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USES OF EPIDEMIOLOGY*

BY

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Until about 1900 death rates in middle age were high and worsening (Fig. 1A), but about the turn of the century sanitary reform began to show results in this age group. Mortality rates for both men and women began to fall, and they continued to fall fairly sharply until the 1920s. Then something happened. Female mortality maintained its downward course; but the reduction of male mortality slackened and almost stopped. One result of this is that death rates for these men, which were about 10% higher than for women a hundred years ago, and about 33% higher after the first world war, are now 90% higher. What happened? As we now know, many strange things were happening, and are reflected, in the vital statistics of the interwar years. The most important was the emergence from obscurity of three diseases, particularly affecting males, and very common in middle age: duodenal ulcer, cancer of the bronchus, and "coronary thrombosis." The first of these is mainly important as a cause of morbidity; the other two are now major causes of death, killing annually over 20,000 middle-aged men. Fig. 1B shows the figures for 1928–53, and the contribution of these two diseases to the course of mortality: the trend among men is very different without them.

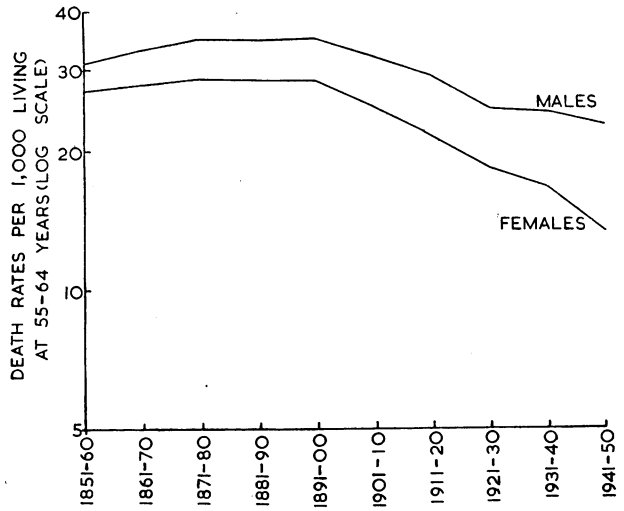

FIG. 1A.—Mortality in middle age during the last 100 years. England and Wales.[21] All causes.

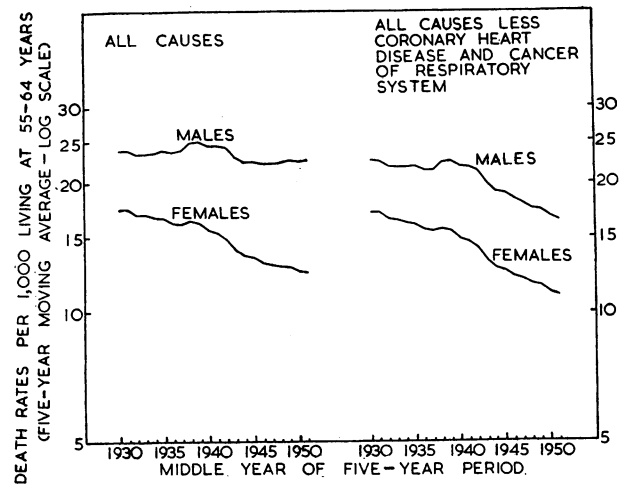

FIG. 1B.—Mortality in middle age. England and Wales. 1928–53.[21 28]

Figs. 1A and B illustrate one use of epidemiology—in historical study. But first let me explain that what I am speaking of is the study of health and disease of populations and groups, the epidemiology of which Farr, Snow, and Goldberger are the masters. By contrast with clinical medicine the unit of study in epidemiology is the group, not the individual: deaths, or any other event, are studied only if information can be obtained, or inferred, about the group in which the events occurred. The clinician deals with *cases*. The epidemiologist deals with cases *in their population*. He may start with a population and seek out the cases in it; or start with cases and refer them back to a population, or what can be taken to represent a population. But always the epidemiologist ends up with some estimate of $\frac{\text{cases}}{\text{population}}$. In consequence he can sometimes ask questions which the clinician may also ask, and get better or different information in reply. Sometimes he can ask questions that cannot be asked in clinical work at all. He can, for example, calculate the rates of occurrence, or frequency, of phenomena in the population—such as the deaths, from all and from particular causes, per 1,000 aged 55–64, a hundred years ago and now, to make possible the kind of comparison shown in Figs. 1A and B.

In this paper I am considering epidemiology as a procedure for finding things out, of asking questions, and of getting answers that raise further questions—that is, as a *method*—and I will have less time to consider the *results*, the information, obtained in reply. I shall confine myself to the non-infectious diseases, and try to illustrate them mostly from investigations carried out from the Social Medicine Research Unit, or with material worked up in that unit. Seven "uses" of epidemiology are described—different ways of looking at epidemiological data, or applications of the method.

*Read in opening a discussion at the Section of Preventive Medicine and Infectious Diseases at the Annual Meeting of the British Medical Association, Glasgow, 1954, and since expanded.

