Measuring the prevalence of disease in middle-aged British men

M Walker, A G Shaper, S G Wannamethee, P H Whincup

ABSTRACT - Objective: To identify and validate a measure of disease prevalence in a town or other subpopulation for the purpose of estimating variations in morbidity and health care needs between groups.

■ Design: A national prospective study of cardiovascular disease based in 24 British towns.

■ Subjects: 7,735 men aged 40–59 years sampled from 24 general practice age-sex registers between 1978 and 1980.

■ Method: A questionnaire administered at recruitment and a postal questionnaire five years later (98% response) asked if the subject recalled ever having had a diagnosis by a doctor of any of 12 listed conditions. In addition, the men were asked about regular medication, occupation, lifestyle and perceived health status. All-cause mortality data were collected during 13.5 years of follow-up.

■ Results: Prevalence of recalled doctor diagnoses varied between the towns; for cardiovascular disease, it correlated significantly with other health indices and personal characteristics and with standardised mortality ratios for the town. Consistency of reporting over time and mortality outcome after 13.5 years also supported the validity of patient recall.

■ Conclusions: A simple standardised questionnaire using patient recall of common conditions diagnosed by a doctor provides a plausible, valid measure of variations in disease burden between communities.

Total and cause-specific mortality rates for a town or region provide a fairly accurate picture of what people are dying from, but are not necessarily a good measure of the clinical burden of disease (morbidity) experienced by people in that town or region. Many of the diseases and disorders which are a burden to individuals, their families and carers, to hospital services and society as a whole, may not emerge as causes of death on the death certificate, and some conditions may not even be recorded. In the process of health needs assessment, as well as in terms of aetiological investigation, measures need to be identified which can be used readily to assess the burden of disease in populations. Such measures do not replace mortality statistics but provide complementary information which can be used to plan provision of services in relation to populations defined in a variety of ways.

Morbidity indices such as permanent or temporary sickness absence (days lost from work) provide a poor approximation of the true community burden of disease because they focus on the experience of a subpopulation. Long-standing disability, assessed by questionnaire in the General Household Survey, estimates the burden of disease related particularly to the elderly in the community. In some cases, the prescribing of specific regular medication, such as glyceryl trinitrate for angina, is the best readily available index for the prevalence of a particular condition.

A standardised tool for measuring morbidity in a community could be of great benefit for comparing the burden of disease and assessing the health needs of different communities.

The British Regional Heart Study (BRHS) is a major national prospective study of cardiovascular disease (CVD) in middle-aged men drawn from one general practice in each of 24 towns in Great Britain. It provides, in particular, an opportunity to examine some specific cardiovascular-related measures of disease prevalence on a town basis, using patient recall of diagnoses made by a doctor. The validity of some of these measures has been determined by comparing them with general practitioner (GP) reporting of specific conditions. Also reported for each man were:

- use of regular medication
- self-assessment of health status
- consistency of diagnosis over time
- mortality experience over a follow-up period of 13.5 years.

Method

The BRHS examined 7,735 men aged 40–59 years, drawn from the age/sex registers of one general practice in each of 24 towns in Great Britain between 1978 and 1980. The details of the study design and methodology have been described elsewhere. Exclusions from the study were limited to the few men (6–10 per practice) whom the GP identified as physically or mentally unable to take part in the study. With one mailed invitation and one reminder, there was an overall response rate of 78%, providing an average sample of 322 men in each town (range 280–389).
Initial screening (Q1)

Research nurses administered to each man a standard questionnaire (Q1) which included questions on:
- medical history
- recall of diagnoses given by a doctor (a 12-item check-list)
- regular drug usage
- longest-held occupation
- smoking habit
- alcohol consumption
- respiratory symptoms.

Physical measurements included height, weight and blood pressure. Blood samples were analysed for serum total cholesterol.

Postal questionnaire (Q5)

A similar questionnaire (Q5) was mailed to all surviving men five years after the initial screening, and similar information obtained on:
- recall of diagnoses
- regular medication
- changes in alcohol intake
- smoking behaviour
- body weight
- employment status.

