

## INCIDENCE OF DISEASE AND DISABILITY IN ELDERLY MEN

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Our statistical knowledge of the implications of ageing may be summed up by the statement that it is possible to assess the chances of living to be old, but not whether it is worth doing so. National life tables show the average number of years which can be expected by an individual of any age, but there are few data giving the incidence of disabilities according to age, and none which enable us to construct a balance sheet of pleasures and pains in old age. Whether "chloroform at sixty", which Osler recommended on public grounds, would also be advisable for private reasons, is still, so far as statistics are concerned, an open question.

In a previous communication (Brown, McKeown, and Whitfield, 1958), the incidence of disease and disability and of fitness for employment was examined in a group of representative men aged 60-69. It was thought worthwhile to extend the inquiry to men over 70, but because the focus of interest is not the same at the later ages we have treated the material somewhat differently. This first report is concerned with the significance of ageing from the point of view of the individual, as reflected in the frequency of disease and disability, and in the relative importance attached to specific pleasures and complaints. A later report will consider the significance of ageing from the point of view of the community, as shown by the increasing demand for medical and social services, and by declining ability to contribute through gainful employment.

The discussion which follows is arranged in three parts. The first part gives the incidence of specific diseases according to age and social class. The second part examines the increase with age in the frequency of disability, and the extent to which class differences are attributable to specific diseases. In the last part an attempt is made to assess the relative importance of the various things which give pleasure or cause discomfort to old people. It is of course a subjective assessment, but it could scarcely be anything else.

### METHODS

The method of obtaining the data was an extension of that used in the earlier inquiry. The eleven Birmingham general practitioners who had previously

examined men on their lists aged 60-69 agreed to attempt to make a similar assessment for all men of 70 and over. In view of the change in emphasis in the later investigation, the form used was not identical with the earlier one, data recorded being as follows:

(a) *Medical Data.*—The examination was again of the "life insurance" type. Coronary disease was not, however, the subject of special inquiry (as it had been previously) and men with suggestive signs and symptoms were not referred for further investigation.

(b) *Care Required.*—The type and frequency of care required was noted in respect of medical care, technical nursing, basic nursing and domestic help.

(c) *Employment and Fitness for Employment.*—The last full-time employment before age 65 and the occupation (if any) at the time of the survey were recorded. In the light of the information obtained from the history and physical examination, the doctors tried to assess each individual's fitness for employment. Patients were asked to indicate the extent of the physical and mental demands of the job they had been doing at 65, or when they last worked if they had retired before 65.

(d) *Personal Data.*—The personal data included observations on sleep, food, drink, and smoking habits. Men were also asked to state in order of importance their three chief sources of pleasure, and their three chief complaints. It was made clear that the latter were intended to include not only specific medical complaints, but such problems as inability to sleep, loneliness, etc.

Table I shows the number of men over 70 (838) on the lists of the eleven general practitioners, and the

TABLE I  
NUMBER OF MEN AGED 70 AND OVER ON THE LISTS OF  
ELEVEN GENERAL PRACTITIONERS

Men aged 70 and Over		No.	Per cent.
Examined	.. .. .	691	82.5
Not Examined	Dead .. .. .	59	7.0
	Untraced .. .. .	44	5.3
	Other .. .. .	44	5.3
Total	.. .. .	838	100

proportion (82.5 per cent.) examined. Of those not examined, 59 were dead when the investigation began and 44 were untraced and had presumably moved from the area; these anomalies arise because lists are never quite up to date. The remaining 44 men were not examined for other reasons, usually because they were not at home at the times of the doctors' visits. Since a serious attempt was made to see all men at home or at a surgery, we believe that no bias has been introduced by the exclusions, and this view is supported by an examination of the age and social class composition of the sample.

Table II shows that the age distribution is approximately the same as that of men over 70 in Birmingham and in England and Wales.

Table III gives the same data for social class; in the case of Birmingham the distribution is known (from the 1951 Census) only for men aged 15 and over.

Except for a small excess of men in Class II, and a corresponding deficiency in Classes IV and V, understandable in view of the age difference, the distribution of the sample is approximately the same as that of Birmingham, and does not differ substantially from that of England and Wales. It seems justifiable, therefore, to regard the sample as being reasonably representative of all men of the same age in the city, and to a lesser extent, in the country as a whole.