I. Historical

Historical statements made in medicine are of two broad kinds. The first describe the *decline* of infections, for example, and of nutritional deficiencies, and the main trends are usually very obvious. The others raise problems about the possible *increase* of various disorders, which is quite another matter. The questions usually put ("Have disk syndromes become commoner?" for example) are bedevilled by uncertainty about diagnosis and nomenclature in the past, and the lack of quantitative estimates of frequency at any time: How many cases occurred annually per 1,000 men, aged *x*, in the 1930s and in the early 1950s? In such problems as the frequency of psychoneuroses, historical questions, which are often asked, are hopeless of direct answer; but even in disorders like leukaemia, urinary cancer or cerebral tumour, subarachnoid haemorrhage, dissecting aneurysm, and the collagen diseases, it is exceedingly difficult to estimate how much a recent apparent increase reflects a *true* increase of disease, and how much it is the product merely of better recognition and greater availability of diagnostic services, etc. Such questions are clearly important because the role of environmental factors in aetiology, and of recent social change which may be associated with the increase, arises. As a result of a great deal of work, the increase of duodenal ulcer, cancer of the bronchus, and coronary heart disease must now be accepted as a working hypothesis and guide to environmental study.

History in the Making

Epidemiology may further be defined as the *study of health and disease of populations in relation to their environment and ways of living.* In a society that is changing as rapidly as our own, epidemiology has an important duty to observe contemporary social movements for their impact on the health of the population, and to try to assess where we are making progress and where falling back—an activity in line with the classic descriptions of famine and pestilence, of the relations of health and disease to social dislocations, wars, and crises. What are the public health implications of the 1,000 extra motor-vehicles a day?; the modern distribution of poverty so different from the 1930s?; the sophistication of foods?; the rising consumption of sugar, our astonishing taste for sweets?; the derationing of fats?; more smoking in women?; more married women going out to work?; less physical activity in work and more bodily sloth generally?; multiple chemical and physical exposures, known and potentially hazardous?; the prodigious increase of medical treatments?; the 11-plus examination?; still increasing urbanization and suburbanization?; the rapid creation of new towns?; smokeless zones (still with sulphur)?; the building of new power stations? And what can we learn from other indicators of community health: crime, for example—the ups and downs of juvenile delinquency, and the apparent increase of sex crimes and of crimes of violence during a period when so much other crime is decreasing?

Some of these questions are being studied, some cannot yet be framed in scientific terms; but parts at least of some could be better tackled than they are. And there are even more fundamental problems in our society; perhaps epidemiology with its concern for woods rather than trees, its special ability to isolate major characteristics for study, can simplify the issues and usefully raise some bold questions about these, too. Indices of health are available, and their quality is improving, although many more are needed, particularly in "mental health."

Looking Ahead

For many the main interest of history is the light it can throw on the future. Vital statistics is better placed than most disciplines to forecast—for example, the whole population of old people of the second half of the century are already born and are leading their lives under the conditions we know. Fig. 1A can therefore be projected ahead, if only with wide margins of confidence. What seems to be keeping the male death rate even as moderately satisfactory as it is now is the balancing of those diseases which are increasing (such as "coronary thrombosis") by those which are declining (tuberculosis and other infections). If the infectious diseases begin to reach some minimum before the *modern* epidemics are brought under control, or if their decline is halted, and if the large group of conditions which are relatively static (cancer of the stomach, cerebrovascular disease, etc.) do not show improvements in the meanwhile, the overall middle-aged male death rate will actually begin to rise. One consequence of this would be that the population of old people in the future will consist more and more of solitary old women (whatever the increasing popularity of marriage during recent years). The current trend of mortality in middle-aged males is the most striking feature of Western vital statistics. Very interestingly—another kind of epidemiological comparison—the situation is better in Scandinavia than in the English-speaking world, as illustrated by figures like these:

Mortality per 1,000 *Aged* 55–64 *from All Causes. (Mean of rates for separate countries. Latest available year)*

	Males	Females
Scotland, England and Wales, Canada, U.S.A., New Zealand, Australia	22·3	12·9
Norway, Sweden, Denmark	13·9	10·5

Searching questions need to be asked in this kind of situation. A first "reconnaisance" suggests that there is no simple answer—all these populations, for example, have high living standards and nutritional levels.

II. Community Diagnosis

Epidemiology provides the facts about community health; it describes the nature and relative size of the problems to be dealt with, and "maps" are produced of such scales as are required or possible. Results are sometimes surprising—at any rate in contrast with the type of problem of which there is general awareness and concern in the public health movement. Over 10% of sickness absence in male industrial workers in 1951 was ascribed to "bronchitis" (16 million days). "Psychological" disorders accounted for more than 13 million days;

TABLE I.—*First Reproductive "Cycle" in a Scottish City*[3 4 5 26 28]

Findings in Married Women	Social Class of Husband		
	I & II	III	IV & V
Physique of Women—Height			
Per cent. 5 ft. 1 in. (155 cm.) or smaller	12	24	28
Intelligence[s]			
Per cent. above average on matrix test	80	42	26
Education			
Per cent. leaving school over minimum age	56	14	3
Housing			
Per cent. living more than 2 per room	2	7	15
Family Budget[*s]			
Average weekly income (after compulsory deductions)	150s.	129s.	119s.
Nutrition[s]			
Calcium intake (mg./day)	1,219	1,071	868
Animal protein intake (g./day)	48·6	44·0	40·4
Reproduction			
Per cent. under 20 years old	2	11	17
Per cent. 30 years old or over	22	10	7
Per cent. pre-nuptial conceptions	15	24	37
Per cent. babies 5½ lb. (2·5 kg.) or less at birth	4	8	10
Child Care			
Per cent. fully breast-feeding at 3 months[s]	60	37	29
Per cent. "potting" regularly at end of first month[s]	72	49	28

This Table deals with local married primigravidae "booked" for the Aberdeen Maternity Hospital, 1948–52; and includes 85–90% of all who were eligible. Data are for periods varying from one year (818 cases) to five years (4,365 cases). Social classes I and II include the professions and business; class III are the skilled workers; IV and V the semi-skilled and unskilled workers.

