RESPIRATORY TUBERCULOSIS

EFFECT OF THE WAR ON THE LENGTH OF THE INTERVAL BETWEEN NOTIFICATION AND DEATH

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Among many factors that have been suggested as influencing the increase in tuberculosis mortality which accompanied the outbreak of the war is that of lowered resistance to the disease by those already infected. It is argued that if resistance were lowered to the point at which the average duration of the disease was shortened, this would tend to produce the higher mortality rates that were a feature of the 1940 and 1941 statistics.

Method of Investigation

The medical service of the Middlesex County Council, realizing the desirability of answering this question, offered for statistical analysis their records of fatal cases terminating in the years 1937 to 1941. The method of approach to the problem has been to compare the interval between notification and death for two periods in which death occurred: (1) the pre-war years 1937–9, and (2) the war years 1940 and 1941. Shorter average duration should appear in the second period if the postulate of the preceding paragraph is correct. The term "duration of disease" as used in this analysis is defined as the time elapsing between notification (or registration as an infected person) and death.

The data are not complete; only about 75% of the deaths recorded in the County of Middlesex by the Registrar-General during these five years appear to have come under the county council's scheme for the treatment of tuberculosis.* Of the remainder a number of persons escape notification as suffering from tuberculosis until after death; and a further proportion, who were notified, were treated privately and not under the county service. It can be shown that the proportion who escaped the net was constant in both periods, and hence the comparison is not invalidated even though the accuracy of the figures as measures of the absolute duration of the disease is somewhat reduced.

* A similar test could be applied by all tuberculosis centres to furnish a rough guide as to the extent to which tuberculosis cases in any administrative area were seen by the official medical service.

Analysis of the deaths in the pre-war period shows that the missing data were not distributed by age in the same proportions as the deaths officially recorded. According to official figures, 43% of the male deaths were at ages over 45, yet 72% of the male leakage occurred at these ages. Again, 20% of the recorded female deaths were at ages above 45, yet the female leakage was 41% in the same group.

Returns were submitted by each of the seven chest clinic or dispensary areas into which, during the period under review, the county was divided for the purpose of administering the tuberculosis service. The information supplied in each fatal case was: Sex, age at death, date first seen by the tuberculosis officer, whether diagnosis was of pulmonary tuberculosis or tuberculosis of other organs, and date of death. The analysis was restricted to deaths due to pulmonary tuberculosis, since there was not sufficient material from which to make satisfactory deductions in regard to the other forms. Two dispensaries supplied the date of notification instead of the date first seen, but exhaustive comparisons between the results given by these two areas as compared with the remainder showed no differences which could be ascribed to the distinction made.

The data were carded and the durations calculated to the nearest month. The frequency distributions in broad duration groupings, in both absolute and percentage form and distinguishing age and sex, are shown in Table I; also the percentage age distribution at death of these fatal cases.

TABLE I.—*Pulmonary Tuberculosis: Middlesex County Council's Data. Distribution of Fatal Cases according to Age and Duration.* Fatal Cases terminating in 1937–9 compared with those terminating in 1940–1*

Durations in Years	MALES											
	Age Groups (Age at Death)											
	Under 25		25–		35–		45–		55+		All Ages	
	1937–9	1940–1	1937–9	1940–1	1937–9	1940–1	1937–9	1940–1	1937–9	1940–1	1937–9	1940–1
	%	%	%	%	%	%	%	%	%	%	%	%
Under 1	109 (41)	78 (41)	111 (37)	77 (39)	117 (43)	78 (40)	111 (46)	87 (45)	93 (49)	78 (47)	541 (43)	398 (42)
1–	124 (47)	85 (45)	153 (51)	90 (45)	111 (41)	81 (42)	100 (42)	69 (35)	73 (38)	65 (39)	561 (44)	390 (41)
5+	32 (12)	26 (14)	39 (13)	33 (17)	46 (17)	36 (19)	28 (12)	39 (20)	24 (13)	22 (12·6)	169 (13)	156 (17)
All durations ..	265	189	303	200	274	195	239	195	190	165	1,271	944
Percentage age distribution	20·8	20·0	23·8	21·2	21·6	20·7	18·8	20·7	14·9	17·5	99·9	100·1