(1) DISEASE INCIDENCE

At the outset we are confronted with the difficulty of assessing the incidence and significance of disease in a group of individuals, in view of the fact that a list of all conditions diagnosed takes no account of their relative importance or of the occurrence of more than one abnormality in the same individual. In Table IV we give the proportions of men with each of the

TABLE II  
AGE DISTRIBUTION

Age (yrs)		70-74	75-79	80-84	85-89	90-94	95 & over	Total
Birmingham Sample	No.	338	213	93	41	5	1	691
	Per cent.	48.9	30.8	13.5	5.9	0.7	0.2	100
Birmingham County Borough*	Per cent.	51.1	31.2	13.3	3.7	0.6	0.1	100
England and Wales*	Per cent.	49.6	31.4	13.8	4.2	0.8	0.1	100

\* From 1951 Census

TABLE III  
SOCIAL CLASS DISTRIBUTION

Social Class		I	II	III	IV	V	Total
Birmingham Sample	No.	24	112	394	82	79	691
	Per cent.	3.5	16.2	57.0	11.9	11.4	100
Birmingham County Borough* (Men aged 15 and Over)	Per cent.	2.2	11.5	59.0	14.3	13.0	100
England and Wales* (Men aged 70 and Over)	Per cent.	3.9	19.0	44.6	17.3	15.2	100

\* From 1951 Census

TABLE IV  
PERCENTAGE OF MEN WITH EACH OF THE SIX DISEASES MOST FREQUENTLY ENCOUNTERED IN THE SURVEY

Disease	Age (yrs)					No. of Men Affected	Percentage of Affected Men in whom the Disease caused Disability
	70-74	75-79	80-84	85 and Over	Total		
Bronchitis	22.8	22.5	24.7	17.0	22.6	156	50.6
Hypertension	22.8	23.0	14.0	19.1	21.4	148	10.8
Coronary Disease	14.8	19.2	15.1	19.1	16.5	114	48.2
Arthritis	11.5	19.2	15.1	21.3	15.1	104	38.5
Hernia	10.7	10.3	14.0	10.6	11.0	76	1.3
Peptic Ulcer	8.9	9.4	5.4	2.1	8.1	56	12.5
No. of Men	338	213	93	47	691		

six most common diseases. In this report, unlike the earlier one, we have tried to separate specific diseases (such as bronchitis and peptic ulcer) from disabilities of less specific origin (such as blindness and deafness). The diagnoses were based on the clinical judgement of the general practitioners, except in the case of hypertension, in which diastolic and systolic pressures above 100 and/or 200 mm. Hg respectively were regarded as abnormal. While an arbitrary classification of this kind is useless for many purposes (this subject is discussed more fully elsewhere: Edwards, McKeown, and Whitfield, 1959), it was considered sufficiently reliable to draw attention to gross changes in frequency of raised blood pressure according to age and social class.

As in men aged 60-69, chronic bronchitis was the commonest disease, approximately one quarter being affected, and of those affected about half were in some degree disabled by the condition. (For this purpose we have considered a disease to be disabling if it interfered in any appreciable degree with an individual's life.) For coronary disease and arthritis the proportions of men disabled (48.2 and 38.5 per cent. respectively) were also high, but they were low for hypertension, hernia, and peptic ulcer. The other point in Table IV worth comment is the absence of a consistent age trend in the incidence of any of the common diseases, except arthritis which increased in frequency, and possibly peptic ulcer which decreased. This result is of course attributable to selective mortality from diseases such as bronchitis, hypertension, and coronary disease.

Table V shows the percentage of men with each of the six commonest diseases according to social class. Only in bronchitis is the relationship regular and pronounced, the proportions affected being 15.4 per cent. in Classes I and II (professional and intermediate occupations) and 31.1 per cent. in Classes

IV and V (partly skilled and unskilled occupations) respectively.

It is conceivable that the relationship (or absence of relationship) between the incidence of these diseases and social class might be affected by class differences in age distribution. This possibility is perhaps somewhat unlikely, in view of the absence of consistent age trends (Table IV); nevertheless we have examined the effect of age-standardization on the incidence of bronchitis according to social class. The effect on the percentages given in Table V is negligible. Standardization for social class also had no appreciable effect on the results in Table IV.