Items [s] are for samples of the total.

[*] Clerical workers in social class III are included with classes I and II for Family Budget only. For other reasons, also, the sample of classes I and II for Budgets was not altogether satisfactory.

gastric and duodenal ailments for over 11 million, "rheumatism and arthritis" for over 11 million.[15]

Usually, however, we are concerned with the distribution of phenomena, and not merely their totals. Such distributions are firstly in terms of age and sex (race or colour, where applicable), economic status, and so on. Table I is an example of a social-economic distribution in relation to primigravidae in Aberdeen. It shows some interesting similarities, as in nutrition, and the remarkable differences that still remain between the social classes in "capital" goods like housing and education (in these early days of the Welfare State). There is a wide range of reproductive performance in this relatively homogeneous town. Such demonstration of inequalities between groups is a standard function of epidemiology, and it can be put to many uses—for example, in the same field as Table I, to identify "*vulnerable groups*" meriting special attention by health services (Fig. 2).

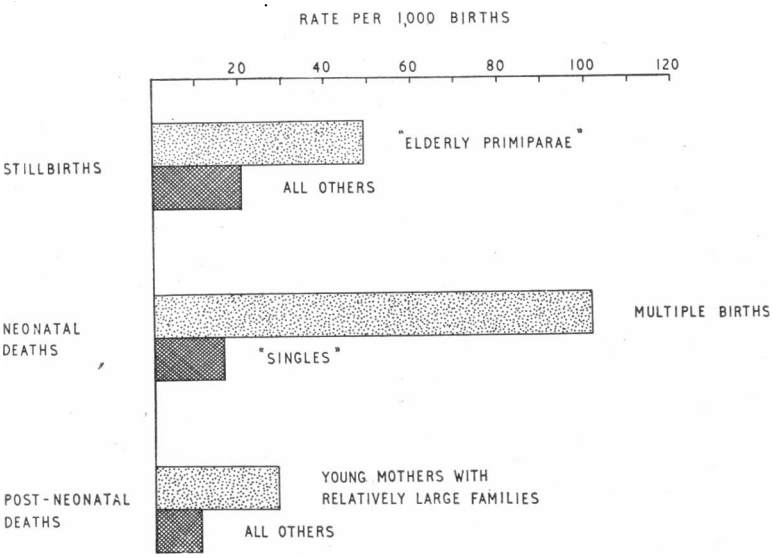

FIG. 2.—Three groups with particularly high foetal and infant mortality rates. England and Wales. 1949.[19]

III. The Individual's Chances

The risks to the individual—or at any rate their order of magnitude—of suffering an accident as a schoolboy cyclist or an elderly pedestrian, of developing leukaemia for a radiologist, of producing malformation from rubella or breast cancer from chronic mastitis, can be estimated only if the experience of whole populations of individuals is known and the relevant averages can thus be calculated. Fig. 3 uses the method of the life-table, an easy and rather neglected technique, to give a rough idea of the "risks" the average male in England and Wales now runs during his middle age, and it complements the picture of Figs. 1A and 1B. It is in the light of something like a one-in-eight chance of suffering from coronary heart disease, or one-in-ten from peptic ulcer, that the use of such terms as "epidemic" have their warrant. About 33% of men reaching 35 now die before they reach 65, compared with just over 20% of women. This approach is likely to become increasingly useful as forward-looking "prospective" studies are initiated, for example, to try to learn something about the differences made to middle-age mortality by different ways of living.

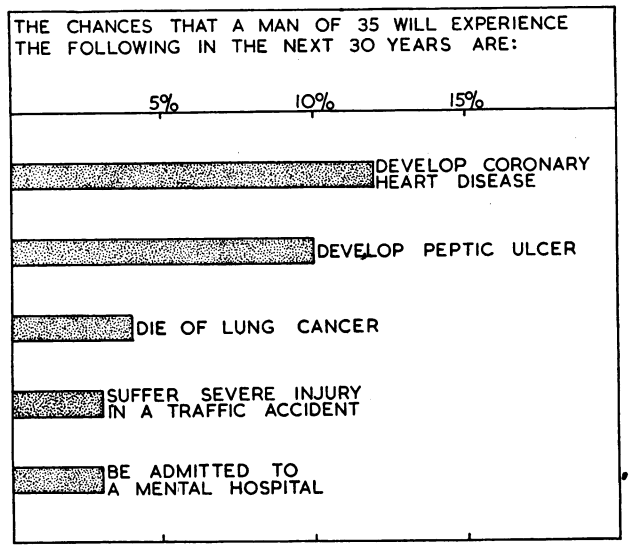

FIG. 3.—The middle-aged man's risks to-day. England and Wales. Rough estimates.[7 11 12 16 20 21 24 28]

IV. Operational Research

The study of community health services—how they are working, what needs they are serving and how well, what they ought to be doing—is a slowly developing branch of social medicine little speeded by the war-time successes in rather different fields. Table II gives a few examples of simple analyses, using epidemiological methods, and the kind of questions (rather than answers) that emerge.

