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CHRONIC BRONCHITIS: AN INTRODUCTORY EXAMINATION OF EXISTING DATA*

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During 1950 a survey was made of the registered disabled persons in four areas of Great Britain. Particular attention was paid to the causes of disablement and to the effects of disability on employment. In all four areas chronic respiratory disease was an important cause of disability; in the north-western area it was the largest single disease group among registered disabled persons and accounted for more unemployment than any other physical condition. This led to an examination of the data available on death and sickness resulting from chronic respiratory disease among the general population. These data are summarized here.

I. MORTALITY

In much of what follows the Registrar-General's figures are used. It is first of all necessary to understand what is implied by "chronic bronchitis" when used as a cause of death on death certificates. It is likely to cover a wide range of conditions from bronchiectasis or chronic bronchitis and emphysema to the degenerative conditions, often primarily cardiovascular, of the older age groups. The Registrar-General has often indicated that there is an overlap between bronchitis and pneumonia as the primary cause of death, and also a similar overlap between deaths caused by respiratory and heart diseases at older age groups. Indeed, as long ago as 1848, William Farr pointed out that "bronchitis and other inflammations or congestions of the chest were . . . the causes of many deaths, particularly among persons afflicted with asthma and heart disease."

If a large proportion of deaths are assigned indifferently to respiratory or myocardial causes, a study of the respiratory deaths alone may give a misleading impression. For this reason, where possible, deaths from bronchopneumonia and from the group of deaths termed "myocardial degeneration" are considered in parallel with those from bronchitis.

The change in 1939 of the Registrar-General's method of selecting the primary cause of death from certificates with multiple causes has greatly affected the respiratory group of deaths. Under the rules prevailing before 1939 any heart disease was chosen as the primary cause of death in preference to a respiratory disease when both were mentioned together. From 1939 the deaths have been classified according to the primary cause given by the doctor signing the death certificate. The effect of this change can be judged by the fact that the 1938–9 bronchitis mortality figures would show a "100% increase at all ages for each sex, the effect being smallest at ages under 5 and greatest at ages between 55 and 75" (Registrar-General, 1947). Thus, in general, the figures of respiratory deaths before and after 1939 cannot be compared other than for the crude total rate for which the Registrar-General gives conversion factors.

As mortality from bronchitis is negligible below the age of 50, it is unlikely that the mortality rates will be affected very much by the exclusion of those in the armed Forces during the war years.

Sex and Age Differences

When used for comparing groups such as men and women inaccuracies in classification are likely to affect both sexes equally and comparison can be informative.

Fig. 1 gives the age specific death rates from bronchitis for men and women separately. The rates for men are three to four times those for women of the same age; the mortality of men of each age group is, in fact, very similar to the mortality of women 10 years older. (A similar difference between the rates for men and women is found in the Scottish figures, although the rates are in fact lower.) Examination shows that this is not due to more women than men being certified as dying of heart disease.‡

*A précis of some of the main points formed a contribution to a symposium on chronic bronchitis at the Annual General Meeting of the Association of Physicians of Great Britain and Ireland in May, 1952.

†Working on a Medical Research Council grant.

‡A difference of three times in the respiratory rates would mean that nearly all the female deaths attributed to "myocardial degeneration" would have had to be misdiagnosed in this way. This is very unlikely, especially as the male rate from this cause is already about one and a half times that of the female. Moreover, the male/female ratio for death rates from myocardial degeneration has remained constant throughout this period. The group of bronchitis deaths which also had myocardial disease mentioned on the certificate as a contributory or secondary cause of death were tabulated by the Registrar-General up to and including 1945 and formed about 30% of all bronchitis deaths for both sexes at 45–54, 37% at 55–64, and about 40% at 65–74 years.

That men have a higher death rate than women for all causes is a well-known feature of the past 100 years, and during this period the male excess has steadily increased (Martin, 1951). The rates from bronchitis, however, show a greater male excess than for all causes, the male/female ratio for bronchitis being more than twice that for deaths from all causes in age groups 45–54 and 55–64, while for the 65–74 age group the male/female ratio was in excess to a smaller degree. The myocardial degeneration group of deaths and deaths from bronchopneumonia, however, shows a male excess much nearer the excess for all deaths (Table I).

