HOUSING AND TUBERCULOSIS IN A MASS RADIOGRAPHY SURVEY

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This study is concerned with the specific association of housing conditions with the prevalence of tuberculosis as found in a 3-year survey by a static Mass Radiography Unit in the Metropolitan Borough of Islington (Brett, Benjamin, Craig, Wallace, and Freeman, 1956). It does not attempt to examine this association from the point of view of the spread of tuberculosis once an infector is introduced into the household; it is solely concerned with the question whether poor housing, as one of the elements of poverty, does in fact have any specific bearing on the incidence of the disease. It was thought that an analysis of *individual* households in relation to tuberculosis might be of value in view of earlier studies (Stein, 1952; Benjamin, 1953) based on the relationship between morbidity or mortality rates and general housing conditions as revealed in censuses or surveys in local authority areas or subdivisions thereof, the whole area being ranked by those indices without any specific relationship between the households which were tuberculous and those which were overcrowded.

METHOD

The housing densities (persons per room) of 15,836 unselected households were obtained from individual adult *male* examinees residing in the borough of Islington. In the first instance, 1,160 one-person households (*i.e.* lodgers) were excluded, since they would heavily weight the one person per room category. (These were subsequently examined separately). The index was calculated from the number of persons and number of rooms in each of the remaining 14,676 households, and the figures were then related to the 190 cases of active respiratory tuberculosis discovered in this group. Only cases requiring some form of treatment were classified as "active".

The data were also subdivided according to social class. By combining Social Classes I and II, and

IV and V, and by grouping housing density into three broader categories, larger groups were made available.

RESULTS

There is a suggestion that those housed at a density of less than one person per room experience lower morbidity than the other categories (Table I). There is no evidence, however, of a rise in morbidity with increased crowding even in this broad analysis.

TABLE I
INCIDENCE OF ACTIVE TUBERCULOSIS RELATED TO HOUSING DENSITY

Persons per Room	No. Examined	Cases of Active Tuberculosis	
		No.	Rate per Thousand
Less than one	4,880	48	9.8
One	4,543	77	16.9
More than one	5,253	65	12.4

The relation between social classes and housing is shown in Table II. As in Table I there is a lower incidence of disease in the "less than one person per room" group. In addition, the analysis by social class supports the findings of higher incidence in Social Classes IV and V which has been previously reported for this sector of the Islington population (Brett and others, 1956). There is, however, no gradient in morbidity with increased crowding.

TABLE II
INCIDENCE OF ACTIVE TUBERCULOSIS (PER THOUSAND) RELATED TO SOCIAL CLASS

Persons per Room	Social Class			
	I and II	III	IV and V	Unspecified
Less than one ..	7.9 (3)	8.5 (26)	12.0 (14)	17.7 (5)
One	14.0 (3)	15.1 (44)	16.1 (22)	31.5 (8)
More than one ..	12.7 (2)	10.0 (34)	17.1 (28)	13.9 (1)

No. of cases in brackets

TABLE III
DISTRIBUTION OF CASES OF TUBERCULOSIS

Social Class		I and II			III			IV and V			Un- specified
Age Group (yrs)		15-24	25-44	45+	15-24	25-44	45+	15-24	25-44	45+	45+
Persons per Room	Less than one ..	— (—)	— (—)	3 (1.5)	3 (1.0)	6 (0.4)	17 (0.9)	1 (0.6)	4 (1.0)	9 (0.6)	5 (0.8)
	One	— (—)	3 (1.9)	— (—)	6 (1.8)	25 (1.5)	13 (1.1)	3 (1.3)	3 (0.5)	16 (1.2)	8 (1.4)
	More than one ..	— (—)	2 (1.5)	— (—)	2 (0.4)	22 (1.0)	10 (1.2)	4 (1.0)	13 (1.3)	11 (1.3)	1 (0.6)

Numbers in brackets are the ratios of the number of cases observed to the number expected on the basis of the rate, specific for age and social class, for all housing groups combined.