Why has the introduction of the National Health Service, in which for the first time every child has, or can have, a general practitioner, made so little difference to the school health service (Table II, A)? What are the appropriate roles to-day of school doctor and G.P.? How much "family medicine" can the general practitioner do if the children are treated elsewhere?

Is there enough "serious" medicine to maintain keen clinical interest in general practice; how is the work divided between "serious" and other problems (Table II, B)?

Since most attendances at these large and representative industrial medical officers' clinics (Table II, C) seem to be for "industrial" reasons, who, it may be asked, does the industrial medicine in the great majority of factories and other work-places where there is little or no industrial health service? What are the different elements in industrial

TABLE II.—*Working of Health Services*

A. *Treatment of Minor Ailments by School Health Service.* Before and after the National Health Service

Year	No. of Pupils	No. of Defects Treated at School Clinics
1947	5,034,275	1,190,754
1952–3	6,088,000	1,154,467

B. "*Serious*" *Clinical Medicine in a General Practice.*[3 28] During one year, 1949–50.

Age	Frequency of Serious Problems per 100 Persons	Proportion these formed of all the Doctor's Work with Age Group
0–14	22	20%
15–44	23	34%
45–64	41	55%
65+	83	76%
All ages	32	43%

C. *Functions of Occupational Health Service,* 1951.[26] Analysis of Sample Attendances at 12 Industrial Medical Officers' Clinics.

No. of Attendances in year	1,952
Proportion for "occupational reasons"	79%
" " "non-occupational reasons"	21%

D. *Impact of a New Therapy.*[22 23] Death rates per million from diabetes at 20–35 years of age. Males.

Social Class	1921–3	1930–
I and II	64	26
III	50	25
IV and V	46	35

medicine (carried out on the shop floor as well as in the clinic), and what is their relative importance, so that priorities for early advance can be planned ?

The diabetes figures (Table II, D) show that social classes I and II did much better with the introduction of insulin than classes IV and V (this is seen throughout " young " diabetes). How are the benefits of anticoagulants being distributed to-day, or of the new cardiac surgery ? Differences are, I fancy, more likely to be regional and local than related to " social class." And tonsillectomy ? Is Glover's fantastic tale[10] still true to-day ? Do children in Leeds, Leicester, and Exeter still run three times the risk of losing their tonsils as do the children of Manchester, Bradford, and Gloucester ? (And do these differences affect the children who most need to have their tonsils removed ?) In how many other examples of medical, obstetric, or dental care would such *community* comparisons stimulate fresh *clinical* thinking ?

Housing policy, pursuing the figures in Table I, evidently does not mean in the comparatively prosperous city of Aberdeen, little affected by bombing, that young people of any social class are finding it at all easy to start a home of their own (Fig. 4). Half of all families in 1951 were sharing

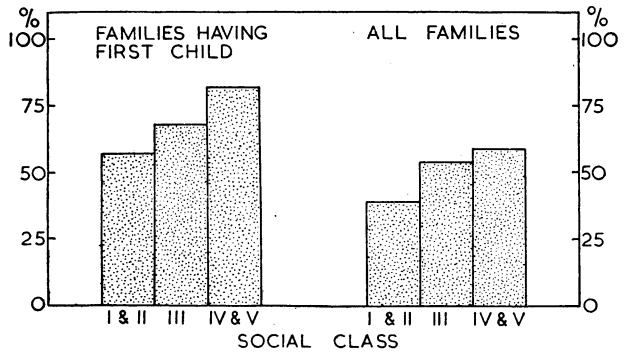

FIG. 4.—Proportion of families living in shared houses or flats. Aberdeen. 1951.[31]

dwellings. These housing figures are an illustration of the value of trying to base " operational research " about social services on populations : the idea of the *human needs* the services are and should be meeting at once becomes important. (Not that the assessment of " needs " is at all easy : so often " demand " is revealed—? created—by supply. However, in the health services—school, maternity and child welfare, appointed factory doctor—which were established to meet needs that certainly have since changed and may have lessened, a reassessment of the present situation is urgent. My private notion is that the Central Health Services Council might be armed with a research secretariat ; otherwise I see no prospect of having enough " operational research " carried out.)

V. Completing the Clinical Picture

The most obvious example of this function is the contribution of the epidemiological method in determining the sex and age incidence of disease. The calculation of accurate age-specific rates showing, for instance, that cancer of the ovary, and possibly of the breast, reach peak frequency late in middle age is of course a help in understanding these conditions, as are the relations with parity. But it is possible to go further. Epidemiology, being by definition concerned with all ascertainable cases in a population, often produces *different* pictures of disease from those derived only from hospitals, for example. Thus half or more of the deaths of men from coronary heart disease in middle age (56% here) seem to occur in the first few days of the first clinical attack of " coronary thrombosis " (Fig. 5). A quite incomplete picture of coronary heart disease must result if many of these cases are excluded. But often these deaths are " sudden," known only to the general practitioner and the coroner's pathologist. Special efforts are therefore needed to discover them, and, dependent on the success of such efforts, so may any picture presented of prognosis in this disease, of survival, and of the results of new treatments be very considerably modified.