## (2) EXTENT OF DISABILITY

It is of course extremely difficult to find a satisfactory basis for assessment of the presence of disability, or of degree of disability. All that we have attempted is (a) to decide whether an individual was in some appreciable degree inconvenienced (either by specific disease such as bronchitis, or by some less specific condition such as deafness, weakness, etc.), and (b) to inquire whether, if present, a disability would restrict an individual's full-time employment. It is obvious that the first of these criteria takes no account of educational or other differences, and was thus applied consistently to all social classes. The second index was graded according to the kind of work a man could be expected to do, and hence was a less severe test in Social Class I, in which there are many sedentary occupations, than in Class V, in which most occupations make heavy physical demands. The decision as to whether a man was to be regarded as disabled was made by the general practitioners after recording the history and completing the physical examination.

Table VI gives the proportion of men disabled according to age. The percentage without any disability decreases from 29.3 at ages 70-74, to 6.4 at 85 and over; the percentage restricted in respect of

TABLE V

PERCENTAGE OF MEN WITH EACH OF SIX DISEASES MOST FREQUENTLY ENCOUNTERED IN THE SURVEY, BY SOCIAL CLASS

Disease	Social Class			No. of Men Affected
	I and II	III	IV and V	
Bronchitis ..	15.4	21.6	31.1	156
Hypertension ..	22.8	22.3	18.0	148
Coronary Disease	25.0	14.5	14.3	114
Arthritis .. ..	8.8	17.5	14.3	104
Hernia .. .. .	11.0	11.4	9.9	76
Peptic Ulcer ..	8.8	6.6	11.2	56
No. of Men ..	136	394	161	

TABLE VI

PERCENTAGE OF MEN WITH DISABILITY, BY AGE

Age (yrs) .. . . .	70-74	75-79	80-84	85 and Over	Total
Percentage with Disability which would restrict Full-time Employment .. . . .	51.8	73.2	77.4	93.6	64.7
Percentage with Disability which would not restrict Full-time Employment .. . . .	18.9	8.5	9.7	0.0	13.2
Percentage not Disabled .. . . .	29.3	18.3	12.9	6.4	22.1
No. of Men .. . . .	338	213	93	47	691

full-time employment increases from 51·8 to 93·6. (As mentioned above, the question of fitness for employment will be treated more fully in the later communication. Here we are concerned with it only as a broad index of disability.)

Table VII shows the proportion of men disabled according to social class. Perhaps the most interesting figure is again the percentage not disabled, which falls regularly from 37·5 per cent. in Class I to 11·4 per cent. in Class V. It seemed possible that this result was affected by age differences in class distribution, for if men in Class V were somewhat younger than those in Class I—not an unlikely possibility—the trend shown in Table VII might understate the extent of the class difference. The effect of correction by standardization for age was very small, however, and scarcely affected the results exhibited in Table VII. (A similar standardization to correct the age trend in Table VI for social class differences also had a trivial effect.)

TABLE VII  
PERCENTAGE OF MEN WITH DISABILITY, BY SOCIAL CLASS

Social Class .. .. .	I	II	III	IV	V
Percentage with Disability which would restrict Full-time Employment .. .. .	41·7	46·4	67·2	70·7	78·5
Percentage with Disability which would not restrict Full-time Employment .. .. .	20·8	17·9	12·2	12·2	10·1
Percentage not Disabled .. .. .	37·5	35·7	20·6	17·1	11·4
No. of Men .. .. .	24	112	394	82	79

We now inquire to what extent these class differences in the incidence of disability were attributable to specific diseases. The class differences were even more marked at ages 60-69, and we have therefore

included data from the earlier inquiry in the examination. For this purpose it has been necessary to combine Classes I and II and Classes IV and V to obtain sufficiently large numbers. In Fig. 1 (opposite) it is shown that in both age groups a very large part of the class gradient was due to chronic bronchitis. This is not surprising, since bronchitis was the commonest disease, was the one associated with the highest incidence of disability, and showed a pronounced relationship to social class. No other single disease accounts for a substantial part of the gradient which remains after the effect of bronchitis is removed, the residual class differentiation being due to a large number of conditions each of which makes only a small contribution to the total.

