MISCELLANEA

Occupational Mortality

Coronary Heart Disease in 1950 with Some Related Observations

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To start with a thoroughly subjective, qualitative, untestable, and altogether unscientific statement, the Registrar-General's *Decennial Supplements* (concerned with occupational mortality) are the most important documents for social medicine that appear anywhere! We therefore owe a particular debt of gratitude to the General Register Office that an interim report on the massive analysis now being made of the mortality in 1949-53 (the five years round the census of 1951) has been published in the form of a series of tables for the single year 1950 (Registrar-General, 1954b). No occupational mortality data have been published since the volume referring to the years 1930-32 (Registrar-General, 1938) because no census was held in 1941, and without the numbers at risk supplied by the census the mortality of men in different occupations cannot be measured. The year 1951 is the centenary of occupational mortality studies by the General Register Office.

There is much of interest on coronary heart disease in the 1950 report. This condition may be said to have "arrived" in the last 20 years, emerging from obscurity in the 1920s to be reported increasingly commonly as a cause of death during the inter-war period (Morris, 1951; Registrar-General, 1929-1955). Although one year's data may not provide entirely reliable figures on some questions (having regard especially to the sample basis of the populations at risk) (Registrar-General, 1952), none at all on many others, and the full five years' analysis may produce some rather different pictures, the observations in the 1950 volumes are certainly worth noting. The present occasion will also be taken (since this is a "miscellany") to refer in rather random manner to some other matters on the margins of industrial medicine that may be of interest to readers.

Social Class—New Diseases for Old

Once again we are provided with tables of mortality in the five social classes which have been built up from the thousands of individual occupations. The analysis (Table 1) for males shows that Class I had about 50% more mortality from coronary heart disease than the average, and almost twice as high a death rate as Class IV. Class V, on the other hand, did slightly worse than Class IV, which is possibly due to the drift of men on account of ill-health into unskilled, Class V "light" jobs reserved officially or unofficially for disabled persons

(night-watchmen, lift attendants, etc.). This excess of mortality in the upper classes occurs of course in several other conditions. In general, it is one of the characteristics of our changing health problems that the "new" diseases show less of the concentration among social Classes IV and V that was so pronounced in the older public health problems. Fig. 1 is an attempt to illustrate this. In its upper half are four typical "classical" diseases: three show a marked "poverty trend". Contrariwise, in the lower half of the figure, of the four selected conditions which are (or appear to be) more common than in the past, only cancer of the bronchus shows this type of class trend, and it is small compared with that in bronchitis. Moreover, in such of the "old" diseases as did show a higher mortality in the upper social classes, the gap between the classes seems to be tending now to narrow (Morris and Heady, 1955).

Sex Differences

Table 1 shows that in 1950 the class gradient of mortality among married women was opposite to that in males. In view of the very different clinical picture of this disease in men and women (the condition, for example, is relatively far less common in women before the menopause*, is probably less severe in women, and has special associations in women with hypertension and diabetes) this contrast in epidemiological behaviour, the *social* picture of the disease, is interesting, and it is not the only instance.

MORTALITY AT AGES 45-64 PER 100,000
ENGLAND AND WALES
1950-52

	Conurbations	Rural Districts	Urban Excess
Males	286	211	35%
Females	70	68	3%

*Because of current interest in hormonal factors in atherosclerosis (Friedberg, 1949; Katz and Stamler, 1953) it may be said straight away that it is unlikely that these are responsible in any simple fashion for this social class trend in women. As might be expected, at 25 to 44 or 49 years of age, which may be conveniently regarded as "pre-menopausal", married women who have borne a child have a lower mortality, about a third lower, from coronary heart disease than married women who have not, and these in turn, have a substantially lower mortality than other women (Registrar-General, 1954a). However, fertility is greater in the lower social classes than in the upper. (Simplifying the data of the "Family Census", for example (Glass and Grebenik, 1954), labourers' wives had on average 3.4-4.5 children, manual wage-earners' wives, 2.7-4.0; and their fertility was higher than that of the wives of non-manual workers, with two to three children. The lowest fertility group were the wives of salaried employees and professional workers with on average 1.7 to 2.4 children, approximately.) Therefore the coronary death rate for women might be expected to be lower in Social Class V than in Social Classes III, II, and I if fertility was the predominant factor in producing the trend of mortality, instead of which, in 1950, Social Class V recorded a higher mortality from coronary heart disease than these other classes.