The same is probably true at the other end of the spectrum : to get an idea of how much there is of *mild* ischaemic heart disease, minor and maybe atypical, reliance cannot be placed on the cases that happen to turn up in a particular practice or out-patient department, but an inclusive and extensive study is needed. (This principle is made use of in " screening " surveys to detect early subclinical disease. Thus detected, as in diabetes, progression may be halted, and the surveys are thus a measure of control or prevention.)

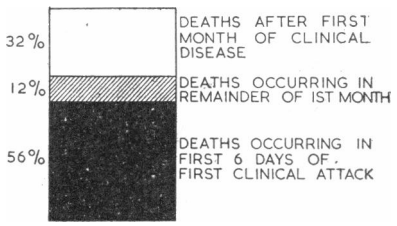

FIG. 5.—Deaths from coronary heart disease during middle age: Relation to first clinical attack. Male medical practitioners, 40–64 years. 1940–52. There were 136 deaths in 13 years.[20 29]

In brief, studies of the natural history of disease will be more complete and correctly proportioned if based on *all* the cases satisfying specified diagnostic criteria occurring in a defined population. Pneumoconiosis, byssinosis, rheumatoid arthritis, and nutritional disorders such as anaemia come to mind in this context.[6 13 27]

VI. Identification of Syndromes

This use again relates directly to clinical medicine. Broad descriptive clinical and pathological categories often include very different elements. Their different statistical distribution, and their different behaviour among the population, may make it possible to distinguish such elements from each other, and thus help to identify characteristic syndromes. Consider the mortality from " peptic ulcer " in *1921–3* (Fig. 6). Clearly there were at least two conditions to be

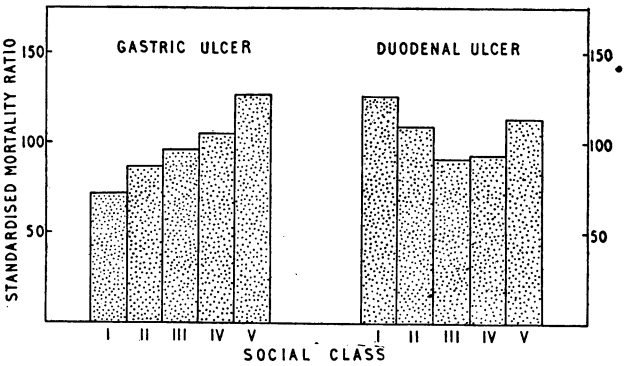

FIG. 6.—Social class differences in " peptic ulcer " mortality. Males. England and Wales. 1921–3.[22]

studied—conditions with possibly different causes. My own main interest in this field is in trying to disentangle coronary heart disease from coronary atheroma, by study of their different distributions in the population to-day, and their different histories in the past 40 years.[17] Table III illustrates again from cardiovascular disease. The common lumping together of coronary and cerebrovascular lesions as " atherosclerosis " is not very strongly justified in clinical or pathological terms. Nor do the two conditions always behave similarly epidemiologically : the recent vital statistics are quite different ; and this small experience among doctors (Table III) is interesting. The natural history of conditions as *group* phenomena may thus help to define syndromes. The vast unknown field of chronic chest disease —middle-aged men with respiratory symptoms—to-day offers particular opportunities for this application of the epidemiological method.

TABLE III.—*Coronary and Cerebrovascular Disease Among Medical Practitioners.*[30 29] *Number of "First Attacks," 1947–50 (Men Aged 40–64)*

	General Practitioners	Other Doctors
Coronary heart disease	82	33
Cerebrovascular disease	14	13
Man-years of observation	10,800	8,620

(The reverse is also true—that the epidemiological method may help to show or to confirm that apparently disparate phenomena are connected, by drawing attention to their related behaviour in the population—for example, malformation and rubella,[12] rheumatic fever and streptococcal infection, zoster and chicken-pox. However, I cannot think of any satisfactory illustrations from the non-infectious diseases.)

VII. Clues to Causes

The main function of epidemiology is to discover groups in the population with high rates of disease, and with low, so that causes of disease and of freedom from disease can be postulated. The most obvious and direct examples are the original observations on the nutritional deficiencies (scurvy, beriberi, pellagra, goitre); the geographical study of cancer (especially of the skin and liver); the industrial cancers (bladder, for instance); and industrial accidents (of coal-miners or railway workers). The biggest promise of this method lies in relating diseases to the *ways of living* of different groups, and by doing so to unravel "causes" of disease about which it is possible to do something.