In addition, the men were asked how they rated their current state of health (excellent, good, fair, poor). This questionnaire was completed and returned satisfactorily by 7,275 men (98% of the survivors).

Follow-up

By December 1993, all the men had been followed up for a minimum period of 13.5 years (range 13.5–16.0) from the initial screening (Q1). Reporting of non-fatal cardiovascular events and all-cause mortality was maintained on over 99% of the cohort through regular medical record reviews and GP reports.

Mortality in the British Regional Heart Study

All subjects have been tagged at the National Health Service Central Register (Southport and Edinburgh). Death certificates relating to men in the study have been received at regular intervals, providing information on date and cause of death coded to the 9th Revision of the International Classification of Diseases codes. Validation of cause of reported death was obtained from GP records, and any inconsistencies followed up for clarification.

National mortality data

Standardised mortality ratios (SMRs) for 1979–1983 for all-cause, CVD and ischaemic heart disease (IHD) mortality were calculated for men aged 35–64 for each of the 24 towns, using Office of Population, Censuses and Surveys mortality data (SD25) and 1981 Census data. The death rate for men aged 35–64 in England, Wales and Scotland for this period was used as the standard.

Prevalence of diagnosed disease

At initial screening, the men were asked by the nurse whether they had ever been told by a doctor that they have or have had any of the conditions listed in Table 1 and whether they were on any regular medical treatment from a doctor. If they answered either question in the affirmative, they were asked to give more detailed information using a short check-list.

Statistical methods

Statistical analyses were carried out using the SAS statistical package (SAS Institute, Cary, NC, USA). Pearson's correlation coefficients were obtained to assess the geographical relation between morbidity indices and SMRs in the 24 towns. Cox's proportional hazards model was used to obtain the adjusted relative risks (RRs) and 95% confidence intervals for mortality according to recall of doctor diagnosis. Recall of IHD (yes/no), hypertension (yes/no), diabetes (yes/no), stroke (yes/no) were fitted as dichotomous variables. 'Number of diagnoses' was fitted as three dummy variables for the four categories (none, 1, 2, 3 or more).

Results

The prevalence of recall of a doctor diagnosis has been obtained for the 12 conditions on the questionnaire check-list (Table 1). Ten of these diagnoses have been examined on a town basis, and four illustrated in Fig 1 (IHD, hypertension, diabetes, bronchitis). Stroke and thyroid

Table 1. 12-point check-list of conditions about which a recall diagnosis was asked.

- ischaemic heart disease*
- 'other heart trouble'
- hypertension
- stroke
- gout
- gall-bladder disease
- thyroid disease
- arthritis
- bronchitis
- asthma
- peptic ulcer
- diabetes

* including recall of angina, heart attack, coronary thrombosis or myocardial infarction.
disease have been omitted from the 24-town analysis due to the small number of cases recorded.

Geographical variation

Table 2 shows the prevalence of 10 recalled diagnoses and regular medication examined by town, with ranges for each condition listed.

Recall of doctor diagnosis

Ischaemic heart disease. The overall prevalence of IHD was 5.5%, with a threefold regional range from 3.0% (Ipswich) to 10.2% (Merthyr Tydfil) (Fig 1(a)). The town prevalence rate correlated strongly with the SMR for IHD in these towns ($r = 0.77, p < 0.001$). Overall prevalence of recall of an IHD diagnosis was significantly age-related, rising from 1.6% in 40–44 year olds to 9.8% in 55–59 year olds ($p < 0.01$).

‘Other heart disease’. Rheumatic heart disease accounted for 57% of ‘other heart disease’. The lowest prevalence was 4.2% (Hartlepool) and the highest 9.9% (Merthyr Tydfil) – a twofold range, with an overall mean prevalence of 6.8%. No age trend was observed. Some of the men in this group may have IHD which was either not clearly specified by the doctor or not clearly recalled by the patient.

