

## RESPIRATORY SYMPTOMS AND SMOKING HABITS OF SENIOR INDUSTRIAL STAFF

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(RECEIVED FOR PUBLICATION JULY 23, 1964)

The prevalence of respiratory symptoms and the smoking habits of 224 industrial 'executives' aged 30 to 69 years in Social Classes I and II were ascertained by means of the Medical Research Council's questionnaire on respiratory symptoms; 31% had persistent cough, 25% had persistent phlegm, and 21% were short of breath on hurrying or going up a hill; 9% had had one or more chest illnesses in the past three years lasting for about a week, and 4% had 'chronic bronchitis'—defined as persistent phlegm and one or more chest illnesses in the past three years; 67% were smokers, 21% smoking more than 25 cigarettes (or equivalent tobacco) per day; another 20% had stopped smoking. The prevalence of cough, phlegm, and breathlessness was closely related to smoking habit.

Data for those aged 40 to 59 years are compared with that obtained from London Transport Board workers and a sample of the population studied by the College of General Practitioners. The latter was further analysed and suggests that the prevalence of cough and phlegm is more closely related to the amount smoked than to social class. The prevalence of chest illness is probably more closely related to social class and less to the amount smoked. It is suggested that, although smoking may initiate irritative respiratory symptoms, the precursors of bronchitis, additional factors are important in causing progression to disabling or fatal chronic bronchitis.

The association between bronchitis mortality and social class in males has been well established by the Registrar General of England and Wales. In the most recently published figures there is a steep gradient in the Standardized Mortality Ratio from 34 in Social Class I to 171 in Social Class V (Registrar General, 1958). Evidence of a similar association between bronchitis morbidity and social class is less obvious. Logan (1960), in a study of morbidity statistics from general practices in England and Wales, found for bronchitis a social class gradient in Standardized Patient Consulting Ratios which was similar to but less steep than the mortality gradient. In a study of men in the seventh decade, Brown, McKeown, and Whitfield (1957) showed a rising incidence of bronchitis from Social Classes I and II to Social Class V, but only among smokers.

Other studies of patients in hospital and general practice have failed to find any association between bronchitis and social class (Oswald, Harold, and Martin, 1953; Fry, 1954).

Community surveys of respiratory symptoms

which indicate the prevalence of the early stages of chronic bronchitis have been undertaken in populations consisting mostly of skilled manual workers who belong to Social Class III, and of partially skilled and unskilled workers (Social Classes IV and V) (Higgins, Oldham, Cochrane, and Gilson, 1956). They have seldom included sufficient numbers from professional and managerial workers (Social Classes I and II) to allow any reliable comparison between all classes.

In an attempt to get more information about the prevalence of early bronchitis in Social Classes I and II a survey of respiratory symptoms was undertaken among the senior staff of various industrial concerns in the London area. Particular attention was paid to smoking habits and their relation to symptoms, since cigarette smoking must now be accepted as a major factor in the aetiology of chronic bronchitis (*British Medical Journal*, 1963; Royal College of Physicians, 1962; Scottish Home and Health Department, 1963).

The Medical Research Council's questionnaire

on respiratory symptoms (Medical Research Council Committee on the Aetiology of Chronic Bronchitis, 1960) was used for the survey. The population studied was randomly selected from men participating in a scheme for routine health supervision (Meadows, 1964). Two hundred and twenty-eight (97% of the sample) were seen and the results are presented for the 224 aged 30 to 69 years; of these, 34% were directors, 46% specialists, and 21% supervisors. For convenience they are all referred to as executives. Similar data for respiratory symptoms and smoking habits are given for men from the same social classes recently surveyed by the College of General Practitioners (1961). The data from this latter survey have been further analysed to compare the relation between smoking and respiratory symptoms for all five social classes.

### Results

Prevalences of cough, phlegm, breathlessness, chest illness, and 'chronic bronchitis' for the male executives are shown in Table 1.

Although there is a general trend towards an increase in symptoms and chest illness with age, the age group 40-49 has a lower prevalence of all symptoms, except breathlessness, than the 30-39 age group. The reason for this is not clear. It was not due to differences in smoking habits.

In the survey undertaken by the College of General Practitioners (1961) a similar but not identical questionnaire was used, and comparisons are therefore limited to certain questions. Out of 787 men seen, the 104 aged 40 to 59 years from Social Classes I and II living in urban areas have been selected for comparison (Table 2).

The prevalence of morning cough, morning phlegm, and chest illness is very similar for the two populations in the 50-59 age group. For those aged 40 to 49 years the executives have a much lower

TABLE 2

COMPARISON OF RESPIRATORY SYMPTOMS IN THE TWO MALE POPULATIONS (COLLEGE OF GENERAL PRACTITIONERS' SURVEY AND EXECUTIVES) AGED 40 TO 59 YEARS DRAWN FROM SOCIAL CLASSES I AND II

Age Group	Population	No.	Percentage With		
			Morning Cough*	Morning Phlegm†	Chest Illness‡
40-49	C.G.P. Survey	48	40	40	10
	Executives	97	24	17	4
50-59	C.G.P. Survey	56	34	30	9
	Executives	65	37	28	11

\*Those who cough in the morning in winter (M.R.C. positive to questions 1 and 5; C.G.P. positive to question 2).