FIG. 1.

TABLE 1
MORTALITY FROM CORONARY HEART DISEASE IN THE
DIFFERENT SOCIAL CLASSES, ENGLAND AND WALES,
1950, AT AGES 20-64 INCLUSIVE*

Social Class	Description	Standardized Mortality Ratios	
		Males	Married Women
I	Major professions, etc.	150	92
II	Smaller businesses and other professions, etc.	110	93
III	Skilled workers, blackcoated, etc.	104	101
IV	Semi-skilled and agriculture	79	100
V	Unskilled; most labourers	89	108
All		100	100

* Registrar-General (1954b).

Occupation

The 1950 Supplement provides death rates by major causes for a limited number of occupations. Fig. 2 shows a range from Class I, mostly professional men, with an S.M.R. of 150, through the national average of 100, and down to 57 among builders' labourers. What can be learnt from such a distribution? The data are

too slight to base hypotheses upon them, but they may be useful in considering hypotheses derived from other sources.

Facts and Fancies about Coronary Heart Disease

Several environmental factors, ways of life, are now postulated to affect the occurrence of coronary heart disease, or its natural history.* To summarize very arbitrarily, these are:—

- (1) Diet (hypothesis: high fat intake, and particularly of animal fat, is harmful; more recently, a deficiency of essential fatty acids is harmful).
- (2) Habitual physical activity (hypothesis: this is protective).
- (3) Cigarette smoking (hypothesis: this is harmful).
- (4) Alcohol (hypothesis: this is protective).
- (5) Nervous strain (hypothesis: this is harmful).
- (6) Obesity, *i.e.*, overeating available food (hypothesis: this is harmful).

* (Bronte-Stewart, Keys, and Brock, 1955; Bronte-Stewart, Antonis, Eales, and Brock, 1956; Friedberg, 1949; Hammond and Horn, 1954; Katz and Stamler, 1953; Morris, 1951, 1955; Morris, Heady, Raffle, Roberts, and Parks, 1953).

FIG. 2.

It is, or ought to be, an interesting exercise to consider the occupations listed in Fig. 2 in terms of these six possible factors.

The first thing that strikes me in relation to the super-nutrition hypothesis is the low ratio of farmers and agricultural workers when the probably favourable situation of this group compared with the others during the period 1940-1950 is remembered. For miners and clerks, we have details of the model, albeit small, enquiry conducted recently in Scotland (Garry, Passmore, Warnock, and Durnin, 1955) and these are summarized in Table 2. If calories derived from fat are the crucial factor, this study lends no support to the suggestion that dietary differences among occupation groups might be producing their different mortality rates from coronary heart disease.

TABLE 2
NUTRITION OF MINERS AND CLERKS*

Occupation	Energy Expenditure				Food Intake		
	Total Calories Expended	At Work	In Leisure and Other Activities	In Sleep, etc.	Total Calories Consumed	As Fats, (g.)	Calories from Fats (% of Total Calories)
Miners	3,660	1,750	1,420	490	4,030	150	33.5
Clerks	2,800	890	1,410	500	3,040	119	35.3

*Nineteen miners and 10 clerks studied over a seven-day period (Garry, Passmore, Warnock, and Durnin, 1955).