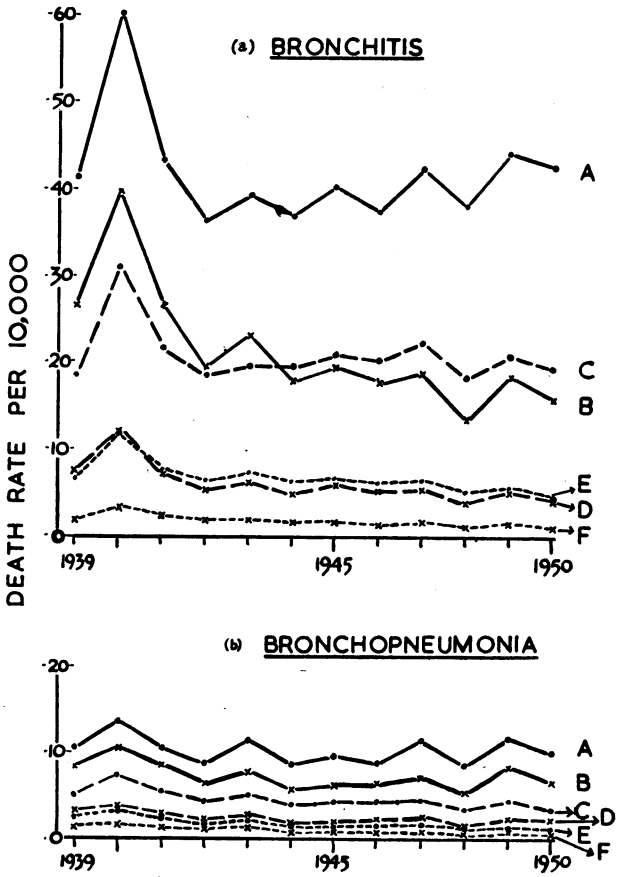

FIG. 1.—Bronchitis and bronchopneumonia death rates, 1939–50. A=Men aged 65–74. B=Women aged 65–74. C=Men aged 55–64. D=Women aged 55–64. E=Men aged 45–54. F=Women aged 45–54.

TABLE I.—*Ratio of Male to Female Death Rates in Age Groups*

Year	Bronchitis			Broncho-pneumonia			Myocardial Degeneration			All Causes		
	45–54	55–64	65–74	45–54	55–64	65–74	45–54	55–64	65–74	45–54	55–64	65–74
1939 ..	3·5	2·5–	1·6	1·9	1·6	1·3	1·4–	1·4	1·2	1·5–	1·5	1·4
1940 ..	3·6	2·6	1·5	2·0	1·6	1·3	1·5–	1·5–	1·3	1·6	1·6	1·4
1941 ..	3·3	3·1	1·6	1·9	1·9	1·2	1·4	1·5	1·3	1·5	1·6	1·4
1942 ..	3·8	3·6	1·9	1·9	1·9	1·4	1·3	1·7	1·4	1·5	1·6	1·4
1943 ..	3·8	3·2	1·7	1·9	1·8	1·4	1·5	1·6	1·3	1·5	1·6	1·4
1944 ..	3·8	4·0	2·1	2·4	2·1	1·5	1·6	1·6	1·3–	1·6	1·7	1·5–
1945 ..	3·8	3·5–	2·1	2·1	2·2	1·5	1·4	1·5–	1·3–	1·5	1·7	1·5–
1946 ..	4·1	3·9	2·1	1·9	1·9	1·4	1·3	1·6	1·3	1·5	1·7	1·4
1947 ..	3·6	4·1	2·3	1·9	1·6	1·6	1·5–	1·6	1·3	1·6	1·7	1·5–
1948 ..	3·9	4·7	2·8	1·8	2·2	1·6	1·5–	1·6	1·3	1·5	1·8	1·5
1949 ..	3·6	4·1	2·4	1·7	1·8	1·4	1·3	1·6	1·3	1·6	1·8	1·5
1950 ..	4·4	4·4	2·7	1·5	1·6	1·5	1·3	1·4	1·3	1·6	1·8	1·5

Social Class

The most recent data on social class mortality are for the triennium 1930–2, when there was an inverse relationship between the death rate from respiratory disease and the social class. The mortality from bronchitis (Fig. 2, Tables II and III) in social class V (unskilled workers) for both men and women was about five times as great as that for social class I (professional classes). For myocardial disease the correlation with social class is also similar, but the gradient is less steep. Sutherland (1947) has pointed out that each social class consists of a conglomeration of occupations which show a wide range of mortality rates within each class. He examined the variation between these classes compared with that within each class. This has been done here for both bronchitis and myocardial diseases, and the observed gradient with social class was statistically significant for both of these disease groups.†

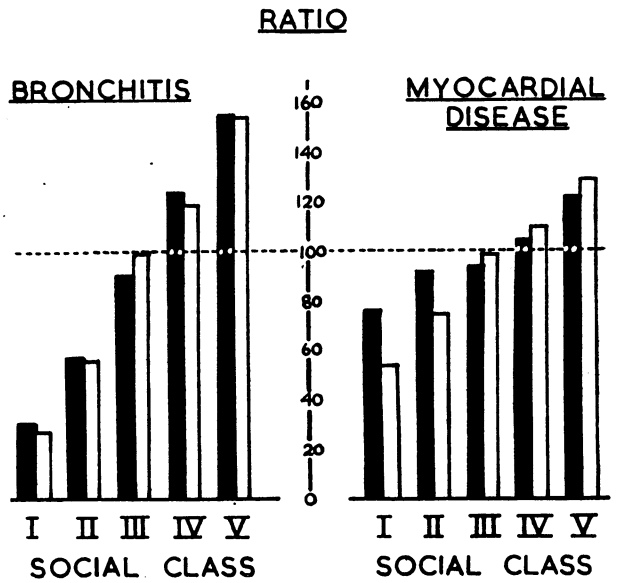

FIG. 2.—Distribution of deaths from bronchitis and myocardial disease according to social class, 1930–2. Ages 20–65 years. The mortality for all men (black columns) or all married women (open columns) is represented by 100.