So far we have been considering disabilities of all types. It was thought worthwhile to examine separately the incidence of the common specific disabilities, and it would probably be agreed that those listed in Table VIII are the most important. In this case, however, attention is confined to levels of disability which would represent severe handicaps. To be included mental disturbance had to be of a degree which would require some supervision, and hence excludes minor manifestations of disturbed behaviour some of which could certainly be regarded as disabling. Blindness includes only total or partial blindness. Deafness is based on the "very deaf" in a three-fold classification of hearing: good, dull, very deaf. Data on mobility are given separately for the proportions (a) restricted out of doors and (b) restricted to indoors. The percentages in this case are obviously additive; that is to say that numbers restricted indoors do not of course include men with the less severe handicap of limitation in some degree out of doors. Criteria of incontinence need no comment.

What emerges from the application of these somewhat severe criteria is that, of the five disabilities, only

TABLE VIII  
PERCENTAGE OF MEN WITH VARIOUS DISABILITIES, BY AGE

Disability	Age (yrs)					No. of Men Affected	
	70-74	75-79	80-84	85 and Over	Total		
Mobility	Restricted out of doors .. .. .	36·1	49·3	52·7	48·9	43·3	299
	Restricted to indoors .. .. .	5·3	6·6	20·4	27·7	9·3	64
Incontinence .. .. .	2·1	3·8	8·6	2·1	3·5	24	
Blindness (total or partial) .. .. .	3·3	3·3	3·2	6·4	3·5	24	
Mental Disturbance requiring Supervision .. .. .	2·1	1·9	6·5	2·1	2·6	18	
Deafness .. .. .	1·8	1·9	2·2	2·1	1·9	13	

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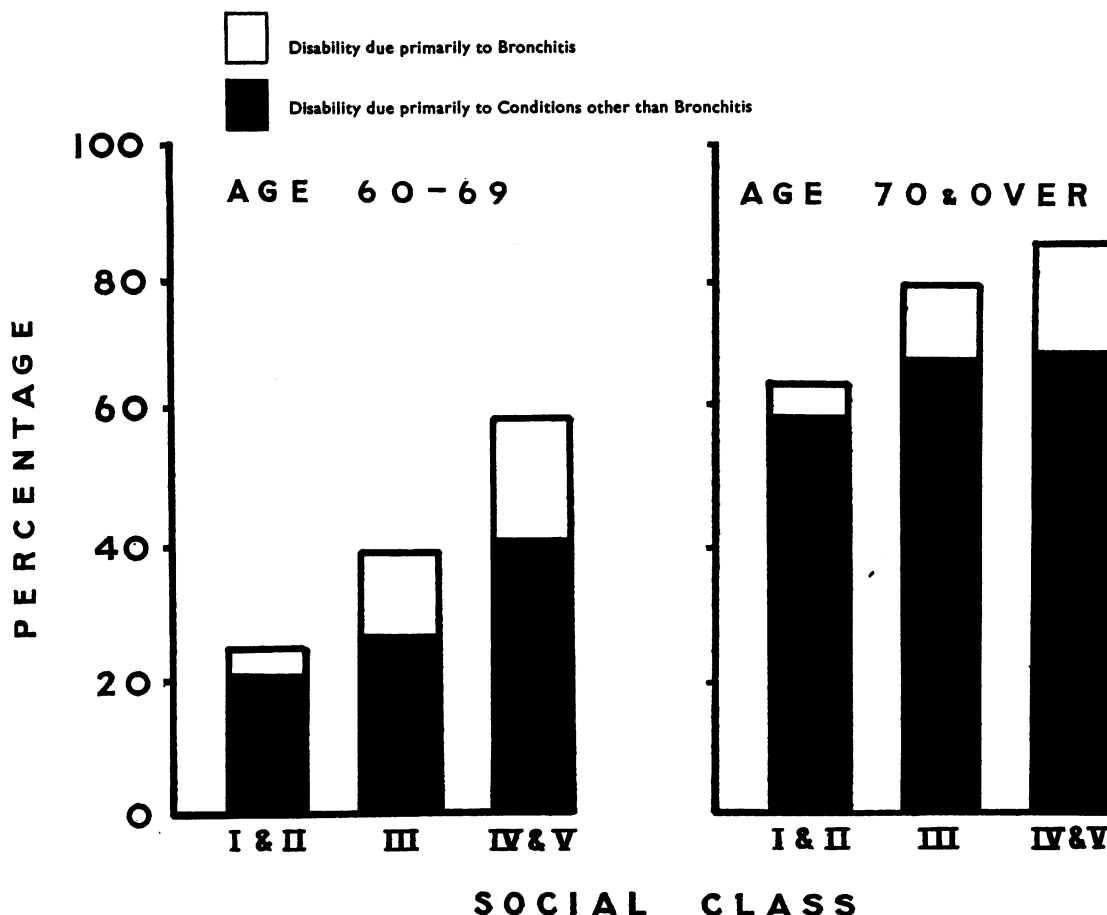