Durations in Years	FEMALES									
	Age Groups (Age at Death)									
	Under 25		25–		35–		45+		All Ages	
	1937–9	1940–1	1937–9	1940–1	1937–9	1940–1	1937–9	1940–1	1937–9	1940–1
Under 1	161 (45)	128 (48)	119 (38)	90 (41)	47 (35)	44 (45)	57 (47)	41 (50)	384 (41)	303 (46)
1–	152 (43)	113 (43)	155 (49)	99 (45)	68 (50)	40 (41)	51 (42)	23 (28)	426 (46)	275 (41)
5+	44 (12)	25 (9)	42 (13)	32 (15)	21 (15)	13 (13)	13 (11)	18 (22)	120 (13)	88 (13)
All durations	357	266	316	221	136	97	121	82	930	666
Percentage age distribution	38·4	39·9	34·0	33·2	14·6	14·6	13·0	12·3	100·0	100·0

* Duration is defined throughout this paper as the period elapsing between notification (registration as a tuberculous person) and death.

Findings

Age Distribution.—Statistical tests showed no significant difference between the age distributions in the two periods.

Duration Distribution (All Ages).—Considering first all ages combined, Table I shows that in the three years 1937 to 1939 1,271 deaths of males occurred from pulmonary tuberculosis among patients under observation by the Middlesex Tuberculosis Service, as against 944 in the two-year period 1940–1. In the pre-war period the duration was of less than one year in 43% of the deaths, as compared with 42% in the war period. Those with durations of more than one year but less than five years accounted for 44% in the pre-war and 41% in the war years; while there were 13% in the pre-war and 17% in the war years with durations ranging from five to twenty-six years. Similarly for females, 41% of the 930 deaths in 1937–9 and 46% of the 666 deaths in 1940–1 were of less than one year's duration; 46% as against 41% were of more than one but less than five years; and 13% in both periods

recorded durations of more than five years. For neither sex were the distributions in the two periods different in the statistical sense; or, in other words, the changes which occurred in the percentages were not greater than one would expect to arise merely by chance.

Durations within the Age Groups.—Statistical tests* applied to the frequency distributions of the durations within the age groups showed that only at ages 45–54 for males and at ages 45 and upwards for females were they really dissimilar in the two periods. In both cases the proportion of patients with a duration of over five years increased in 1940–1. Certain features of the table were suggestive, but when tested statistically were found to be inconclusive.† These were: (*a*) an increase in 1940–1 in the proportion of male deaths with durations longer than five years, the amount of increase being small but persisting at every age group; and (*b*) a similar small but consistent increase in the proportion of female patients with durations of less than one year, accompanied by a decrease, except at ages under 25, in the proportion with durations of one to five years.

One other point is perhaps noteworthy even though it is hardly relevant to the present problem. The proportion of cases in which death occurred less than a year after notification showed for males the same relationship with age in both periods—namely, that it was lowest at age group 25–34 and thereafter increased with age. This was also true of the female patients in the more recent period, but in 1937–9 the smallest proportion occurred in age group 35–44.

Average Length of Duration.—A comparison between the pre-war and war years as regards average length of duration, in age groups, is shown in Table II. Separate indices are given for the duration groups used in Table I, since the mean for all durations combined appeared to be unduly influenced by a few long-drawn-out cases. The difference between each pair of means was tested for statistical significance, and the table shows the ratio of each difference to its standard error—15 values for males and 12 for females. Of the former, in only two instances was the ratio greater than 2, and only in those two instances could it be concluded that the difference was greater than could arise by chance. Neither instance is, however, evidence that average duration *decreased* with the outbreak of war, but suggests the contrary. Four significant differences occurred among the 12 pairs of means for the females, and they all arose in the duration group in which death occurred within one year after notification. But while three showed the average duration in 1940–1 to be less than in 1937–9, the fourth recorded an increase, and statistical tests indicated that no definite deductions could be drawn from these results.