Hypertension. There was recall of hypertension by 12.8% of men, ranging from 7.4% (Falkirk) to 19.0% (Wigan) (Fig 1(b)). The prevalence doubled across the four five-year age groups: 40–44 (8%), 45–49 (11%), 50–54 (15%) and 55–59 (17%). Antihypertensive medication was being taken by 2%, 4%, 6% and 8% of these age groups, respectively. Five years later (Q5), recall of a diagnosis of hypertension had increased in each age group by between 1 and 2 percentage points, but a much higher proportion (almost twice as many) were on antihypertensive medication (4%, 8%, 11% and 15%).

Diabetes. The overall recall for diabetes was 1.5%, with a fivefold range from 0.6% (Lowestoft) to 2.9% (Hartlepool) (Fig 1(c)). The other four towns with over 2% of men diagnosed as diabetic (Burnley, Guildford, Harrogate, Wigan) are towns of very different social class composition and mean body mass index (BMI). The prevalence of diabetes doubled across the four age groups from 0.9% to 1.9%. There was no significant correlation on a town basis between prevalence of diagnosed diabetes and the percentage of men:

- consuming over 21 units of alcohol weekly ($r = 0.37$)
- who were physically active (ie taking moderate activity or more) ($r = -0.39$)
- who were obese ($\geq 28$ kg/m$^2$) ($r = 0.1$).

Gall-bladder disease. There was a low mean prevalence of 1.7% for gall-bladder disease, ranging from 0.3% (Ayr) to 2.8% (Mansfield). Numbers in each town were too small to examine any geographical patterns, and no regional trend using grouped data was apparent. A twofold increase was seen across the four age groups.

Peptic ulcer. A diagnosis of peptic ulcer was recalled by 10.8% of men overall, ranging from 4.8% (Guildford) to 17.5% (Carlisle). All nine towns with over 12% recall were located in the North and Wales. No important increase with
age was observed, but there was a strong correlation between prevalence of peptic ulcer and high alcohol consumption (>21 units per week) \( (r = 0.66, p < 0.001) \). A significant inverse correlation was found on a town basis between the percentage prevalence of peptic ulcer and the percentage of never-smoking men \( (r = -0.48, p = 0.01) \).

**Gout.** Gout was recalled by 2.6% of men, ranging from 1.0% (Ayr, Falkirk) to 5.7% (Guildford) and 4.9% (Merthyr Tydfil). Guildford and Merthyr Tydfil form an unusual pairing, usually being found at opposite extremes of the range for any disorder.

**Arthritis.** Recall of arthritis was made by 10.8%, ranging from 5.4% (Bedford) to 18.2% (Burnley). Other towns with a prevalence above 14% were Dewsbury, Merthyr Tydfil and Wigan. The regional variation of this condition was remarkably similar to that of IHD, and the correlation between the recall prevalence of these two diagnoses in the 24 towns was highly significant \( (r = 0.52, p = 0.008) \). There was also a significant correlation on a town basis between the prevalence of arthritis and the percentage of men reporting alcohol consumption of more than 21 units per week \( (r = 0.57, p = 0.003) \). Despite a strong correlation on a town basis between the percentage of current smokers and the percentage with moderate to heavy alcohol intake \( (r = 0.60, p < 0.002) \), correlation between the former and the prevalence of arthritis in the 24 towns was not significant \( (r = 0.34) \).

**Bronchitis.** For bronchitis, there was an overall prevalence of 18.0%, with the lowest 6.9% (Guildford) and the highest 31.4% (Merthyr Tydfil) and 28.6% (Dewsbury) (Fig 1(d)). There was a less than twofold increase with age, but the prevalence was already high (14.3%) in the 40-44 year olds, rising to 22.4% in the 55-59 year age group. A significant inverse correlation was seen between town prevalence of bronchitis and the percentage of never-smoking men in each town \( (r = -0.53, p < 0.01) \).

**Asthma.** Overall, a 3.7% prevalence of asthma was present in these middle-aged men, with no increase with age. There were seven towns with above average (>4%) prevalence rates. The lowest was 1.3% (Gloucester), while at 10.4%, Harrogate had almost twice the rate found in any other town. A diagnosis was recalled by only 2.2% of men in Grimsby, the town with the highest proportion of heavy smokers.