TABLE II.—*Bronchitis Deaths, 1930–2. Standardized Mortality Rates*

Social Class	Men		Married Women	Single Women
	20–65	35–65	35–65	35–65
I	31	31	27	87*
II	57	57	57	
III	91	92	99	58
IV	124	126	121	
V	156	157	156	78
All social classes, including unoccupied ..	100	100	100	100

* Including unoccupied single women.

One of the striking features of Fig. 2 is that, although the actual rates for men were higher than for women, the *ratio* of deaths between the various social classes was similar for the two sexes. It would appear, therefore, that in 1930–2 some at least of the factors which determined this ratio affected men and women equally, and these would more likely be of a general environmental rather than of an exclusively occupational nature.

To see if the association between social class and chronic bronchitis still exists in spite of changed conditions, a more up-to-date measure is available. Wilkins (1952) found that a useful measure of the socio-economic status of towns is the percentage of households in which the chief wage-earner has a basic wage exceeding £7 10s. a week. He estimated this percentage for the county boroughs of

†As in Sutherland's paper, the analysis of variance was applied to the logarithms of the standardized mortality ratios, as these, unlike the ratios themselves, were normally distributed. The ratio of the between to within variances were for bronchitis 7.7 ($P<0.001$) and for myocardial diseases 5.8 ($0.01>P>0.001$).

TABLE III.—*Bronchitis Deaths, 1930–2. Comparative Incidence of Social Class Mortalities. (Rate for all Social Classes, Including Unoccupied in Each Age Group=100). (From Registrar-General's Decennial Supplement, 1931)*

Social Class	Men					Married Women					Single Women				
	20–	25–	35–	45–	55–65	20–	25–	35–	45–	55–65	20–	25–	35–	45–	55–65
I	—	D	D	32	33	—	—	D	D	D	—	—	—	—	—
II	D	67	53	55	59	—	D	44	67	55	—	D	D	D	47
III	88	79	86	90	94	D	106	98	99	98	59	58	82	100	117
IV	D	113	129	122	127	—	92	114	111	126	D	—	—	E	170
V	155	142	169	170	147	—	148	167	149	157	—	—	—	—	E
Unoccupied	E	737	E	E	45	—	—	—	—	—	335	271	162	106	93

D and E indicate deficit or excess when there are fewer than 20 deaths recorded.

England and Wales for 1949–50. When this was compared with the bronchitis figures there was a significant correlation between it and the bronchitis death rates for men aged 45–64 in county boroughs for 1947–8 ($r = -0.65 \pm 0.12$). Many factors are reflected in this measure, but it does show that there is still at the present time a correlation existing between bronchitis deaths and conditions grouped vaguely as "socio-economic."

Region and Degree of Urbanization

The highest death rates from bronchitis are experienced in the northern and western parts of England and Wales (see Table IV and Fig. 3). The conurbation of South-east Lancashire has the highest rate (20.8 per 10,000 men in the 45–54 age group), which is almost four times the rate for the southern region (5.4 per 10,000). How far this difference is attributable to geographical conditions and how far to urbanization it is impossible to say.

TABLE IV.—*Bronchitis Deaths, 1950. Rates per 10,000 per Year*

Standard Region	Age 45–54		Age 55–64	
	M	F	M	F
England and Wales ..	10·8	2·5	43·0	15·8
Northern	13·2	3·2	40·5	18.7
Tyneside conurbation ..	18·8	3·3	63·8	28·1
Remainder	11·2	3·2	32·3	15 2
E. and W. Riding	13·6	3·3	56·1	18·7
W. Yorks conurbation ..	15·0	4·1	63·3	19·8
Remainder	12·6	2·5	50·8	17·8
North-western	16·4	4·7	61·7	26·0
S.E. Lancs conurbation	20·8	6·2	77·8	34·4
Merseyside ,, ..	15·7	3·2	64·6	19·6
Remainder	12·9	4·0	47·1	21·5
North Midland	8·6	2·2	42·8	11·2
Midland	12·8	2·8	45·9	18·3
W. Midland conurbation	16·1	3·4	56·2	22·6
Remainder	9·5	2·1	36·6	14·1
Eastern	5·9	1·1	24·4	9·2
London and S.E.	9·0	1·8	40·5	12·3
Greater London	9·9	1·9	46·6	13·8
Remainder	5·9	1·3	24·5	8·6
Southern	5·4	1·3	25·7	8·7
South-western	6·4	1·4	25·9	10·3
Wales	12·2	2·4	46·9	18·5
Wales I	14·0	2·7	51·5	22·2
Wales II	7·6	1·8	37·1	11·4

Urbanization has repeatedly been shown to influence deaths from chronic bronchitis, and the latest figures confirm previous experience. The highest death rate from bronchitis in both sexes and at all ages is experienced by those living in "conurbations." There is a progressive decline in the death rate with the size of the towns, and the lowest figures are found in the rural areas (Table V, Fig. 4).

TABLE V.—*Bronchitis and Degenerative Heart Diseases, 1950. Death Rates per 10,000. (Age 45–54)*

	Bronchitis		Degenerative Heart Disease	
	M	F	M	F
England and Wales ..	10·8	2·5	7·4	5·2
All conurbations	13·7	3·1	6·9	4·3
All conurbations excluding Greater London	17·5	4·4	9·1	6·1
Urban areas with population of 100,000 and over ..	12·2	2·7	7·8	5·7
50,000 and under 100,000	10·6	2·6	8·9	5·7
Under 50,000	9·5	2·3	8·3	6·1
Rural areas	5·5	1·3	6·8	5·3

The ratio of male to female death rates does not appear to vary much for the varying degrees of urbanization, but does differ between the different standard regions, the north-western having the lowest ratio 3.5, for age 45–64, with North Midlands very near (3.8), and, at the other end of the scale, London and Wales each with a ratio of 5.1 and the eastern region with 5.4.