TABLE II.—*Deaths from Pulmonary Tuberculosis in the County of Middlesex. Average Duration, from Notification (or Date first seen by T.O.) until Death (in Months)*

MALES

Duration Group (in years)	Under 25			25–			35–			45–		
	1937–9	1940–1	Diff. S.E.	1937–9	1940–1	Diff. S.E.	1937–9	1940–1	Diff. S.E.	1937–9	1940–1	Diff. S.E.
Under 1 ..	5·2±0·30	5·3± 0·37	+0·13	5·6±0·31	5·1±0·38	−0·96	4·8±0·29	4·5±0·35	−0·49	4·3±0·30	3·9±0·32	−0·98
1–	30·5±1·16	29·1± 1·30	−0·86	29·6±0·99	33·1±1·32	+2·15*	30·8±1·27	31·2±1·45	+0·23	29·6±1·38	28·4±1·38	−0·61
5+	80·8±4·24	111·5±10·91	+2·62*	101·0±6·76	92·6±6·69	−0·88	106·2±7·05	109·5±8·28	+0·31	102·4±6·96	111·2±7·26	+0·87

Duration Group (in years)	55+		
Under 1	4·2±0·33	4·1± 0·36	−0·25
1–	26·7±1·60	30·5± 1·63	+1·68
5+	110·5±9·35	128·5±13·63	+1·09

FEMALES

	Under 25			25–			35–			45+		
Under 1 ..	5·8±0·23	5·0±0·28	−2·14*	6·5±0·31	5·3±0·34	−2·65*	4·6± 0·46	6·0±0·51	+2·01*	5·3± 0·45	3·8± 0·43	−2·38*
1–	26·6±0·89	27·2±1·14	+0·41	29·3±1·00	29·6±1·32	+0·17	29·1± 1·52	30·0±2·10	+0·35	26·4± 1·74	28·3± 2·50	+0·62
5+	87·7±4·41	82·0±3·51	−1·02	88·6±3·57	91·1±4·34	+0·45	103·6±11·31	93·9±9·34	−0·66	114·2±19·12	106·0±10·36	−0·38

* = Significant difference.

* The results of the statistical tests applied may be summarized:

Age Group	Males			Females		
	χ^2	Degrees of Freedom	P	χ^2	Degrees of Freedom	P
Under 25 ..	0·34	2	0·87	1·50	2	0·49
25–	1·98	2	0·37	0·93	2	0·63
35–	0·42	2	0·84	2·75	2	0·26
45–	6·00	2	0·05	6·81	2	0·03
55+	0·10	2	0·96			
†Additive χ^2	8·84	10	approx. 0·60	11·99	8	approx. 0·20

Conclusions

The analysis has produced no conclusive evidence of any appreciable decrease in the average length of time between notification and death from pulmonary tuberculosis in the two years following the outbreak of war. Nor do the results, presented in three groups according to whether death occurred within one, five, or more years after notification, show the existence of any movement to indicate that during the war years a higher proportion of the deaths occurred at a relatively shorter interval after notification.

There is perhaps a suggestion, which statistically is unproved, that among female patients in the more acute group—those dying within a year of notification—the average duration was a few weeks less in 1940–1 than in 1937–9.

The conclusion must be, therefore, that there is no evidence, from the experience of the tuberculosis service of the County of Middlesex, of a lowered resistance to the disease to the point at which duration was shortened, and hence no evidence that lowered resistance was a causative factor in the increase of tuberculous mortality which occurred in 1940–1.

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The report on health centres presented by request to the Manchester Public Health Committee by the city's medical officer of health, Dr. C. Metcalfe Brown, is concerned with centres for those health services now administered by local authorities, and not with health centres for group medical practice. Assuming a population of 750,000 divided into 15 units of about 50,000 persons, Dr. Metcalfe Brown suggests that each unit should have one main and four subsidiary health centres, each of the latter serving 10,000 persons. The plan for a main health centre (with excellent drawings), which is included in the report, provides accommodation on the ground floor for a maternity and child welfare section with ante- and post-natal clinics and milk sales department, the school medical service, venereal diseases clinic, and accident department; on the second floor for dental, *x*-ray, skin, orthopaedic, physiotherapy, and pathological departments; and on the third floor for the medical staff, medical records, health visitors, etc. It is suggested that wherever possible an additional site adjacent to the centre should be reserved "to accommodate the comprehensive general medical services of the city."