FIG. 1.—Percentage of men with disability (all grades), by social class.

restricted mobility is very common in any age group and increases consistently in frequency with age. The numbers of men aged 85 and over are rather small; when they are grouped with those aged 80-84, the only other consistent age trend is in respect of incontinence, which increases from 2.1 per cent. at 70-74 to 6.4 per cent. at 80 and over.

We have also examined the percentage of men with these various disabilities according to social class. The only consistent trend is an increase in the frequency of the less severe restriction of mobility (outdoors) from Classes I and II to Classes IV and V.

### (3) PLEASURES AND COMPLAINTS

As stated in the discussion of method, men were asked to give their three main sources of pleasure and complaints in order of significance. These are not the

kind of data which lend themselves to precise treatment, but Table IX is based on the chief pleasure and complaint. The only pleasure which can be said to be of outstanding importance is gardening, which between one-fifth and one-quarter gave as their main interest. And the most common complaint, if it can be referred to meaningfully as a single complaint, was "poor health", rather than any of those listed in Table VIII.

Additional information was collected about eating, smoking, drinking, reading, and the use of wireless and television, but the only data which seem of sufficient interest to be referred to here are related to sleeping habits and appetite. Although it appears in Table IX (overleaf), insomnia was not common (only 3.2 per cent. of men regarded it as their chief complaint, and 6.5 per cent included it in the first three). The mean number of hours slept (by day and night) increased slightly with age, from 7.4 (at 70-74) to 8.3

TABLE IX

PERCENTAGES OF MEN AGED 70 AND OVER GROUPED ACCORDING TO (a) CHIEF PLEASURE, AND (b) CHIEF COMPLAINT

(a) Chief Pleasure	Per cent.	(b) Chief Complaint	Per cent.
Gardening ..	22.6	Poor Health ..	35.7
Reading ..	8.4	Deafness ..	5.1
Radio or Television	8.0	Loss of Mobility ..	4.9
Company of Friends ..	6.4	Poor Sight ..	3.6
Walking ..	5.6	Insomnia ..	3.2
Watching Sporting Events ..	5.1	Loneliness ..	3.2
Smoking ..	4.6	Financial Worries	1.2
Work ..	4.5	Inability to Work	1.2
Other ..	28.9	Other ..	3.8
None ..	5.9	None ..	38.1

(at 85 and over). Table X gives the distribution of men according to the number of hours slept at night, and shows that the relationship between day and night sleep is U-shaped. Expressed differently, the duration of day sleep was greater among men who at night slept a little (whose day sleep probably interfered with night sleep) or slept a lot (whose sleep requirements were high) than among men who slept for a moderate period at night. There is perhaps nothing unexpected in this result. Duration of sleep (day and night) was unrelated to marital status or smoking habits.

TABLE X

DISTRIBUTION OF MEN, BY DURATION OF SLEEP

No. of Hours of Sleep per Night	No. of Men	Per cent.	Mean No. of Hours of Sleep per Day
Under 5	77	11.2	0.84
5	57	8.3	0.67
6	133	19.4	0.65
7	105	15.3	0.34
8	194	28.3	0.55
9 and Over	119	17.4	0.70
Total .. ..	685	99.9	0.61

About two-thirds of the men described their appetites as good, and less than one in ten said it was poor. There was little change in relation to age.

TABLE XII

PERCENTAGE OF BIRMINGHAM MALES IN HOSPITALS

Age (yrs) .. .. .	60-	65-	70-	75-	80-	85 and Over	No. of Men
Type of Hospital	Chronic Sick Hospitals .. .. .	0.13	0.27	0.66	1.24	2.76	6.60
	Mental Hospitals .. .. .	0.58	0.62	0.87	1.03	1.12	1.34
	Other Types of Hospitals .. .. .	0.42	0.51	0.44	0.69	0.50	0.67
	All Hospitals .. .. .	1.14	1.40	1.97	2.96	4.38	8.61
Birmingham Male Population*	21,090	16,597	12,365	7,560	3,219	1,045	

\* From the 1951 Census.