"Degenerative heart diseases" do not show such a consistent fall in rates with a decrease in size of town, but those living in conurbations (excluding Greater London) have the highest risk and rural areas the lowest risk of dying from these causes (Table V).

Atmospheric Pollution

Stocks (1947) drew attention to the inverse relation that existed between hours of sunshine and bronchitis death rates. He pointed out that smokiness of atmospheres, the shorter day, and the excess of cloud are all cumulative and affect northern towns particularly. Attention has been drawn to the relationship between atmospheric pollution and death rates from respiratory causes in many papers, such as those by Mills and Mills-Porter (1948) and Herrington and Moriyama (1939), but in all these studies the areas with the worst pollution are also those with lower social and economic standards.

There is ample evidence that atmospheric pollution may be responsible for the deaths of many who suffer from

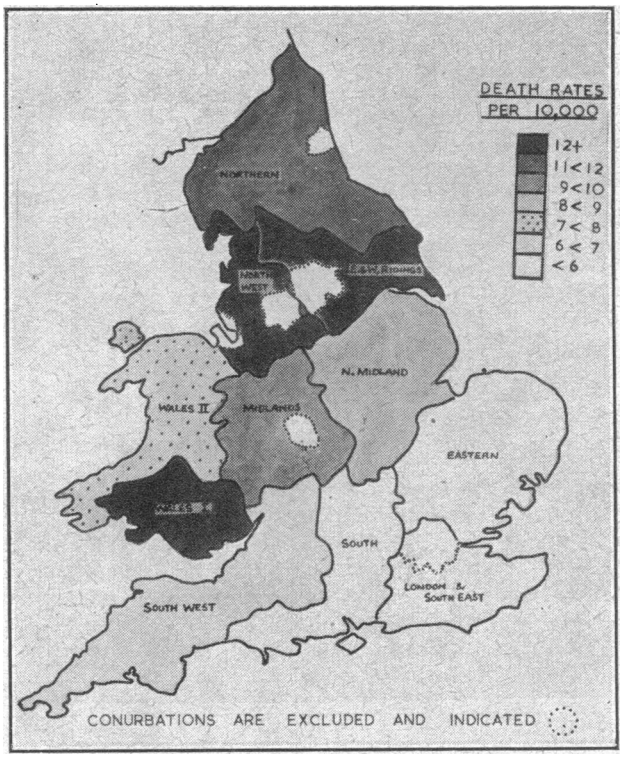

FIG. 3.—Bronchitis death rates in regions, 1950. Men aged 45–64 years.

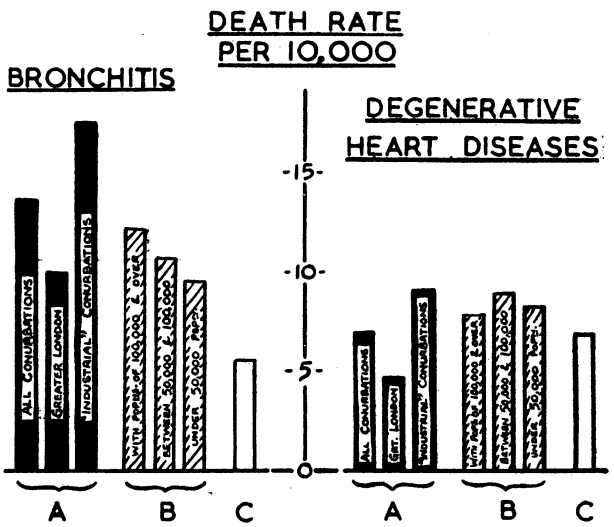

FIG. 4.—Distribution of deaths from bronchitis and degenerative heart diseases according to degree of urbanization, 1950. Men aged 45–64 years. A=Conurbation. B=Urban districts. C=Rural districts. ("Industrial" conurbations are: S.E. Lancs, Merseyside, Tyneside, W. Yorkshire, and W. Midlands.)

chronic respiratory and heart disease. The Meuse disaster in 1930 and the Donora Valley incident of 1948 are widely quoted. The extensive official report of the Donora episode shows that over 40% of a population of 14,000 were in some way affected, but that all but 1.7% were quite well within a week of the fog lifting. It was those who suffered from long-standing respiratory disease who were more likely to be killed or incapacitated for long periods. London has long provided examples of the results of the lethal nature of severe fogs, which may give a death rate of the same order as that experienced in the severest epidemics (*British Medical Journal*, 1953). The recent London fog was responsible for 6,000 deaths, most of which were in the age groups above 45.

It may well be that exposure to continuous but much less severe atmospheric pollution, such as is experienced in many of our large towns, contributes to the high death rate from chronic bronchitis of those who live in industrial towns, but no evidence is available which makes it possible to be certain of this point.