The physical activity hypothesis breaks about even in these ratios. For example, the S.M.R. for clerks of Social Class III is expectedly high (quite a bit higher than of Social Class II), for hewers and getters it is unexpectedly high. One of the difficulties in testing this hypothesis is the fewness of skilled heavy workers nowadays, and we shall have to wait for the full 1949-53 tabulations before a proper analysis can be made. Nothing is known about characteristic physical activity (if any) in leisure for any type of occupation.

Very little can be said about smoking habits in different occupations. Coal-miners may not smoke as much as others (Thomas, Cotes, and Higgins, 1956). Perhaps this is also true of agricultural workers. Even less is certain about habits of alcohol consumption. We all have ideas about nervous strain, responsibility, the stresses on brain-workers, etc., but they are not supported by any facts. The figures in Table 3 may be relevant: they show little correlation between school-leaving age, which is some indication of educational levels, and mortality rates from coronary heart disease. There is

TABLE 3
CORONARY HEART DISEASE AND EDUCATION LEVELS

Occupation	Standardized Mortality Ratios Coronary Heart Disease* (1950)	Proportion Leaving School at 15 Years of Age or Later† (1951 Census)
Professional, Social Class I	150	83 %
Clerical workers	138	48 %
Armed Forces (except officers)	120	35 %
Social Class II (except farmers)	118	50 %
Transport workers	107	9 %
All males	100	24 %
Hewers and getters (coal)	90	4 %
Foremen in metal and engineering trades	88	15 %
Dock labourers	80	40 %
Semi-skilled mineworkers (coal)	78	7 %
Farmers	65	24 %
Agricultural workers	63	17 %
Building labourers	57	7 %

* Males, aged 20-64 years inclusive in England and Wales (Registrar-General, 1954a).

† Males, aged 15 and over in Great Britain (Registrar-General, 1952).

nothing useful to be said so far as I know about the prevalence of obesity among men in different occupations.

Work to be Done

I am intentionally closing on this negative note. It is quite clear that if we are to study the relations of occupation to diseases like "coronary thrombosis"

which are not simple occupational hazards, it will be necessary to know not only about the direct connexions between occupations and the particular disease, but also about the connexions between work and the other putative factors which are currently being studied. In the present instance, this involves, first, the connexions between occupation and various relevant habits of living. Thus, there is every reason to suppose that obesity is not equally distributed amongst various occupations; it is a reasonable proposition that men in different jobs have different smoking and, possibly, food habits; and that they enjoy leisure activities of different kinds. There are wide fields here on the margins of industrial medicine waiting to be tilled; and the situation today is rich with opportunity for the student who wishes to learn something about the causes of health and ill-health in middle age.

I am grateful to my colleagues in the Social Medicine Research Unit for their help.

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Exposure to Trichloro-ethylene during an Industrial Degreasing Operation

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The effect of trichloro-ethylene vapour upon workers exposed to it has been the subject of several detailed studies in recent years (Ahlmarm and Forssman, 1951; Frant and Westendorp, 1950; Grandjean, Münchinger, Turrian, Haas, Knoepfel, and Rosenmund, 1955). We are reporting the results of a routine industrial hygiene survey in order to emphasize the importance of such surveys in detecting undesirable contamination of the workshop air.

Description of the Process

The degreasing plant concerned consisted of a single gas-heated tank, approximately 2 ft. 6 in. × 3 ft. 6 in., and divided laterally to provide liquid and vapour phase degreasing sections. The work to be cleaned was mainly small machined components, which were packed into wire baskets fitted with long handles, and then placed in the tank. In some cases where the baskets were tightly packed with very small components, such as nuts and bolts, manual agitation in the liquid degreaser was necessary in order to facilitate the penetration of the solvent. The volume of the regular output from the machine shop involved a considerable quantity of degreasing, and the degreaser unit was heavily loaded.

Covers were not provided on the tank, but vapour-cooling coils were fitted near the upper edges of the tank. Two propeller fans in the outer wall of the shop extracted air at high level, and a further fan extracted air via a draining grid fitted in the floor of the shop near to the tank. The general layout is shown in Fig. 1. Three men were involved in the operation of the plant.