†Those who produce phlegm in the morning in winter (M.R.C. positive to questions 6 and 10; C.G.P. positive to question 7).

‡One or more chest illnesses in past three years lasting for at least a week, with increased phlegm.

prevalence of symptoms and illness than the men in the College of General Practitioners survey who compare unfavourably with the older men seen in the same survey.

There was no major difference in the smoking habits of those seen in the two surveys; both contained similar proportions of cigarette smokers. As a group, the executives smoked rather more heavily and had more non-smokers and fewer ex-smokers. A comparison of those between the ages of 40 and 59 is given in Table 3.

Data on the prevalence of respiratory symptoms in occupational groups obtained with the Medical Research Council questionnaire are limited. Recently a survey of London Transport Board (L.T.B.) clerical and maintenance workers who belong to Social Classes III and IV has been undertaken (Fletcher, 1964). Provisional figures indicate that the executives have a lower prevalence and severity of respiratory symptoms than the L.T.B. workers in the age group 40-49, but not in the older age group 50-59 (Table 4).

TABLE 1

PREVALENCE OF SYMPTOMS BY AGE IN MALE EXECUTIVES

Age Group	No.	Cough*		Phlegm†		Breathlessness‡		Chest Illness§		'Chronic Bronchitis'¶	
		No.	%	No.	%	No.	%	No.	%	No.	%
30-39	40	11	28	10	25	5	13	4	10	2	5
40-49	97	25	26	17	18	17	18	4	4	1	1
50-59	65	25	39	20	31	15	23	7	11	5	8
60-69	22	8	36	8	36	10	46	4	18	2	9
Total	224	69	31	55	25	47	21	19	9	10	4

\*Those who cough regularly in winter, irrespective of the time of day (positive to questions 1 and/or 3 and 5).

†Those who produce phlegm regularly in winter, irrespective of the time of day (positive to questions 6 and/or 8, and 10).

‡Those troubled by shortness of breath on hurrying or going uphill and over, *i.e.*, grade 2 and over (positive to questions 14a and over).

§One or more chest illnesses in past three years lasting for at least a week, with increased phlegm.

¶Regular production of phlegm and one or more chest illnesses in the past three years lasting for at least a week, with increased phlegm.

TABLE 3

COMPARISON OF SMOKING HABITS IN THE TWO MALE POPULATIONS (C.G.P. SURVEY AND EXECUTIVES) AGED 40 TO 59 YEARS DRAWN FROM SOCIAL CLASSES I AND II

Population	Percentage							
	Smokers (quantity)			Non-smokers	Ex-smokers	Smokers (type)		
	1 to 14 g./day	15 to 24 g./day	25 or more g./day			'Mixed'	Pipe or Cigar	Cigarette
Executives	23	27	20	12	19	11	12	47
C.G.P.	34	19	14	9	25	8	12	47

TABLE 4

COMPARISON OF PREVALENCE OF PHLEGM, CHEST ILLNESS, AND 'CHRONIC BRONCHITIS' IN MALE LONDON TRANSPORT BOARD WORKERS AND EXECUTIVES

Age Group	Population	No.	Percentage With		
			Phlegm	Chest Illness	'Chronic Bronchitis'
40-49	L.T.B.	433*	27	9	5
	Executives	97	18	4	1
50-59	L.T.B.	485*	31	10	6
	Executives	65	31	11	8

\*This was a stratified sample using a variable sampling fraction; 918 males were seen but the prevalence figures have been adjusted to make them representative of the total population from which the sample was drawn.

**Smoking and Symptoms Among Executives.**—In examining the relation of symptoms to smoking among the executives (Table 5), the non- and ex-smokers are kept separate although the numbers are small because they show considerable differences in prevalence of symptoms.

There is a definite trend of increasing symptoms, chest illness, and bronchitis from non-smokers through the grades of smokers. The differences between smokers and non-smokers are statistically significant for cough and phlegm and breathlessness ( $P < 0.01$ ). The differences between those smoking over 15 g. a day and under 15 g. a day are also statistically significant for cough and phlegm. Ex-smokers have more symptoms than non-smokers but less than

moderate or heavy smokers; they have the highest prevalence of chest illness of any group. The relation between smoking and symptoms might arise simply because the older workers who are expected to have more symptoms also smoked more than the younger workers. Further analysis of the data revealed that this is not the case.

**Social Class and Smoking.**—Data were extracted from the College of General Practitioners' study in order to consider further the effect of smoking on respiratory symptoms for the different social classes. Considering all social classes together, there is a marked increase in prevalence of morning phlegm from 6% among the non-smokers to 55% among the heavy smokers, with a consistent increase for the amount smoked in each social class except V (Table 6). The ex-smokers have a prevalence between that of the non-smokers and that of the light smokers. There is a less regular relation between prevalence of morning phlegm and social class. Considering all smoking groups together the prevalence is 35% in Social Classes I and II and 54% in Social Class V. Similar trends are observed when morning cough is examined in relation to smoking habit and social class.