At the other end of the scale, the Scandinavian countries, with a dry atmosphere little polluted by smoke, record very few deaths from bronchitis. For example, in 1948 the death rates per 10,000 from bronchitis in these countries for the age group 50–60 years were:

	Males	Females
Norway	0·2 (5)	0·4 (7)
Sweden	0·4 (25)	0·2 (12)
England and Wales	17·8	4·5–

The actual numbers of deaths in the Scandinavian countries are given in parentheses.

The actual number of deaths were small in the Scandinavian countries, but when all respiratory deaths (excluding tuberculosis and carcinoma of the bronchus) were considered together there was still very little difference between Norway and Sweden or between men and women in these countries, whereas this country's rates were much higher (Table VI).

TABLE VI.—*All Respiratory Deaths (Excluding Tuberculosis). Rate per 10,000*

Age	Norway		Sweden		England and Wales	
	Men	Women	Men	Women	Men	Women
40–49	1·8	1·9	1·1	1·1	5·2	2·4
50–59	4·4	3·3	3·6	2·1	17·4	5·4
60–69	11·9	9·3	8·1	7·1	46·0	14·3
70–79	39·5	44·3	26·0	30·6	80·3	43·0

It is possible that deaths from chronic respiratory disease were certified as cardiac deaths in Scandinavian countries. Examination of the figures shows this cannot affect the relative positions to any large extent, as the rates for death from heart disease are lower in Norway and Sweden than in this country.

Occupation

(The latest figures are for 1930–2—that is, when there was some overlap between respiratory and myocardial causes of death. There is a significant correlation between the standardized mortality ratios for bronchitis and for myocardial disease for the different occupations, $r=0.68$; $P<0.0001$.)

TABLE VII.—*Occupational Distribution of Bronchitis Deaths, 1930–2. Males Aged 20–65. (All Males=100)*

Social Class III	Ratio	*Social Class IV*	Ratio	*Social Class V*	Ratio
Coal hewers and getters	170	Metal grinders	222	Costermongers, newspaper sellers	230
Metal moulders and diecasters	169	Road transport—horse-drivers	205	Messengers, porters, etc.	203
Furnacemen, rollers, etc.	163	Iron and steel foundry furnacemen and labourers	179	Water transport, dock labourers	199
Masons, stonecutters	147	Coal workers, above ground	172	General labourers, etc.	187
Cotton-spinners	132	Coal—others below ground	143	General unskilled workers, etc.	176
Warehousemen, storekeepers	118	Textile dyers	140		
Salesmen of meat, greens, etc.	117	Coal—conveying to shaft	135		
Paper-hangers, painters, etc.	111	Sawyers and wood turners	128		
Boiler-makers, etc.	108	Coal workers below ground	126		
Hairdressers, etc.	107				
Boot factory workers (skilled)	103				
Boot-makers and repairers	102				
Tailors, etc.	100				
Cotton-weavers	97				
Bricklayers	94				
Smiths and skilled forge-workers	92				
Total of all in Social Class III	*91*	*Total of all in Social Class IV*	*124*	*Total of all in Social Class V*	*156*
Stationary engine drivers	89	Fitters' labourers, etc.	123	Builders' labourers, etc.	133
Fitters, mechanics, etc.	81	Metal machinists	111	Railway porters	117
Postmen and sorters	80	Coal workers—roadways	102	Other workers, navvies, in building	74
Domestic servants (indoors)	73	Boiler firemen and stokers	93	Agricultural labourers	52
Typists and other clerks	71	Platelayers	90		
Bakers and pastrycooks	67				
Carpenters	65				
Road transport—motor-drivers	64				
Railway engine drivers, etc.	60				
Civil Service typists and clerks	54				
Gardeners, nurserymen, etc.	51				

The standardized mortality ratios for bronchitis for different occupations are given in Table VII. Owing to the great differences between social classes the occupations have been grouped into their respective classes. Dusty trades were high on each list, and the figures for 1930–2 almost certainly will include cases of pneumoconiosis, which were not at that time diagnosed with the same accuracy as to-day.

Predominantly outdoor work does not seem to have an adverse effect. Gardeners, agricultural labourers, railway porters, builders' labourers are all below their own social class averages. Sutherland (1947) reached a similar conclusion. It must, however, be remembered that these figures are based on the occupation as given on the death certificate, which may not be the predominant occupation of the individual's working life. This was especially likely to apply in the 1930's. Moreover, the existence of chronic bronchitis may have driven men from work involving heavy physical labour either to lighter work or, more usually, to no work at all. The very high death rate from this cause among unoccupied males probably reflects this result of the disease.

II. SICKNESS

Little information is available on the incidence of sickness from chronic bronchitis. Inquiries made by the Social Survey in 1951 suggested that 16.5% of the total days lost from sickness by those aged 21 and over resulted from respiratory complaints* (this excluded 23% due to colds and influenza) (Table VIII).