**Stroke.** Not surprisingly, for a group with an average age of 50 years at recruitment, the overall prevalence of stroke

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**Table 2. Prevalence (%) of recall of doctor diagnosis by middle-aged men in 24 British towns.**

| Town       | IHD | Other heart condition | Hypertension | Diabetes | Gall-bladder disease | Peptic ulcer | Gout | Arthritis | Bronchitis | Asthma |
|------------|-----|-----------------------|--------------|----------|----------------------|--------------|------|-----------|------------|--------|
| Ayr        | 8.3 | 6.3                   | 10.6         | 1.0      | 0.3                  | 14.6         | 1.0  | 8.3       | 17.9       | 4.7    |
| Bedford    | 3.7 | 8.7                   | 11.7         | 1.7      | 2.0                  | 7.7          | 2.7  | 5.4       | 13.4       | 3.0    |
| Burnley    | 5.6 | 8.2                   | 14.0         | 2.8      | 1.7                  | 13.6         | 1.7  | 18.2      | 25.3       | 2.5    |
| Carlisle   | 6.2 | 7.2                   | 11.8         | 1.8      | 2.6                  | 17.5         | 3.1  | 6.7       | 13.9       | 2.3    |
| Darlington | 5.5 | 5.2                   | 16.0         | 1.0      | 2.1                  | 11.3         | 3.1  | 7.6       | 13.4       | 4.7    |
| Dewsbury   | 7.4 | 6.5                   | 13.5         | 1.8      | 0.6                  | 14.8         | 2.8  | 14.2      | 28.6       | 5.5    |
| Dunfermline| 6.3 | 6.8                   | 12.5         | 0.9      | 2.3                  | 13.1         | 1.4  | 9.7       | 14.2       | 2.3    |
| Exeter     | 3.3 | 9.3                   | 15.4         | 0.9      | 1.5                  | 6.6          | 2.4  | 6.6       | 15.1       | 6.3    |
| Falkirk    | 6.5 | 8.7                   | 7.4          | 1.0      | 2.6                  | 13.3         | 1.0  | 10.0      | 16.2       | 1.6    |
| Gloucester | 4.8 | 5.8                   | 12.3         | 1.6      | 1.9                  | 8.1          | 2.9  | 5.8       | 19.1       | 1.3    |
| Grimsby    | 3.1 | 4.7                   | 17.0         | 1.3      | 1.9                  | 10.7         | 3.1  | 8.8       | 22.6       | 2.2    |
| Guildford  | 3.3 | 7.2                   | 15.5         | 2.1      | 0.9                  | 4.8          | 5.7  | 7.2       | 6.9        | 4.8    |
| Harrogate  | 4.3 | 5.7                   | 13.2         | 2.1      | 1.1                  | 10.4         | 3.2  | 13.6      | 22.9       | 10.4   |
| Hartlepool | 6.7 | 4.2                   | 12.1         | 2.9      | 1.0                  | 12.5         | 3.3  | 12.5      | 21.0       | 3.8    |
| Ipswich    | 3.0 | 8.0                   | 10.8         | 1.4      | 2.2                  | 5.5          | 1.9  | 8.3       | 13.8       | 5.0    |
| Lowestoft  | 3.1 | 5.6                   | 9.0          | 0.6      | 1.5                  | 9.9          | 2.2  | 9.9       | 15.4       | 3.4    |
| Maidstone | 3.5 | 6.3                   | 11.5         | 0.9      | 0.9                  | 9.1          | 1.3  | 10.1      | 16.4       | 3.5    |
| Mainsfield | 5.9 | 8.7                   | 13.4         | 1.9      | 2.8                  | 10.6         | 3.1  | 12.1      | 16.8       | 4.0    |
| Merthyr Tydfil | 10.2 | 9.9                  | 17.7         | 1.4      | 1.4                  | 13.4         | 4.9  | 14.5      | 31.4       | 3.5    |
| Newcastle-under-Lyme | 6.5 | 4.4                  | 11.9         | 1.4      | 1.7                  | 9.2          | 2.4  | 13.7      | 21.8       | 1.7    |
| Scunthorpe | 6.9 | 8.4                   | 14.2         | 1.8      | 2.1                  | 10.2         | 1.5  | 11.4      | 21.1       | 3.6    |
| Shrewsbury | 6.1 | 6.4                   | 8.7          | 1.3      | 2.3                  | 10.0         | 3.5  | 7.7       | 15.8       | 3.5    |
| Southport | 3.1 | 6.2                   | 7.8          | 1.2      | 1.9                  | 10.2         | 2.8  | 7.1       | 17.1       | 4.0    |
| Wigan      | 8.3 | 8.0                   | 19.0         | 2.1      | 1.5                  | 12.8         | 1.8  | 16.3      | 19.0       | 1.8    |
| **Mean for all men** | 5.5 | 6.8                  | 12.8         | 1.5      | 1.7                  | 10.8         | 2.6  | 10.8      | 18.0       | 3.7    |
| **Range: Minimum** | 3.0 | 4.2                  | 7.4          | 0.6      | 0.3                  | 4.8          | 1.0  | 5.4       | 6.9        | 1.3    |
| **Maximum** | 10.2 | 9.9                 | 19.0         | 2.9      | 2.8                  | 17.5         | 5.7  | 18.2      | 31.4       | 10.4   |