"Ways of living" can usually be described only in simple terms, and the kinds of causes of health and disease postulated in them tend therefore to be in rather simple terms, not of intimate biological mechanisms, but of social factors in the satisfaction of elementary human needs, of large-scale environmental features, of major aspects of behaviour. They are thus often "general" rather than specific factors of health, causes of *dis*-ease, or diseases, rather than of a particular disease: as in the relations of water supply to bowel infections (not merely the cholera), living space and respiratory infections (as a class), income levels, nutrition and growth. We are only just beginning to identify such factors in ways of life, mass habits and social customs which may be related to many of the important problems of our own highly advanced society. For example, *overnutrition* (obesity; and ? atherosclerosis, thrombosis, dental caries, diabetes, toxaemia of pregnancy); *physical inactivity* (? "coronary thrombosis" and ? how much else); *tobacco and smoking* (oral and lung cancer—a "specific," rather, this—"coronary thrombosis"; and ? how much else); *atmospheric pollution* (lung cancer; ? chronic chest disease of many kinds, and ? acute, and ? other, non-respiratory conditions); *cultural factors* (genital cancer in Jews and non-Jews); *eating customs* (? alimentary cancer); "*social isolation* (? schizophrenia, senile psychosis, suicide). And, of course, there is still an overabundant heritage of nineteenth-century (and earlier) *poverty* and *crowding, insanitation* and *bad habits* that contribute over-fully to modern ill-health.

Fig. 7 illustrates from some recent studies, and includes a wide range of data, from the first turning of the ground to highly advanced observations. I have included (B) the famous analysis from the "Metropolitan Life" on the dangers of "overweight"; an elaboration of Doll and Bradford Hill's classic data on cigarette-smoking and cancer of the lung (E); some figures (unique so far as I know) from France on consanguineous marriages in relation to stillbirth and early neonatal mortality (G); an example (H) of the recent pioneering by the General Register Officer in psychosis, the darkest area of all; figures from Revans on the size of industrial units in relation to the frequency of accidents (D), which raise large questions of morale and the human environment, of *group* functioning as such, rather than the properties of the *individuals* who aggregate the group (compare immunity, and endemicity of infections). The distributions shown (A) on physical activity (they are different for *gastric* ulcer, incidentally, and for diabetes in *younger* persons, and do not show with other diseases), and on the disadvantages of town dwellers in respect of respiratory disease (C), merely set a stage for further inquiry; the natural experiment, or "experiment of opportunity" provided by miners and clerks (F), provides, at least, contrast groups in which it may be profitable to seek factors that are significant in modern infant mortality.

The great advantage of this kind of approach to prevention is that it may be applicable in the early stages of our knowledge of diseases, to disrupt the pattern of causation before the intimate nature of diseases is understood. Sufficient facts may be established for this by epidemiological methods alone, or in combination with others. The opportunity may thus offer to deal with one "cause," or with various combinations of causes. Moreover, the possibility of two types of control may be opened up—environmental (as in the fluoridation of water) and personal (through alteration of diet and hygiene).

Conclusion

Epidemiology is to-day the Cinderella of the medical sciences. The proposition might, however, be advanced that public health needs more epidemiology, and so does medicine as a whole, and, it may be said, society at large. *Public health* needs more epidemiology—this is the most obvious intellectual basis for its further advance. Epidemiology, moreover, as a tried instrument of research—with its modern developments in sampling and surveys, small-number statistics, the follow-up of cohorts, international comparisons, field experiment, and family study; and with its extensions to problems of genetics as well as environment, to physiological norms as well as disease, the psychological as well as the physical, morbidity as well as mortality—epidemiology now offers the possibility of a new era of collaboration between public health workers and clinical medicine. Such a collaboration could be on equal terms, each making their particular contribution to the joint solving of problems. There is abundant evidence to-day that clinicians would very much welcome such a development.

Medicine as a whole needs more epidemiology, for without it cardinal areas have to be excluded from the consideration of human health and sickness. Epidemiology, moreover, is rich with suggestions for clinical and laboratory study, and it offers many possibilities for testing hypotheses emerging from these. One of the most urgent *social* needs of the day is to identify rules of healthy living that might do for us what Snow and others did for the Victorians, and help to reduce the burden of illness in middle and old age which is so characteristic a feature of our society. There is no indication whatever that the experimental sciences alone will be able to produce the necessary guidance. Collaboration between clinician, laboratory scientist, and epidemiologist might be more successful. The possibilities are at present unlimited, if often neglected.

Summary

We may summarize what has been said in terms of some of the relations between epidemiology, and the epidemiological method, and clinical medicine.

Epidemiology studies populations, and all cases that can be defined in them. It is concerned not only with those whose troubles immediately present to particular clinical attention but with the subclinical, the undiagnosed, the cases treated elsewhere. It thus *helps to complete the clinical picture* and natural history of disease.