TABLE VIII.—*Social Survey—Survey of Sickness, 1951. Total Days Lost Each Month. Age 21 Years and Over (4,000 Persons Interviewed Each Month)*

Month†	Males			Females		
	All Illnesses	Colds and Influenza	Respiratory Diseases‡	All Illnesses	Colds and Influenza	Respiratory Diseases‡
January ..	8,384	3,764	1,336	11,333	6,267	2,078
February..	6,546	2,671	1,137	7,669	3,038	1,635
March ..	5,077	975	1,185	5,094	1,311	990
April ..	3,941	329	820	3,529	378	470
May ..	3,487	238	630	3,116	230	334
June ..	2,484	99	245	2,944	80	318
July ..	2,831	63	289	2,505	88	204
August ..	1,414	27	205	954	63	37
September	1,173	53	110	1,440	143	184
October ..	2,732	238	300	3,534	576	440
November	3,664	317	663	3,506	433	640
December	3,453	458	690	4,317	624	1,016
Total ..	45,186	9,232	7,590	49,941	13,231	8,346
Total, incl. Aug. and Sept. twice	47,773	9,312	7.905	52,335	13,437	8.567
Percentage of all illnesses ..		20	17		26	16

† Based on interviews in the two following months except for August and September, when, owing to the General Election, there were no interviews in October.
‡ For list of diseases included, see footnote on this page.

In a survey of illness in general practice Pemberton (1949) found that in Sheffield bronchitis was the commonest cause for which a doctor's advice was sought. In the eight practices examined it accounted for 13% of consultations in a week in winter and 7.6% in a summer week. Pemberton (1952) reported that in three Sheffield steel-works employing 9,970 men bronchitis accounted for 13% of all medically certified illness over the period January–June, 1949. In a factory in the Manchester area employing some 1,700 employees this percentage was 14.5. Using data from Raffle (1951), we estimated that 13,000 man years are lost annually in England and Wales from bronchitis.

Sex Differences

What little information there is suggests that the male mortality excess from this disease may not reflect its true sex incidence. In fact the Social Survey found in 1951 that of all days lost during the years through illness the women lost more through respiratory complaints than the men (Table VIII). The women seemed to have shorter and more frequent attacks than the men. For women not going to work the criterion of "days lost" is taken to mean the number of days on which they were prevented by the illness from going out of doors. These figures are open to criticism, since they are based on interviews in which information was sought about the illnesses and days of incapacity experienced during the preceding two months and the cause of such illness is that given by the informant.

In the Statistical Report of the Health of the Army 1943–5 (1948) it was found that in 1943–4 the percentage of A.T.S. admitted to hospital for bronchitis, when standardized for age, was higher than that for soldiers, whereas the percentage of cases requiring discharge from the Army was much higher for men than for women. This report dealt, of course, with a highly selected group of both men and women, but it comments: "This difference between discharge and morbidity sex differentials suggests that (*a*) the incidence of the more serious type of bronchitis—namely, cases leading to discharge—is higher among men, and (*b*) the reverse is true of the milder cases that do not involve discharge." Of all military discharges (category E) for 1943–4, 50% were due to bronchitis.

In a survey of respiratory illness in Corby in 1949, Sutherland and Wilson (1950) concluded that "the incidence of respiratory illness among women aged 15 to 44 was double that reported by men."

There is very little information on sickness among women over 45 years of age. Firms keeping records of certified sickness absence for men and women doing similar work find that women have from two to three times the men's rate, age being comparable, for absence due to bronchitis as well as that due to all certified sickness. It must be remembered that this is a comparison of sickness absence, and that economic and social conditions may make absence from work more necessary or perhaps easier for a woman than a man. It is difficult, however, to believe that these factors would change a two to three times male excess, as seen in the mortality figures, into a two to three times female excess for sickness.

Occupation

There is very little information on the effect of occupation on sickness due to bronchitis. Bradford Hill (1929) examined the sickness experience of printers from 1921 to 1925 as given by the records of approved societies, and in the next year he also examined similar figures for operatives in Lancashire cotton-mills for 1923–7, which was repeated 10 years later by Harvey (1939). The number of days' sickness per person per year from respiratory causes (excluding colds and respiratory tuberculosis) are shown in Fig. 5. This chart also gives the recent post-war experience

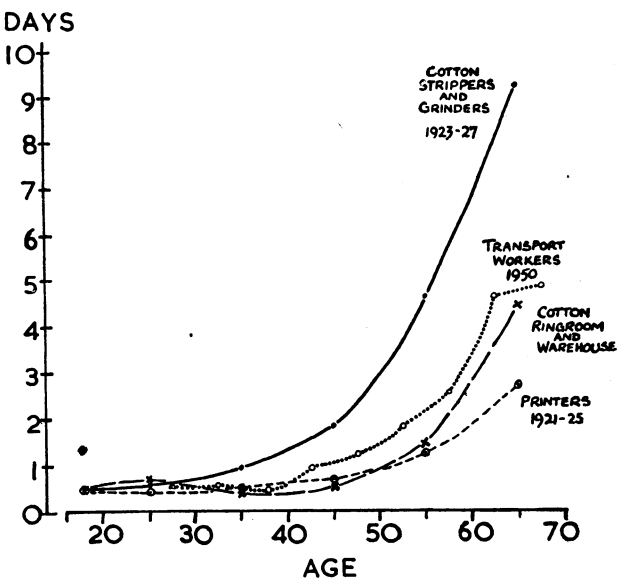

FIG. 5.—Sickness from bronchitis and other respiratory disease (excluding respiratory tuberculosis, colds, etc.) in males. Number of days' sickness per person per year. Printers and cotton workers from Bradford Hill (1929, 1930), transport workers from Raffle (1951).

of a group of transport workers (Raffle, 1951). It will be seen that those exposed to cotton dust (strippers and grinders) begin to show an increase in lost time from respiratory causes at a much earlier age than those not exposed to dust. It must be pointed out, however, that cotton dust is known to be irritating. Figures are not available to show the effect upon sickness rates of bland or inert dusts, though it has long been held that "dust which impairs the vitality of the lungs predisposes to tuberculous infection . . . and . . . to other respiratory disease" (Collis, 1923).