The possibility that examinees in a better housing category may belong to an older age group with a lower attack rate led to the investigation of the age differential (Table III).

The ratio of the actual numbers of cases to the numbers of "expected" cases, calculated for each group, allowing for age and social group variations but assuming no variation with housing density, showed no gradient in the prevalence of tuberculosis with rising housing density. All the ratios in the first line except one are equal to or less than unity. All the other ratios, except one or two based on very small numbers and without significance, are greater than unity. But the ratios in the third line are not generally greater than those in the second line. It seems likely that what we are observing is a separation in terms of lighter incidence of those enjoying "above average" housing conditions, *i.e.* that the housing index of "less than one person per room" screens off the higher economic strata of each of the social classes. But this is not the separation of a specific housing factor which remains inseparable from the general complex of social conditions.

Table IV provides a separate analysis of the incidence of tuberculosis in the "lodger" examinees.

It would appear that lodgers in Social Classes IV and V are likely to prove a specially productive field of investigation for mass miniature radiography.

TABLE IV
INCIDENCE OF ACTIVE TUBERCULOSIS IN
MEN IN LODGINGS

Social Class ..	I and II	III	IV and V	Unspecified
No. Examined ..	79	698	356	27
No. of Cases of Tuberculosis ..	1	11	12	—
Rate per 1,000 ..	[12.7]	15.8	33.7	—

DISCUSSION

A comparison of tuberculosis morbidity in areas with poor housing conditions with that in better residential areas has invariably shown a higher prevalence of disease in the former. Keith (1951) found twice as many cases of respiratory tuberculosis

in the slums of Cincinnati as in better residential districts. Willner (1952), analysing slum tuberculosis and taking into consideration various factors associated with a low standard of living, thought that a greater drop in the tuberculosis rate could be achieved by improved housing than by education.

In Scotland, Stein (1950, 1952) has analysed comprehensively the influence of the social complex on tuberculosis morbidity and mortality in Edinburgh and Glasgow. She found that all social variables have an association with the disease, but that ordinary crowding and over-crowding have a higher correlation. One of us (Benjamin, 1953) has stressed the difficulty of assessing the role of each variant of the social complex in relation to tuberculosis, and was unable to reach a definite conclusion about the specific effect of housing conditions on tuberculosis morbidity in London boroughs.

It might be suggested that the priority re-housing of crowded tuberculous households may have been responsible for the absence of any rise in incidence in the "more than one person per room" group as compared with the "one person per room" group in the present inquiry. The numbers of families rehoused by the Borough of Islington principally on account of tuberculosis in the years 1951-55 inclusive is 119. In addition, probably two or three hundred tuberculous households have been rehoused by the L.C.C., though no precise figures are available. While the above are significant numbers, it should be borne in mind that these are *known* tuberculous cases which would not attend for mass radiography examination and would therefore be absent from all groups in our investigation. However, consideration of this factor gives us the opportunity of emphasizing that we are concerned with prevalence in the sense of the likelihood of discovering unsuspected cases of tuberculosis by means of mass radiography.

The present study based on an analysis of individual households has shown that there is no simple direct relationship between housing density and the incidence of active post-primary respiratory tuberculosis as revealed by mass radiography. It has, however, underlined the importance of what is broadly termed

the social complex. Thus the search for the unknown infector is probably best based on the general social conditions of an area, with a population analysis by socio-economic groups as the most reliable criterion, rather than on data concerned specifically with housing. It must be borne in mind that we are dealing here with the incidence of cases discovered by mass miniature radiography, and that the negative finding does not imply that overcrowded housing does not increase the risk of spread of disease within the household.

SUMMARY

A possible association of housing conditions in

14,676 individual households in the Metropolitan Borough of Islington with 190 cases of active post-primary tuberculosis discovered by mass miniature radiography was investigated.

The commonly found association with general economic and social circumstances was demonstrated, but there was no gradient in tuberculosis morbidity in relation to rising housing density.

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