LOSS OF EMPLOYMENT AND ILL HEALTH

THESIS
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DEGREE
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DOCTOR OF PHILOSOPHY
in the Faculty of Medicine
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ABSTRACT

This thesis examines the relationship between non-employment (unemployment and early retirement), physical health, health-related behaviour and mortality using data on 7735 men enrolled in the British Regional Heart Study. The Initial Screening of men aged 40-59 from 24 towns in England, Scotland and Wales was carried out in 1978-80. After five years follow-up a postal questionnaire was completed by 98% of available men and after eight years follow-up, each man's general practitioner records were examined. The main analyses are based on 6057 'stably' employed men who were employed at Initial Screening and had experienced no unemployment in the five years prior to this.

At Initial Screening 'stably' employed men who subsequently experienced some non-employment over the next five years showed evidence of greater morbidity, were heavier smokers and drinkers and consulted their general practitioners more frequently than 'stably' employed men who remained continuously employed. Men who stated that their subsequent retirement was not due to ill health did not exhibit these characteristics prior to the loss of employment. On experiencing non-employment there was no evidence that non-employed men were likely to increase their smoking and alcohol consumption. The only evidence of a loss of employment being associated with the adoption of behaviour detrimental to future health was an increased propensity to gain a large amount of weight. Loss of employment was associated with an increase in general practice consultations.

Over a five and a half year period following the Postal Questionnaire, men who had experienced some non-employment between Initial Screening and the Postal Questionnaire had a raised risk of death from all causes compared to men who had remained continuously employed. This association between loss of employment and increased risk of mortality could not be explained fully by pre-existing health status and/or by health-related behaviour.
DECLARATION OF AUTHORSHIP

This thesis is based on data provided by the British Regional Heart Study. An Initial Screening of 7735 men occurred between 1978-1980, a Postal Questionnaire was sent to the surviving men five years later and a Postal Questionnaire was sent to the surviving men's current General Practitioners after eight years of follow-up. I was not involved in the design or collection of this data. A paper on health and unemployment, based on the data collected at Initial Screening was published in 1982 (Cook DG, et al 1982). My involvement with the BRHS began in 1989. I was responsible for cleaning the consultation rate data. I am responsible for all the computing and statistical analysis carried out in this thesis.

Joan Katherine Morris
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This thesis is dedicated to

J.F.L
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ABBREVIATIONS AND NOMENCLATURE

ABBREVIATIONS

BMI  Body Mass Index = weight/height² in kg/m².
BRHS  British Regional Heart Study
CI  Confidence Interval
DBP  Diastolic Blood Pressure
DF  Degrees of Freedom
FPC  Family Practitioner Committee
GHS  General Household Survey
GP  General Practitioner
IS  Initial Screening (1978-1980)
LS  Longitudinal Study
MI  Myocardial Infarction (coronary thrombosis, heart attack)
NMS  National Morbidity Study
OPCS  Office of Population Censuses and Surveys
OR  Odds Ratio
PQ  Postal Questionnaire (1983-1985)
SE  Standard Error
SMR  Standardised Mortality Ratio
SBP  Systolic Blood Pressure

NOMENCLATURE

‘Stably’ employed  Men who were employed at Initial Screening and had
men  experienced no unemployment in the five years prior to this.
'Non-stably' employed men

Men with complete data on employment status, but who were not ‘stably’ employed at Initial Screening.

Continuously employed men

Men who were employed at Initial Screening and the Postal Questionnaire and had experienced no unemployment in the five years from Initial Screening till the Postal Questionnaire.

Discontinuously employed men

Men who were employed at Initial Screening and the Postal Questionnaire and had experienced some unemployment in the five years from Initial Screening till the Postal Questionnaire.

Part time employed men

Men who were employed part-time at the Postal Questionnaire.

Unemployed ill men

Men who were unemployed at the Postal Questionnaire and stated that this was due to illness.

Unemployed not-ill men

Men who were unemployed at the Postal Questionnaire and stated that this was not due to illness.

Retired ill men

Men who were retired at the Postal Questionnaire and stated that this was due to illness.

Retired not-ill men

Men who were retired at the Postal Questionnaire and stated that this was not due to illness.