*Acute sinusitis; laryngitis and tracheitis; acute upper respiratory infection of multiple or unspecified sites; pneumonia; bronchitis; other respiratory diseases (excluding hypertrophy of tonsils and adenoids).

Disablement

The survey of registered disabled persons to which reference has already been made was carried out in four regions —London, Midlands, North-west England, and Scotland. In the north-western region not only was bronchitis the largest single disease group encountered (with the possible exception of skeletal conditions) but it accounted for more unemployment at all ages and social levels than did any other physical condition. In the sample of 1,184 drawn from this area there were 124 patients with chronic bronchitis of whom 24 (20%) were unemployed. The prospects of employment for men who were severely disabled by bronchitis did not appear to be influenced by the possession of manual skill—this was in marked contrast to general experience. Those with bronchitis who were unemployed at the time of the interview had often undergone a steady decline in social status since becoming disabled. The frequent winter exacerbations of their disease and the necessary long absences from work made them very uncertain employees. It was estimated that 42% of those with bronchitis were severely incapacitated for any type of work, whereas only 23% of the rest of the sample were disabled to a similar extent.

DISCUSSION

While the facts given above are of interest the reasons for them still remain obscure, and much of what follows is but surmise.

Sex Difference

The reason for the male mortality excess from chronic bronchitis is not clear, and is made more difficult to understand by the apparent excess of respiratory sickness among women. The observation that chronic bronchitis takes a more serious course in men is confirmed by Fulton (1953), who has found that in a series of deaths from cor pulmonale in a Manchester hospital over 90% were in men. This sex difference in bronchitis may be due to hormonal or other constitutional differences, so resembling rheumatoid arthritis and coronary disease in its predilection for a particular sex. The fact, however, that this difference is not observed in the Scandinavian countries may be an argument against such an explanation. It might, however, be explained by the different work habits of men and women. Comparatively few women work for long periods in cold, rain, fog, and dust. Nor is there the same economic urge for them to return too early to such conditions following acute respiratory infection. Physical effort carried out during or immediately after an acute respiratory infection may also be a factor in the different sex incidence. For the most part men of social classes III, IV, and V do heavier physical work than women. It is likely that this heavy exercise and the heavy breathing it induces may produce excessive stretching in lung tissue still abnormal as the result of recent infection. The fact that those conurbations where it is the custom for married women to go out to work show a lower sex difference than in those where most married women stay at home supports this hypothesis.

Smoking may also be a factor in producing this sex difference. In a series of 50 male patients with chronic bronchitis seen clinically in the north-western region almost all had been cigarette smokers. A number regard the predyspnoeic stage of their bronchitis as a "smoker's cough." Most of them had continued to smoke except during the more acute exacerbations of their disease, and many had ultimately to cut it down or give it up completely.

If these surmises are in fact correct, one might look for a narrowing of the gap between male and female deaths from chronic bronchitis in the next 20 years, first, because of the reduction in physical work required of the modern workman on account of increased mechanization; and, second, because the smoking habits of the sexes have undergone a change.

Social and Economic Factors

Many writers have emphasized the importance of social factors in the aetiology of chronic bronchitis. Overcrowding and cross-infection, malnutrition, and inability to treat early respiratory infections with enough care may all play a part. In most working-class homes it is impossible to treat a serious respiratory infection with the respect it deserves, and the cross-infection and re-infection that ensue among many of these families is familiar to most general practitioners. Douglas (1951) found that lower respiratory tract infection in the first six months of life was four times as great in the infants of manual workers as in those of professional and salaried classes, and he attributes this to "the general pattern of their living as well as their home conditions."

The greatly improved nutrition of the children of social classes IV and V, and the remarkable reduction in overcrowding reported by the Registrar-General (1952) in all our slum areas, may do something to reduce the excess of this disease among these social classes in the future.

Urbanization and Location

It is difficult to separate the effects of socio-economic factors and those due to urbanization and location. Living in a town involves more opportunities for cross-infection during entertainment and travel. It is not unlikely that pollution of the atmosphere from small amounts of coal dust and sulphur dioxide has an irritating effect on the respiratory tract. There is no doubt at all that smoke associated with fog has a serious effect on the elderly and the chronic bronchitic in precipitating a mortal bronchopneumonia. Part of the excess of deaths in the poorer classes may be accounted for by their living in a more heavily smoke-polluted atmosphere.

It is not easy to be sure of the importance of location, because the industrial towns, with their crowding and heavy atmospheric pollution, happen to be situated very largely in the north and west. It is true that the rural areas of the north and west show higher figures than the rural areas of the south and east, but this may be due to contamination from nearby industrial areas. It seems probable, however, that the humidity of these parts, particularly when it is accompanied by smoke, has a bearing on the incidence and course of chronic bronchitis in the north-west. The strikingly low mortality rate from this disease in the Scandinavian countries, where a much drier as well as cleaner atmosphere is enjoyed, supports this view.