IHD = ischaemic heart disease.
was low \( (n = 52, 0.6\%) \), but there was a striking increase
over the four age groups from 0.1\% to 1.4\%.

**Thyroid disease.** The low prevalence of thyroid disease
(0.6\%) did not rise with age.

**Regular medication**

On average, 28.6\% of these middle-aged men were on some
regular medication at baseline examination (Q1), ranging
from 22.2\% (Lowestoft, Shrewsbury) to 37.8\% (Merthyr
Tydfil). A steadily increasing trend in regular medication
was seen across the four age groups, rising from 21\% to
37\%. Five years later (Q5), 32\% reported being on regular
medication, with an increase across the age-groups from
21\% to 44\%. This index of morbidity showed consistently
strong correlations with SMRs for all-cause, IHD and CVD
mortality in the 24 towns \( (r > 0.6, p < 0.002) \) in each case. A
strong relationship was also found between the percentage
on regular medication in each town at Q5 and self-perceived
health status (percentage reporting poor and fair
health) at that time \( (r = 0.7, p = 0.0001) \).

**Burden of disease**

Overall, 50\% of the study population had no recall of any of
the 12 conditions listed. Merthyr Tydfil scored worst with
only 39.4\% of men 'recall free from a doctor diagnosis',
while Guildford did best with 59.1\%. As expected, the
percentage of men 'recall free' in each of the 24 towns had a
strong negative correlation with the percentage on
regular medication \( (r = -0.77, p < 0.0001) \). Men who had
never smoked were more likely to be free from recall of
diagnosed disease (59\%) than other men (46\%) \( (p < 0.0001) \).

The percentage of men in a town with two or more
recalled diagnoses from the 12-item check-list at Q1
correlated strongly with other indices, for example:

- cardiovascular SMRs \( (r = 0.64, p < 0.007) \)
- self-perceived health status at Q5 \( (r = 0.69, p < 0.002) \)
- percentage on current medication at Q1 \( (r = 0.66, p < 0.0001) \).

The SMR for all causes of death was highly correlated
with the percentage reporting poor or fair health \( (r = 0.72, p = 0.0001) \).

**Social class variation**

In this study, 57\% of men were manual workers
compared with the national average of 58\% at the 1981
Census. Furthermore, compared with the six
Registrar-General's Office (RGO) categories (I, II, III
non-manual and III, IV, V manual) at the 1981 Census,
the study data were found to be remarkably similar, within
1-2\% in most cases. The percentage of manual
workers in each town varied widely from 24\% (Guildford)
to 84\% (Grimsby). There was a high correlation between
the percentage of manual workers in the BRHS sample in
each of the 24 towns and the percentage of manual
workers in those same towns at the 1981 Census
\( (r = 0.84, p < 0.00001) \), giving considerable validity to the
study results as representing the findings in the general
middle-aged male population of Great Britain.