Non-employed men

Discontinuously employed, unemployed ill, unemployed not-ill, retired ill and retired not-ill men.
CHAPTER 1

INTRODUCTION

1.1 EMPLOYMENT

A fully employed society has been defined as one in which 'those who lose jobs must be able to find new jobs at fair wages within their capacity without delay' (Beveridge WH 1960). Full employment, Beveridge argued, meant 'having more vacancies for workers than there are workers seeking vacancies', so that unemployment 'would be reduced to short intervals of standing by' and no one would be 'demoralised' by long periods of enforced idleness. During the 1960s nearly one-third of those on the unemployment register in the United Kingdom were likely to have been out of work for more than six months. During the 1970s this proportion rose steadily and increased sharply during the recession of 1979-82. By mid-1985 some 18 per cent of all unemployed men had been on the register between six months and a year, while 46 per cent had been there for over a year (Hawkins K 1987; p10). In the early 1980s, the time period the data analysed in this thesis covers, Great Britain was a long way from being a 'fully employed' society.

1.2 NON-EMPLOYMENT

Just as with defining employment, there are many different ways of defining non-employment in society. All official emphasis is on the numbers of unemployed people, the numbers of people who are 'impelled' to retire early are ignored. For example the Department of Employment records only those people who are claiming particular benefits as unemployed. It omits people who are ineligible for those benefits, but who nevertheless are seeking a job and also people who are classified...
as economically inactive (for example retired). Figure 1.1 gives the Department of Employments' figures for the level of unemployment in the United Kingdom from 1971 - 1988 (seasonally adjusted). In 1985 the average level of unemployment in the UK was 3.2 million, or just over 13 per cent of the labour force.

**Figure 1.1**  Seasonally adjusted levels of unemployment in the United Kingdom
(Source: Employment Gazette February 1989)

Even using this restrictive definition of the unemployment rate, the levels of non-employment in the early 1980s were extremely high. In the midst of a recession (1990/91), and with many forecasting high levels of non-employment continuing well into the twenty-first century, the impact of high levels of non-employment on society is an important issue.
1.3 NON-EMPLOYMENT AND PHYSICAL ILL HEALTH

Many studies have shown that unemployed people are less healthy and have a higher mortality rate than employed people (Moser KA, et al 1984; Cook DG, et al 1982; Arber S 1987). Few studies have examined the association between early retirement and ill health. The association between unemployment and ill health may be explained in many different ways (Figure 1.2):

**Figure 1.2 Unemployment and ill health**

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<td>ILL HEALTH</td>
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**Direct Causation**

Unemployment leads to ill health.

**Selection**

Men with poor health are more likely to become unemployed and may find it harder to regain employment.
Common Background Factors

Other factors may be associated with both greater morbidity and also with unemployment. For example, manual workers have more ill health and were also more likely to have experienced unemployment in the early 1980s.

Interaction

Unemployment may interact with other factors which also cause ill health. For example, for a man with a drink problem, becoming unemployed may exacerbate the problem.

These alternative explanations should not be seen as mutually exclusive nor as operating at one point in time. They need to be seen as part of a process, as Beveridge in 1909 commented:

'After all allowance has been made for special cases, the selective influence of personal character stands out as one of the dominant facts of the situation. Every employer, where he has the choice, dismisses the less satisfactory workmen and keeps the more satisfactory. In every organised trade the more regular and more efficient men have to pay for the less efficient and less regular. Almost inevitably, again, irregularity of employment reacts upon the man and accentuates the weaknesses with which he started. The net result is that the unemployed at any time, though they may include men of every grade, are as a whole below the general level in the qualities that make for industrial efficiency. The bulk of them are in no sense unemployable. They are equally removed from being the picked men of their trades. They are simply, taken in the mass, less competent, less industrious, less temperate or less regular than their fellows who have retained employment.' (Beveridge WH 1909).

In this context physical ill health can be viewed as a 'weakness', in that those who are unhealthy may be equated with being less satisfactory workmen. The aim of this thesis is to use longitudinal data from the British Regional Heart Study (BRHS) (a) to examine the 'weaknesses' of men before they become non-employed and (b) to examine how much the non-employment 'accentuates the weaknesses'. The emphasis will be on physical health and health-related behaviour since this was what was measured in the BRHS. Non-employment will cover both unemployment and 'early' retirement.
1.4 THE BRITISH REGIONAL HEART STUDY

The aim of the British Regional Heart study was to investigate the large geographical variations in cardiovascular disease in Great Britain, by examining environmental, socio-economic and personal risk factors. Between 1978 and 1980, 7735 middle-aged men from 24 towns in Great Britain were interviewed and clinically examined. Details of the men’s employment status were recorded. Five years after the initial interviews (1983-1985), all the men who were still alive and resident in Great Britain were mailed a questionnaire, with a 98% response rate. Due to the dramatic increase in unemployment from 1978 to 1983 and its possible adverse effects on health, information on the men’s employment status (both current and past) was collected in greater detail, as well as new data on the men’s health status and health-related behaviour. Eight complete calendar years after the initial interviews each man’s general practitioner (GP) was contacted and asked to record the number of times the man had consulted him (or another GP) in each calendar year for the previous eight years.