Disablement

The serious nature of this disease is shown by the high incidence of disablement among its victims. At a comparatively early stage they may become incapable of heavy physical effort, and winter exacerbations make them unreliable workers throughout the winter months.

Little can be done to help the patient with established emphysema, and any hope lies in prevention. While the social and occupational factors are slowly being mitigated it would seem that the general practitioner has an important part to play in reducing this disablement. The modern range of antibiotics have provided him with a means of giving effective treatment for the acute respiratory infections, and the National Health Service has made the full treatment of these conditions freely available to everyone. It would also seem to be important to persuade the man whose job involves heavy physical effort or exposes him to fog, cold, or dust to delay his return to work until his chest has fully recovered from acute pulmonary infection. By such measures fewer bronchitics may pass into the chronic stage and their deterioration may be retarded.

CONCLUSION

For many years this crippling disease has been complacently accepted, and the "cough bottle" has been one of our national institutions. The problem is one of great complexity. A logically planned attack upon it cannot be made until more is known of the weight to be given to various aetiological factors. Further investi-

gations planned to throw light on the different incidence of the disease in the two sexes might give a useful lead in such a study. Long-term studies of the natural history of the disease are already in progress and are likely to give information on the importance of certain occupational factors.

It is certain, however, that the problem is too difficult to be solved by a piecemeal approach. What is needed is a well-planned and co-ordinated attack by experts from various fields. Quite apart from humanitarian consideration, the economic loss resulting from this disease calls for immediate action.

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THE PLACE OF THE HOSPITAL IN A NATIONAL HEALTH SERVICE*

BY

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Administrative Areas

Our next problem in a combined service is the areas to be covered and the populations to be served. Many think that there are too few regional hospital boards and that the original conception of between 30 and 40 would have been better. This might have avoided the expensive administrative set-up of hospital management committees and also have avoided the friction which tends to develop between the boards and the management committees. There are, however, obvious advantages in linking hospital boards with teaching hospitals, though some may say that the disadvantages outweigh them. The location of the university medical schools, placed where they are for entirely different reasons than to be the nucleus of a national health service, certainly caused grave difficulty when the boundaries of the 14 regional boards were being settled. It is clear that if there were a combined service a much larger number of areas than 14 would be needed. There are 145 local health authorities and about the same number of executive councils. In any organization of a combined service, the hospital areas would have to coincide with those of local authorities, many of which would have to be associated with their neighbours for the purpose of making an adequate area for hospital planning—generally regarded as one to serve at least one million people. This coincidence of boundaries of responsibility would in itself greatly facilitate co-operation between the hospital services and those of local government.

It is the dream of many to restore hospital provision to local government. With salaries and conditions of service for hospital staffs fixed centrally and specific regulations made concerning the method of appointment of consultants, the main objections to this are not nearly so strong as in the past, but, without ruling it out, I will not discuss it further, as it hinges on the relationship between the finances of central and local government and on a complete reform of the boundaries of local government areas, involving inevitably the disappearance of many of the smaller local authorities. The emotional reaction to any such proposal is infinitely greater even than that evoked when it is proposed to close a small hospital. Parliament is unlikely, in the foreseeable future, to tackle such a thorny and controversial subject.

My conclusion, therefore, on the questions of a combined service, and whether it should be administered by nominated or elected bodies, is that the practical difficulties of making any radical change, particularly at this stage, are insuperable, but it is not beyond the realm of realism to go back to the "Willink" proposals so far as the number of hospital boards is concerned, and this would ensure a much closer association with the other two branches of the service—the local authorities and the executive councils.

Why Does the State Charge Itself with the Cost of Hospitals?

In the meantime, it behoves us to look again at the administrative structure as it exists to-day and try to determine what is the proper function of a hospital in a national health service. In the first place, we must remind ourselves that Governments do not pour out vast sums of money because they are sorry for sick people. They do so because there is a national insurance scheme which pays out money to people who cannot work because of ill-health and to the dependants of those who die, and also because the Government needs for the well-being of the nation, in peace or in war, the productive capacity of all its nationals who are able to work.

The first National Health Insurance Scheme provided from 1913 a general-practitioner service for insured persons. It was for the dual purpose of providing treatment so as to get the insured persons off the funds and back to work again as soon as possible and also to provide responsible certifying officers for sickness and disablement benefit. Sir William Beveridge, as he then was, said in effect in his report of 1942 (Beveridge, 1942) that if his scheme, which provided larger benefits, was to be successful a comprehensive medical service available to all, free at the time the service was needed, was essential. The link, again, is with the payment of cash benefits.

The objectives of the Service are, primarily, to maintain the health of the community, to prevent disease, and to restore to good health as soon as possible all those who fall ill. That the Service also relieves suffering and prolongs the life of the aged is incidental, as, collectively, whatever their private feelings, Governments, as such, are not sentimental.

Prevention of Illness and Speedy Restoration to Good Health

The insistence on prevention of illness and a speedy restoration to good health of those who fall sick as a major responsibility of a national health service is no new idea of my own. It is the thread running through the recent book

*The second of the Croonian Lectures delivered before the Royal College of Physicians of London on July 9.