X-Ray Negative		X-Ray Calc. Gl.		X-Ray Prim. N.		X-Ray Pleurisy		2nd Inf. Tb.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
15-19	.....	4	1	6	.....	1	.....	3	.....	1	.....	2	.....	.....	.....	.....	.....	.....
20-24	42	169	33	157	.....	13	42	156	6	41	36	108	...	3	1	4	.....	7
25-29	94	115	40	80	.....	4	94	111	23	16	67	81	.....	3	3	2	3	9
30-34	141	100	38	39	.....	4	143*	96	42	23	95	70	4	6	4	1	4	3
35-39	137	86	37	23	.....	4	137	82	42	27	85	52	7	3	5	3	7	2
40-44	116	84	38	22	.....	2	118	82	33	25	72	50	7	2	5	4	10	7
45-49	124	60	23	13	2	3	122	57	36	16	82	37	3	3	7	3	5	2
50-54	94	63	27	20	4	.....	90	63	30	14	51	48	5	4	5	.....	6	1
55-59	84	48	18	15	.....	1	84	47	24	16	55	25	2	3	2	1	5	6
60-64	55	16	21	3	1	.....	54	16	13	2	35	13	1	3	3	.....	4	.....
65-69	38	17	6	6	1	1	37	16	9	3	22	11	3	.....	5	.....	4	2
70-74	16	2	5	1	1	.....	15	2	4	.....	9	2	4	.....	1	.....	1	.....
75-79	3	1	.....	.....	.....	.....	3	1	1	.....	2	.....	.....	.....	.....	.....	.....	1
80 plus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Not Given	27	11	8	4	.....	.....	29*	11	8	1	19	9	2	.....	.....	.....	1	1
Total	971	776	294	389	9	33	968	743	271	185	630	511	38	30	41	18	50	41

* Six employes with negative Mantoux X-Rayed.

TABLE IX—TUBERCULOSIS SURVEY OF STATE INSTITUTIONS
MANTOUX AND X-RAY EXAMINATIONS

Total Inmates in State Institutions.

AGE GROUP	Positive Mantoux		Negative Mantoux		No. Not X-Rayed		No. of X-Rays		X-Ray Negative		X-Ray Calc. Gl.		X-Ray Prim. N.		X-Ray Pleurisy		2nd Inf. Tb.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
0-1	1	.....	11	11	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
1-4	1	2	13	29	.....	1	1	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....
5-9	14	15	116	101	.....	.....	14	16	8	7	6	9	1	.....	.....	.....	.....	.....
10-14	130	68	339	232	2	1	131	71	44	16	80	54	2	2	1	.....	6	1
15-19	244	231	442	406	1	.....	249	235	69	67	173	152	3	5	5	3	6	13
20-24	642	281	548	132	4	10	640	271	195	93	411	152	9	7	21	4	22	22
25-29	748	259	239	71	5	6	743	253	286	101	400	129	15	3	21	2	46	20
30-34	718	331	112	103	3	9	715	322	319	108	334	172	24	10	17	6	54	38
35-39	644	443	79	79	5	3	639	440	274	146	308	241	17	7	15	8	49	46
40-44	708	521	64	86	5	4	703	517	254	148	365	294	25	14	22	18	75	64
45-49	755	558	52	85	6	5	749	553	295	191	361	297	32	18	20	25	82	51
50-54	682	436	74	83	4	2	678	434	261	156	335	224	28	18	34	15	66	48
55-59	528	377	58	60	5	1	523	376	189	133	272	189	18	9	26	12	51	54
60-64	396	342	96	71	5	2	391	340	129	107	202	184	15	14	26	17	46	43
65-69	330	223	44	48	4	1	327	222	129	74	155	103	17	5	11	14	38	41
70-74	231	171	63	53	3	0	228	171	65	67	116	75	12	5	19	10	38	25
75-79	131	103	31	29	5	3	126	100	36	36	63	45	4	5	8	1	20	18
80 plus	83	72	32	24	2	.....	81	72	21	18	33	35	1	3	9	3	18	15
Not Given	65	25	14	6	.....	.....	65	26	16	11	41	14	4	1	2	1	9	3
Total	7,051	4,458	2,433	1,709	59	48	7,004	4,420	2,592	1,480	3,657	2,366	230	126	257	139	626	502

TABLE X—TUBERCULOSIS SURVEY OF STATE INSTITUTIONS
MICROSCOPIC EXAMINATIONS

Grand Total—Inmates. All examinations are flotations unless otherwise specified.

AGE GROUP	No. Cases by X-Ray		Number Spec. Rec'd.				Negative Sputum						Stool Neg.		Positive Sputum				Stool Pos.		Total Pos.	
			Sputum		Stool		1 Neg.		2 Neg.		3 Neg.				Smear		Flot.					
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
10-14	6	1	10	2	4	1	....	.....	....	....	3	.....	4	....	.....	.....	1	1	.....	1	1	1
15-19	6	13	15	30	5	10	.....	.....	.....	1	3	6	5	10	.....	1	2	3	.....	.....	2	4
20-24	22	22	47	56	17	22	....	.....	.....	....	12	11	15	20	1	3	6	7	2	2	6	9
25-29	49	20	85	30	33	19	.	1	5	.....	19	5	32	15	2	....	7	5	2	3	9	7
30-34	54	38	102	60	47	35	.....	.....	1	1	17	12	42	30	5	1	17	8	5	6	20	13
35-39	49	46	72	74	46	44	1	1	4	3	25	18	45	39	1	1	7	6	2	5	8	8
40-44	75	64	120	97	72	61	2	1	2	3	27	21	64	57	.....	2	11	11	8	6	15	16
45-49	82	51	130	53	71	45	1	5	2	1	28	8	65	39	4	1	10	9	6	6	15	13
50-54	66	48	98	65	61	43	2	1	4	1	22	15	58	40	2	1	14	5	3	3	16	9
55-59	51	54	80	85	50	50	1	.....	2	1	18	23	47	49	....	1	10	6	4	3	13	8
60-64	46	43	88	52	44	42	2	1	3	2	22	10	41	38	.....	2	7	8	3	4	10	10
65-69	38	41	62	56	33	36	1	....	1	1	13	17	28	31	1	....	7	3	5	5	9	6
70-74	38	25	56	30	33	23	....	1	2	2	12	7	34	23	1	....	4	2	1	1	4	3
75-79	20	18	26	19	16	18	.....	1	.....	.....	7	6	15	17	.....	.....	1	.....	1	.....	2	.....
80 plus	18	15	30	6	16	13	2	1	1	.....	8	1	16	12	.....	.....	1	1	.....	1	1	2
Not Given	9	8	18	2	5	2	1	....	....	.....	3	.....	4	2	1	....	1	1	.....	.....	2	1
Total	626	502	1,045	717	553	464	13	13	27	16	239	160	515	422	18	13	106	76	42	46	133	110
Employes	50	41	94	71	23	23	3	1	5	....	20	15	22	22	....	.....	8	8	1	.....	8	8
Total	676	543	1,139	788	576	487	16	14	32	16	259	175	537	444	18	13	114	84	43	48	141	118

Mr. Foley: Thank you, Doctor Burns, for your excellent paper. We all appreciate the wonderful work which you and the members of your staff have done in instructing the superintendents how to handle the tuberculous situation in their institutions and in advising them what can best be done to protect the inmates and employes. While we realize that this survey has involved a tremendous amount of study, we believe the results attained will be of such great benefit to the state of Minnesota that you will in the end feel compensated for your efforts. Such an accumulation of scientific data should be of interest to other states as well as to Minnesota.

Doctor Mark, will you tell us something of the field work?