None of the non-smokers in any social class reported a chest illness in the past three years. Among the smokers there is no clear relation between the amount smoked and the prevalence of

TABLE 5

PREVALENCE OF SYMPTOMS ACCORDING TO SMOKING HABIT IN 198 EXECUTIVES\*

Smoking Habit	Non-smokers		Cigarette and 'Mixed' Smokers						Ex-smokers	
			1 to 14 g./day		15 to 24 g./day		25 or more g./day			
Number	28		26		53		45		46	
	(no.)	(%)	(no.)	(%)	(no.)	(%)	(no.)	(%)	(no.)	(%)
Those with:										
Cough	1	4	1	4	25	47	26	58	9	20
Phlegm	2	7	4	15	20	38	18	40	7	15
Breathlessness	1	4	4	15	15	28	14	31	9	20
Chest illness	1	4	2	8	4	8	4	9	6	13
'Chronic bronchitis'	0	0	1	4	2	4	4	9	3	7

\*Those smoking only pipes or cigars have been omitted because the numbers are small.

TABLE 6

STUDY OF 507 MALES AGED 40 TO 59 BY THE COLLEGE OF GENERAL PRACTITIONERS:  
PERCENTAGE WITH MORNING PHELMG ACCORDING TO SOCIAL CLASS AND SMOKING HABIT

		Non-smokers	Smokers			Ex-smokers	All
Social Class	No.		1 to 14 g./day	15 to 24 g./day	25 or more g./day		
		35	199	121	64	88	507
		%	%	%	%	%	%
I and II	104	0	31	55	57	23	35
III	272	9	40	46	53	29	39
IV	66	0	47	63	67	10	46
V	65	0	57	61	50	46	54
All	507	6	42	52	55	27	41

TABLE 7

STUDY OF 507 MALES AGED 40 TO 59 BY THE COLLEGE OF GENERAL PRACTITIONERS:  
PERCENTAGE WITH PAST CHEST ILLNESS\* ACCORDING TO SOCIAL CLASS AND SMOKING HABIT

		Non-smokers	Smokers			Ex-smokers	All
Social Class	No.		1 to 14 g./day	15 to 24 g./day	25 or more g./day		
		35	199	121	64	88	507
		%	%	%	%	%	%
I and II	104	0	6	15	0	19	10
III	272	0	26	12	16	20	18
IV	66	0	16	0	0	30	12
V	65	0	21	11	17	36	20
All	507	0	20	11	11	23	16

\*One or more chest illnesses in the past three years lasting at least a week, with increased phlegm.

chest illness. The ex-smokers have a generally higher rate than the others (Table 7). There is, however, rather more chest illness among Social Classes III, IV, and V than among Social Classes I and II.

### Discussion

There are difficulties in comparing the prevalence of respiratory symptoms between different social classes. The findings are based on answers to questions which may reflect differences in the threshold of perception; it is possible that cough and phlegm regarded as 'normal' and overlooked by manual workers may be recorded as abnormal by executive staff. Similarly, an increase in phlegm may be regarded differently and this will be reflected in the number of chest illnesses accompanied by an increase in phlegm that are recorded.

Thus the comparisons made between social classes in this paper are liable to error. Nevertheless the general conclusions are that respiratory symptoms and illness vary with both the amount smoked and social class.

The most striking and probably the most reliable result was that of increasing cough, phlegm, and breathlessness in the executives according to the amount they smoked. A similar trend has been

found by Fletcher, Elmes, Fairbairn, and Wood (1959) among postmen (Social Class III) and has been demonstrated for each social class in the College of General Practitioners' study.

Evidence from this latter source suggests that persistent cough and phlegm, the initial symptoms of bronchitis, are more closely related to the amount smoked than to social class, whereas chest illness is probably more closely related to social class and less to the amount smoked.

Thus it appears that although smoking initiates irritative respiratory symptoms, the precursors of chronic bronchitis, some other factors that are broadly associated with social class are largely responsible for progression to disabling or fatal chronic bronchitis. It is possible that chest infection, particularly if inadequately treated, or if heavy work is resumed too quickly afterwards, might be responsible for such progression. These events are more likely to occur in partially skilled and unskilled workers where standards of personal and medical care are generally lower.

We should like to thank Miss Joan Walford for help in preparing this paper; Miss Sheila Farrow and Miss Elizabeth Farrow for computing assistance; the Respiratory Diseases Study Group of the College of General

Practitioners who gave access to their original data; and Dr. C. M. Fletcher who made available unpublished figures on London Transport Board workers.

We are also indebted to the firms and their senior staff who co-operated so willingly in this enquiry, to Lord Taylor, Miss Nancy Savill, and the staff of the Harlow Industrial Health Service and the Personnel Department of Richard Costain Ltd.

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