Table XI shows the relationship between appetite and smoking habits; the proportions with moderate and poor appetites were considerably higher in cigarette smokers than in men not smoking (for the first two rows of Table XI,  $\chi^2 = 8.13$ ;  $0.01 < P < 0.02$ ); pipe smokers were intermediate between the two, and there were too few mixed smokers to justify a confident opinion. Appetite appeared to be unrelated to marital status and drinking habits.

TABLE XI

PERCENTAGE DISTRIBUTION OF MEN, BY APPETITE AND SMOKING HABITS

Appetite .. .. .	Good	Moderate	Poor	Total	
Men not Smoking .. (213)	71.8	23.5	4.7	100.0	
Men Smoking	Cigarettes (237)	59.5	31.6	8.9	100.0
	Pipe .. (194)	68.0	23.2	8.8	100.0
	Mixed .. (39)	53.8	30.8	15.4	100.0

DISCUSSION

The observations recorded in this investigation were based on men living at home, and as a reflection of the change in frequency of disease and disability in the elderly they are deficient because they make no allowance for those in institutions. Men in municipal homes are probably at least as healthy as those at home, and no serious bias is introduced by their exclusion. Our main problem is to assess the effect of omission of men in hospitals.

The percentage of Birmingham men aged 60 and over who were in hospital at about the time of the survey is given in Table XII. (The numbers in each type of hospital were obtained in another enquiry and the total numbers in each age group were provided by the 1951 Census.) The proportion in hospital increased regularly from 1.1 per cent at ages 60-64 to 8.6 per cent at ages 85 and over.

It seems permissible to assume that all men in hospital had a disability which would restrict full-time employment. On this assumption they are included in Fig. 2, which gives the percentage of men with disability according to age from age 60. Data for the seventh decade were available from the previous inquiry (Brown, McKeown, and Whitfield, 1958). The figure shows separately the proportions (a) restricted in respect of full-time employment, and (b) restricted in some lesser degree. The inclusion of men in hospital had little effect on the original percentages of men disabled which were based on men living at home.

It is not possible to estimate with a reasonable degree of accuracy the effect of exclusion of hospital patients on the incidence of disease and specific disability. It is probable that it would be larger than in the case of the correction in Fig. 2. For example, if we assume that all patients in mental hospitals needed supervision because of their mental state (the

standard used in Table VIII), for the four age periods 70-74, 75-79, 80-84, and 85 and over, the percentages of men with mental disturbance of this order are changed from 2.1, 1.9, 6.5, and 2.1 to 3.0, 2.9, 7.5, and 3.4 respectively. That these estimates are no more than a rough approximation is evident from the fact that we have assumed that men in chronic sick and other hospitals did not need supervision. Nevertheless they underline the obvious point that, although an assessment based on men living at home is acceptable in respect of the levels of disability shown in Fig. 2, it understates the frequency of the disabilities referred to in Table VIII. The reason is of course that the effect of omission of the hospital population is trivial in the case of disabilities which are common and considerable in the case of disabilities which are uncommon.

Our examination of the chief pleasures and complaints of elderly men shows that "gardening" was their only common pleasure, and "poor health" (as