Epidemiology *supplements the clinical picture*: by asking questions that cannot be asked in clinical study—about the health of the community and of sections of it,

Figs. 7A–H.—Seeking Clues to Causes

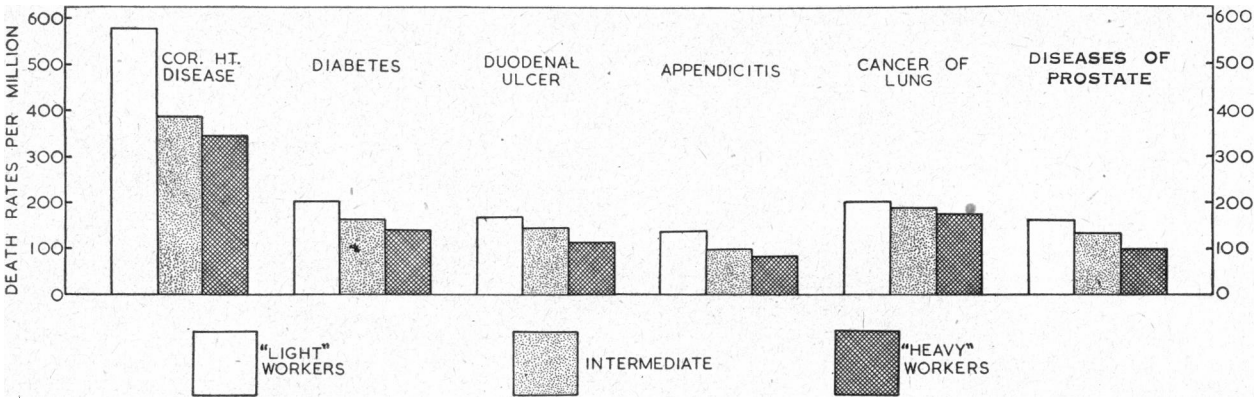

FIG. 7A.—Mortality in relation to physical activity of work. Men aged 45–64 in social class III (skilled workers). England and Wales. 1930–2.[18 28]

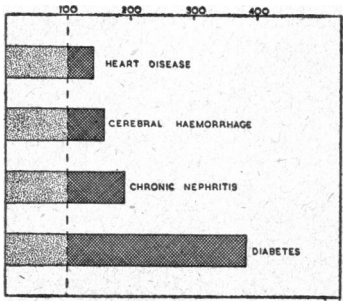

FIG. 7B.—Experiences of overweight men in comparison with standard policy holders. Metropolitan Life Assurance Company.[9] Actual number of deaths per 100 of expected. Ages attained 25–74.

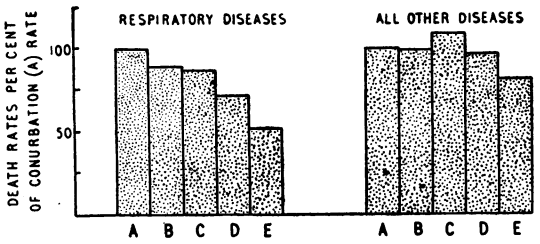

FIG. 7C.—Mortality of town and country dwellers from bronchitis, pneumonia, respiratory tuberculosis, lung cancer; and from all other diseases (males). Aged 45–64. England and Wales. 1950–2.[24 28] A=Conurbations. B, C, and D=Large, medium, and small urban areas. E=Rural areas. (The trend for females is very similar.)

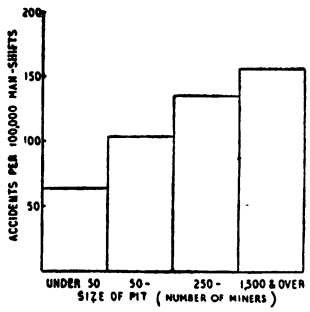

FIG. 7D.—Frequency of accidents and size of pits.[1]

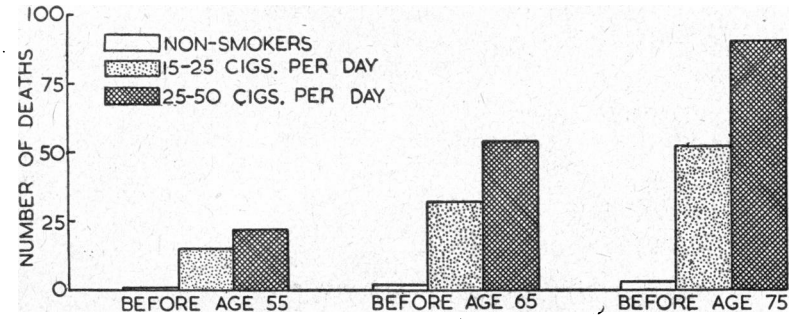

FIG. 7E.—Smoking and lung cancer.[8 11] Number of men per 1,000 aged 25 expected to die from cancer of lung before ages shown.

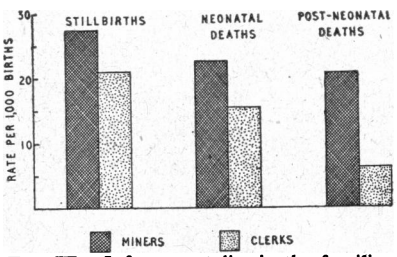

FIG. 7F.—Infant mortality in the families of miners and clerks. England and Wales. 1949–50.[19]

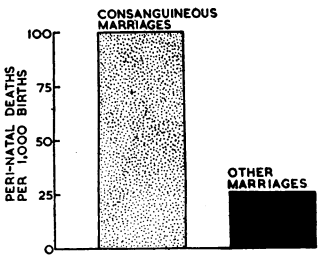

FIG. 7G.—Stillbirths and deaths in the first four weeks of life. Infants of consanguineous and other marriages. Two French *départements*.[20]