Air Sampling and Analysis

Air sampling was carried out on a day when the normal volume of work was being handled. Air was drawn through two U-tubes in series, each limb containing approximately 5 g. of dried 20- to 60-mesh silica gel. The rate of flow was controlled at approximately 1 litre per minute by the insertion of a critical orifice in the suction line between the U-tubes and the vacuum pump. Analysis of the air samples was carried out by the method described by Elkins (1950), the final titration being performed in a blackened box illuminated by a photographic darkroom lamp with an Ilford yellow safelight No. VS901.

produced behavioural symptoms which could be predicted. Examples of such patterns of behaviour were described.

During the week visits were paid to a number of industrial organizations in the London area and there was a full social programme for members and their wives.

An exhibition of the medical services of the Ministry of Supply was open during the week at the Pillar Hall in the new Government buildings, Whitehall. Exhibits and illustrations were shown, covering many types of hazards and the protection required. Of particular interest was the resuscitation section in which the historical development of resuscitation procedures was illustrated with examples of old and modern types of equipment.

The anniversary dinner was held at the Royal College of Surgeons on the anniversary date, September 27, of the foundation of the Association 21 years before. The toast of the Association was proposed by Sir Harry Platt, who spoke of the need for all branches of medicine to work together. The President of the Association, Dr. R. S. F. Schilling, in his reply, foresaw a steadily developing future for occupational health services, bringing great benefit to industry. In proposing the toast of "Medicine in Industry" the Earl of Verulam recalled the many benefits to industrial management which an occupational health service provided. The toast of the guests was proposed by Dr. L. G. Norman, and Dame Florence Hancock replied.

Erratum

We much regret that the legends to the paper by J. N. Morris in the last number (13, 287) were omitted. They are as follows:—

FIG. 1.—Mortality in the "social classes" England and Wales, 1950. Males aged 20-64 inclusive.

FIG. 2.—Mortality from coronary heart disease England and Wales, 1950. Males aged 20-64 years inclusive.

Industrial Medicine and Hygiene

A Review by

L. G. NORMAN

This is the only book in the English language which brings together a series of authoritative essays comprehensively covering almost the whole field of industrial medicine and hygiene. Messrs. Butterworth & Company are to be congratulated on their foresight and enthusiasm, no doubt stimulated by the late Lord Horder, in developing this work. Dr. E. R. A. Merewether, as Editor, has not only achieved a personal masterpiece; he has placed British industrial medicine firmly in the forefront. To collate the balanced contributions of 33 individualistic experts, to make them speak roughly the same language, and avoid overlapping each other's contributions to any serious extent is a remarkable achievement. It has been a task which few would care to undertake and the three present volumes will remain a lasting tribute. There is indeed a galaxy of authors, each at the head of the field about which he writes. The work is perhaps least strong on the clinical side, but it does not set out to be a clinical text-book, and about half the authors, leaders in their own field, are not medical men. There are one or two omissions, which, together with a summary of recent advances, will, it is hoped, form the basis of a further volume or volumes in order that the book as a whole may be kept up to date. For example, there is little about the treatment of gassing casualties, human-engineering aspects of machine design, the clinical aspects of toxicology, accident prevention, the effects of shift work, and psychiatry in industry.

There is a good index, separate for each volume. The production is of a high standard throughout, on good quality art paper, with excellent illustrations, and with a refreshing absence of typographical errors.

Volume I

This volume was published in 1954 and is inevitably out of date in minor respects. It is interesting to note that progress seems to have been most marked in legislation. For example, the Mines and Quarries Act and the Food and Drugs Act, 1955 (and Regulations), have been passed since the relevant chapters in this volume were written.

The volume opens formidably but perhaps appropriately with an account of the work of the Factory Inspectorate by H.M. Chief Inspector of Factories. Sir George Barnett's brief and impeccable first chapter describes the history of the Factory Inspectorate and gives an account of its present-day activities. As this is

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