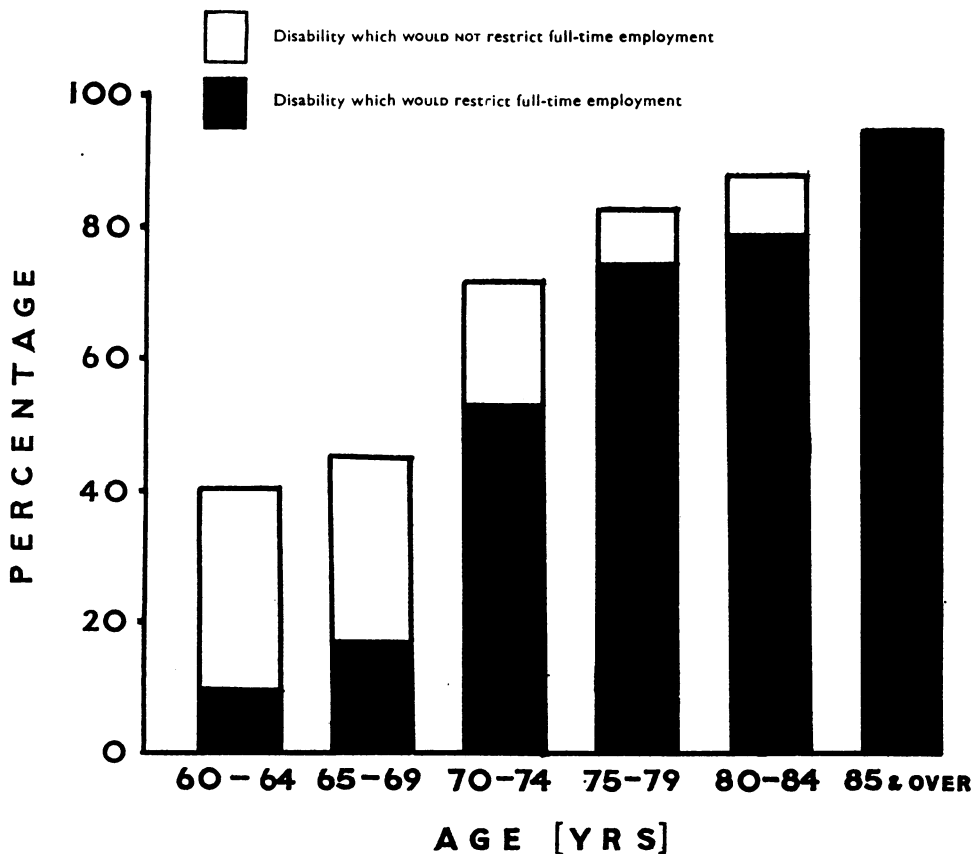


FIG. 2.—Percentage of men with disability, by age.

distinguished from specific disabilities such as deafness or loss of mobility) their only common complaint. Broadly the data indicate, what many of us have long suspected, that what Browning described in his much quoted version of ageing, was not typical old age, but healthy middle age, that pleasant interval after the children and before the disabilities, when the demands are lessened but the powers still undiminished. But if the outlook is less rosy than Browning suggested, it is also not so grim as that anticipated by his contemporary Arnold (in "Growing Old"). And there are comparatively few people who now find themselves before death "sans teeth, sans eyes, sans taste, sans everything". Particularly not "sans taste", for the findings on appetite confirm an observation which can be made in the dining room of any hotel in Bath or Bournemouth, that most human beings leave the world as they enter it, with a strong taste for food.

#### SUMMARY

Eleven Birmingham general practitioners examined 82.5 per cent. (691) of all the men on their lists aged 70 and over. In its distribution by age and social class (based on occupation) this sample is reasonably representative of all men over 70 in Birmingham and in England and Wales.

Of the six commonest diseases—bronchitis, coronary disease, arthritis, hypertension, hernia, and peptic ulcer—the first three were associated with a high incidence of disability. Only arthritis and possibly peptic ulcer showed an increase in frequency with age (a result presumably attributable to selective mortality at earlier ages), and only bronchitis has a marked association with social class.

The data are pooled with observations from a previous survey of men in the seventh decade to show the increase after age 60 in the incidence of disability which would either (a) restrict or prohibit full-time employment, or (b) cause appreciable inconvenience but not restrict employment (see Fig. 1). The frequency of disability was consistently related to social class, the proportions not disabled among men over 70 being approximately one-third and one-tenth in Classes I and V respectively. A very large part of the class gradient was attributable to chronic bronchitis.

Of men over 70, about one-quarter gave "gardening" as their chief pleasure, and one-third gave "poor health"—as distinguished from specific disabilities such as deafness, poor sight, etc.—as their chief complaint.

The effect of the bias introduced in these results by exclusion of men living in hospitals or other institutions is examined.

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#### REFERENCES

- Brown, R. G., McKeown, T., and Whitfield, A. G. W. (1958). *Brit. med. J.*, 1, 555.  
 Edwards, F., McKeown, T., and Whitfield, A. G. W. (1959). *Clin. Sci.* (in press).