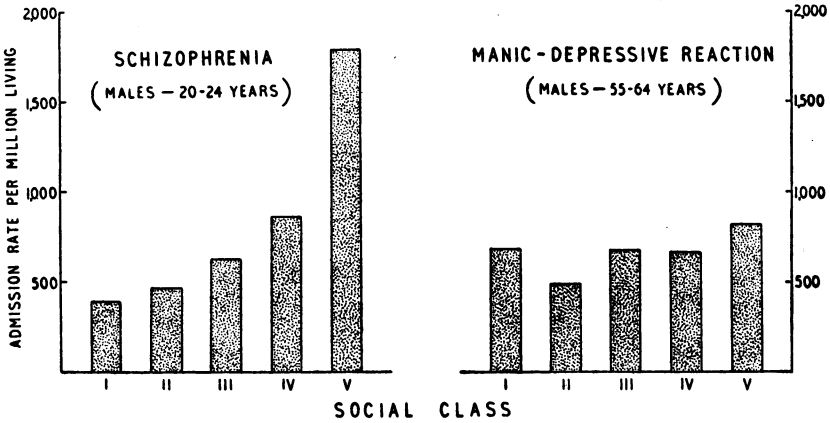

FIG. 7H.—Social class and admissions to mental hospitals. England and Wales. 1949.[24]

present and past; by setting clinical problems in community perspective, describing their behaviour as group, not individual, phenomena, indicating their dimensions and distributions, and how much, and where, action is needed; by revealing problems and indicating where among the population these might best be studied.

Finally, epidemiology by identifying harmful ways of living, and by pointing the road to healthier ways, *helps to abolish the clinical picture.* This is its chief function and the one in greatest need of development to-day.

I am grateful to my colleagues outside and in the Unit for much help; and in particular wish to thank Mr. C. Daly and Mrs. V. P. Hall for help with the figures.

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A remarkable expansion of work for the blind in the Colonies has taken place in the five years since the British Empire Society for the Blind was formed. The Society's fifth report can claim that in territories which contain more than two-thirds of the colonial population "the number of blind children at school has doubled; the number of blind adults in training has increased tenfold. Thirty new schools and training centres have been established, six more are being built, and an additional 18 have been planned. Braille alphabets have been devised for practically every written language in the Colonies." In West Africa, where the blindness rate is 20 times higher than in the United Kingdom, an ophthalmic team directed by Dr. F. C. Rodger is investigating the causes of blindness; an entomological team directed by Dr. G. Crisp is investigating the *Simulium* fly, whose bite causes "river blindness" (ocular onchocerciasis), and seeking a local means of controlling the pest. £20,000 was raised for the British West Indian blind. Half the blindness in the Caribbean territories "could be prevented or cured if more eye specialists were available and if people took better care of their eyes." The Society hopes to raise £20,000 of new revenue in the coming year.

ASSESSMENT OF ADRENOCORTICAL FUNCTION IN CASES OF PITUITARY TUMOUR*

BY

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This study concerns the assessment of adrenocortical activity in 18 cases of pituitary tumour. The application of the results to the surgical management is described.

The hazard of operation in some cases of adenoma or cyst of the pituitary gland is well known. Jefferson (1940) pointed out that "intracranial extension" of the tumour greatly increases operative mortality. In recent years there has developed an increasing awareness of the part played by pituitary insufficiency in post-operative death in these cases (Henderson, 1939; Grant, 1948; Bakay, 1950; Caughey *et al.*, 1952; Caughey and Garrod, 1954).

It was felt that in the complex polyglandular failure associated with pituitary tumour it might well be the adrenocortical deficiency which was dangerous to life at the time of operation. The hypothesis, then, which stimulated this study was that in cases of pituitary tumour operation might precipitate death in acute or subacute adrenocortical failure, and that corticotrophin (A.C.T.H.) might restore adrenal function and prevent death.

The object of this investigation was to produce a practical plan of management which could be followed routinely in the unit, excluding tests involving complex or time-consuming analyses. The selected tests, which are discussed below, were the glucose-tolerance test, the diuresis test of Robinson *et al.* (1941), and the fractional test meal.

Observations and Results

This series of 18 cases consists of all the patients admitted to this unit between 1951 and 1953 for operation on a pituitary tumour. Sixteen had an adenoma and two had a cystic craniopharyngioma. The indication for surgery was progressive visual loss in all cases. With one exception lesions were all exposed by transfrontal craniotomy.

The presentation of the observations on which this paper is based has posed a problem. A system of allocation of points has been chosen, arranged so that a score of 10 represents normality.

The scoring has been made out for each case on clinical estimation and on the results of the biochemical tests. In the clinical scoring points were added to or deducted from the normal rating of 10. The following features were considered as evidence of pituitary–adrenal hyperactivity: "moonface," hirsuties, and the type of obesity seen in Cushing's syndrome. Points were deducted for loss of energy, susceptibility to cold, impotence, testicular atrophy, Fröhlich type of obesity, loss of secondary sexual hair, infrequency of shaving, and soft finely wrinkled skin. Obviously there can be no precision in translating a matter of clinical judgment into numerical symbols, but the method has seemed practical enough for the purpose.

In the test-scorings the following data were used. Only the points for the sugar curve and the diuresis test were

*Based on a preliminary report read to the Society of British Neurological Surgeons at Zurich, June, 1952.