Disease prevalence of the 10 listed diagnoses varied
between the non-manual and manual workers (Table 3), but
the differences were not marked between the three RGO
social class categories within each of these two main
groups. The difference in prevalence of bronchitis (18\%
overall) between non-manual (15.6\%) and manual workers
(21.1\%) was highly significant \( (p < 0.001) \) and had the
largest social class variation: 12.4\% in social class I to 25\%
in social class IV. Other conditions found to have highly
significant \( (p < 0.001) \) non-manual/manual differences in
prevalence were:

- IHD (4.4\% vs 6.1\%)
- arthritis (8.5\% vs 11.2\%)
- use of regular medication (26.3\% vs 30.4\%).

Asthma was the only diagnosis significantly more
prevalent in the non-manual than the manual groups
\( (p < 0.01) \).

**Geographical and social class variation**

Using an arbitrary measure of two or more recalled doctor
diagnoses, the prevalence of 'disease burden' was examined
for manual and non-manual workers in each of the
24 towns. In general, where the burden of disease was high
in one social group it was also high in the other \( (r = 0.44, p = 0.03) \), suggesting a town variation independent of social
class.

### Table 3. Prevalence (%) of recall of doctor diagnosis and
regular medication by non-manual and manual workers.

| Social class | Doctor diagnosis recalled |
|--------------|--------------------------|
|              | Non-manual (%) \( (n = 3,061) \) | Manual (%) \( (n = 4,426) \) |
|              | Ischaemic heart disease | 4.4 | 6.1** |
|              | 'Other heart trouble' | 7.4 | 6.4 |
|              | Hypertension | 12.0 | 13.2 |
|              | Diabetes | 1.4 | 1.6 |
|              | Gall-bladder disease | 1.8 | 1.6 |
|              | Peptic ulcer | 9.7 | 11.8* |
|              | Gout | 1.8 | 1.6 |
|              | Arthritis | 8.5 | 11.2** |
|              | Bronchitis | 13.6 | 21.1** |
|              | Asthma | 4.5 | 3.2* |
|              | Regular medication | 26.3 | 30.4** |

* \( p < 0.01; ** p < 0.001. \)
Consistency over time

The agreement among men reporting recall of any of the diagnoses at Q1 with their self-reported recall on a check-list five years later (Q5) was examined. A man who reported a positive recall of a specific disease at Q1 but no recall of that disease five years later (Q5) represents inconsistency. Comparison of the recall of these 10 specific diagnoses by the 7,275 surviving men with both sets of data indicated strong consistency, with 87% agreement for IHD and 84% for diabetes. Less severe or intermittent conditions (those with acute episodes not necessarily liable to recurrence or which were amenable to treatment) had less good agreement (eg bronchitis 54%). Men with two out of three positive symptoms of phlegm, wheeze and breathlessness at Q1 were almost twice as likely to recall a diagnosis of bronchitis at Q1 and Q5 than men who recalled a diagnosis of bronchitis only at Q1, indicating the chronic nature of their disorder.

Recall of cardiovascular-related doctor diagnoses in predicting mortality

Using 13.5 years of follow-up data for each man and a total of 1,136 deaths, mortality rates for CVD and non-CVD causes were examined in relation to recall of cardiovascular-related conditions at Q1 (IHD, stroke, 'other heart trouble', hypertension and diabetes) (Table 4). Compared with the 5,988 men free from any recall of diagnosis of a cardiovascular condition and in whom the death rate was lowest (RR = 1.0), all those with at least one of the diagnoses were at significantly increased risk from a cardiovascular death. The risk increased considerably with increasing numbers of diagnoses. The presence of a specific cardiovascular-related condition diagnosed by a doctor and recalled by the subject also appeared to increase the risk of death from non-CVD causes, but only for men with a recall of diabetes did this increase in RR remain significant after adjustment for age and coexisting diagnoses. No increase in risk of death from non-CVD causes was seen with increase in the number of cardiovascular-related diagnoses.

Discussion

These data from the BRHS illustrate regional and social patterns of disease derived from patient recall of doctor diagnoses and regular medication. This method of ascertaining disease prevalence does not provide precise levels, due to the many problems associated with an individual's ability to recall a diagnosis made in the past by a doctor\(^1\). These problems include:

- the nature and severity of the disease
- the impact on the individual of the diagnosis
- the clarity and certainty of communication made by the doctor
- the circumstances under which the recall is required.

However, it remains an attractive possibility that simple checklists to enumerate recalled diagnoses and regular medication may be a useful crude and relative measure of the burden of disease in a community.

Geographical variation

Other surveys carried out in defined areas of England and Scotland using various data collection methods have

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Table 4. Relative risk (RR) and 95% confidence intervals (CIs) for cardiovascular disease (CVD) and non-CVD mortality in men with recall of cardiovascular-related doctor diagnosis, compared with men without such recall, adjusted for age and coexisting diagnoses (13.5 years follow-up).

| Diagnosis recalled                        | No. of men | CVD (n = 576) | Non-CVD (n = 560) |
|------------------------------------------|------------|---------------|-------------------|
|                                          |            | RR 95% CI     | RR 95% CI         | RR 95% CI | RR 95% CI |
| Free from all conditions listed below    | 5,988      | 1.0           | 1.0               | 1.0       | 1.0       |
| Ischaemic heart disease                  | 422        | 4.4 (3.6-5.4) | 3.7 (3.0-4.5)     | 1.3 (0.9-1.7) | 1.3 (0.9-1.8) |
| Stroke                                   | 52         | 4.7 (3.0-7.2) | 1.9 (1.2-3.1)     | -         | -         |
| 'Other heart trouble'                    | 528        | 1.9 (1.5-2.4) | 1.5 (1.2-1.9)     | 1.3 (0.9-1.7) | 1.3 (0.9-1.7) |
| Hypertension                             | 990        | 2.1 (1.7-2.5) | 1.6 (1.3-2.0)     | 1.0 (0.8-1.3) | 1.0 (0.8-1.3) |
| Diabetes                                 | 118        | 3.1 (2.0-4.5) | 2.2 (1.5-3.3)     | 1.7 (1.0-2.9) | 1.8 (1.0-3.0) |
| 1 of above                               | 1,432      | 2.2 (1.8-2.7) | 1.2               | 1.0 (1.0-1.5) | 1.0 (1.0-1.5) |
| 2 of above                               | 273        | 5.7 (4.4-7.2) | 1.2               | 0.8 (0.8-1.8) | 0.8 (0.8-1.8) |
| 3 of above                               | 42         | 8.2 (5.1-13.2)| 0.6               | 0.1 (0.1-2.6) | 0.1 (0.1-2.6) |

- = numbers insufficient for analysis.
examined the prevalence of some specific diagnoses (eg IHD, diabetes, gout) and have reported results similar to ours[12-15]. Hypertension has been less well investigated on a regional basis. In the BRHS, comparison of the results between 'recall of a doctor diagnosis' and survey-measured blood pressure indicate a halving of the true prevalence although, on repeated readings by the GP, a proportion of survey-identified hypertensives were below the levels usually categorised as hypertensive (<160/100 mmHg)16. The relative contribution made by many different factors (environmental, occupational, lifestyle, genetic) to these regional variations in disease patterns varies between conditions, but certain exposures with strong regional variation (eg cigarette smoking) are likely to have played an important role in several of the conditions. In particular, high smoking rates in addition to occupational exposures (eg mining, textile and steel industries) are likely to account for the high prevalence of bronchitis in towns such as Burnley, Dewsbury, Merthyr Tydfil and Scunthorpe. More heavy smokers and more men with hypertension are likely to contribute to the higher rates of IHD in Ayr, Dewsbury, Merthyr Tydfil and Wigan4. Mean serum total cholesterol levels did not correlate with the prevalence of IHD in the 24 towns, but were high by international standards in all towns (ie basic susceptibility to IHD from these levels was universally high in Great Britain)4. Similarly, obesity (BMI ≥28 kg/m²) did not correlate with the prevalence of IHD in the 24 towns but was a common and widespread finding6. The striking geographical patterns in the prevalence of a wide range of diseases offer an opportunity for testing specific aetiological hypotheses.

Social class variation
The social class distribution of the BRHS sample mirrored the national and town census sample in 1981, suggesting that the data in this study can be generalised to the middle-aged male British population. A higher prevalence of disease was found in manual workers for all causes examined, apart from asthma, gout and 'other heart conditions'. This is consistent with known social class variations reported by other investigators13.

Variation with age
The prevalence of most chronic conditions increases with age. This trend was found with all the conditions examined, except for asthma and thyroid disease, suggesting that men susceptible to these diseases will already have manifested the condition by middle age.

Consistency over time
Repeatability, using recall of diagnoses over a five-year period, was higher for severe or persistent conditions. Problems such as bronchitis, with acute episodes which do not necessarily recur and are amenable to treatment, are less well recalled, but individuals with chronic respiratory symptoms were almost twice as likely to recall a diagnosis consistently.

Validation with general practitioner reporting
The cross-checking of data on recall of a diagnosis of non-fatal myocardial infarction (MI) and stroke with GP reports inevitably found some discrepancies5. There tended to be more over-recall of major cardiovascular events by patients than under-recall (MI: 33% vs 6%, stroke: 25% vs 11%). In those who over-recalled these specific events, 78% had other circulatory problems which suggests that their recall was genuine and would have been appropriate if a broader definition of cardiovascular conditions had been used.

Prediction of mortality
The results from 13.5 years of follow-up indicate a significant increase in RR of cardiovascular death in men with a cardiovascular-related diagnosis, but no significant increase in non-cardiovascular mortality, apart from men with diabetes. The higher RR found with diabetes indicates the wide range of complicating conditions which extend beyond cardiovascular problems (eg renal disease). Cardiovascular burden, as measured by the presence of two or more cardiovascular-related diagnoses, was an even stronger indicator of risk of cardiovascular mortality. Mortality rates may not be a suitable gold standard for comparison with morbidity, except in conditions with a high fatality rate (eg IHD). For strokes, where there were three non-fatal events to each fatal event in this age group (40-59)17, placing a heavy burden on aftercare and rehabilitation services, mortality rates are clearly an inappropriate measure of the burden of the disease. It is impossible to measure morbidity to the same degree of accuracy as mortality, but it seems reasonable to attempt to estimate it for the purpose of needs assessment, resource allocation and detection of changes in prevalence when measured in a standardised and reproducible way.

Conclusions
Collecting morbidity data through patient recall on a simple standardised postal questionnaire of common conditions diagnosed by a doctor is a non-threatening, repeatable and relatively inexpensive method. It can be selectively directed towards specific subpopulations (eg women, ethnic and geographical communities) or particular age groups, thus targeting samples and using resources efficiently. It provides a cost-effective tool for rapidly ascertaining relative measures of prevalence of some specific conditions and/or a composite measure of cardiovascular burden, which may be of help to health authorities wishing to quantify disease prevalence in their populations in order to plan the provision of health care.
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Address for correspondence: Mary Walker, Department of Primary Care and Population Sciences, Royal Free and University College Medical School, Royal Free Campus, Rowland Hill Street, London NW3 2PF. E-mail [maryw@rfhsm.ac.uk]

Science-based complementary medicine

Edited by Tom Meade FRS

An increasing number of patients who feel that conventional medical treatment provided by their doctors has not met their expectations are seeking ways to complement, or to replace it with some alternative therapy.

Doctors trained in western medicine and its scientific basis have been suspicious of the claims of therapies based on different concepts, attributing any reported benefits at best to a placebo effect or dismissing them as fraudulent. An important step in bridging the gap between these therapeutic cultures was the setting up of the Research Council for Complementary Medicine which aims to introduce genuine, acceptable scientific methods of assessing these treatments. At about the same time, Professor Tom Meade’s unit conducted a carefully controlled comparison of chiropractic with conventional physiotherapy for lower back pain which is reported here.

Based on papers given at a conference organised by the RCP, this book describes how to gather and examine the evidence of a scientific basis for complementary medicine, illustrates what can and cannot be achieved with homeopathy, herbal remedies and manipulations of the spine, and what doctors and patients expect of such therapies.

This marks the start of a new epoch in the relationship between conventional and complementary medicine which can only be to the benefit of patients.

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