1.5 STRUCTURE OF THE THESIS

Chapter 1 provides a brief introduction to the reasons for investigating the relationship between employment status and health status. The data that will be analysed are briefly described and the structure of the thesis outlined.

Chapter 2 reviews the literature on non-employment (unemployment and ‘early’ retirement) and health, concentrating on the methodology involved in the different studies. Specific results concerning the relationship between non-employment and specific outcomes will be reviewed in greater detail in the relevant chapters :-

a) Morbidity prior to non-employment (Chapter 5)

b) General practitioner consultation rates (Chapter 7)

c) Other health-related behaviour (smoking/drinking/obesity) (Chapter 8).
Chapter 3 describes the methodology of, and the data collected in, the British Regional Heart Study.

Chapter 4 examines the changes in employment status that occurred between Initial Screening and the Postal Questionnaire. In an attempt to standardise for previous unemployment experience, further analyses (except those in Chapter 10) are restricted to ‘stably’ employed men (men who were employed at Initial Screening and had experienced no unemployment in the five years prior to Initial Screening). Various socio-demographic characteristics are examined to determine which factors were related to the odds of men experiencing non-employment after Initial Screening and whether these factors were independent. Non-employment covers both unemployment and early retirement.

Chapter 5 attempts to determine (a) whether the health status of non-employed men differed from the health status of continuously employed men prior to non-employment occurring (ie how important was health selection in determining who lost employment) (b) whether certain forms of ill health were more likely to be associated with subsequent non-employment than others and (c) whether health selection was more important amongst manual workers than amongst non-manual workers.

Chapter 6 compares the general practice consultation rate data collected in the British Regional Heart Study with consultation rate data from other sources to determine their validity. The method of analysing consultation rates that is used in this thesis is described.

Chapter 7 examines whether non-employed men consulted their GP more frequently, and if so, whether this occurred on becoming non-employed, or whether such differences had been present prior to non-employment.
Chapter 8 compares the health-related behaviour (smoking, drinking and body weight) of non-employed men with that of continuously employed men prior to non-employment occurring. It then examines the question of whether non-employment was associated with changes in these health-related behaviour patterns.

Chapter 9 compares the mortality from all causes of non-employed men with that of continuously employed men over on average five and a half years follow-up since the Postal Questionnaire. The extent to which statistically adjusting for socio-economic variables, self reported health status and health related behaviour reduces the observed differences in mortality rates is investigated.

Chapter 10 compares men who were ‘stably’ employed at Initial Screening with those who were not. ‘Non-stably’ employed men had experienced more unemployment at Initial Screening and therefore the effects of unemployment on health and health-related behaviour observed in earlier chapters should be apparent in these men at Initial Screening. This chapter also examines whether changes in health-related behaviour were different in men who had experienced more unemployment in the recent past compared to those for whom non-employment was a new experience.

Chapter 11 draws conclusions about the relationship between employment status and health status in middle-aged men in Great Britain in the early 1980s.
CHAPTER 2

NON-EMPLOYMENT AND ILL HEALTH - A REVIEW

SUMMARY

All reported studies showed a strong association between unemployment and both psychological and physical ill health. Only longitudinal studies are able to address the problem of establishing causality as opposed to association. The main evidence of a causal link between unemployment and physical ill health comes from census-based longitudinal studies. These have observed increased mortality rates over ten years of unemployed people compared to employed people. The pattern of mortality rates and the fact that they occurred in younger men and in diseases which are known to be stress-related (in particular, suicides and ischaemic heart disease) suggests a causal interpretation. However, these studies did not have sufficient measurements on background variables to control adequately for the effect of common factors which are associated with both unemployment and increased morbidity. Smaller studies, in which a wider range of background variables had been measured, tended to lack power to detect any health effects. Also, most of these studies were based on a geographically or occupationally defined group of people, which prevented the results from being generalised to a wider population of unemployed people. Few studies have investigated the association between ‘early’ retirement and ill health. Both large and small scale studies have lacked the data to investigate the extent to which the ill health of unemployed men can be explained by their ill health and health-related behaviour prior to unemployment.
2.1 INTRODUCTION

The aim of this chapter is to review the literature on non-employment (unemployment and 'early' retirement) and ill health. This chapter begins with a discussion of the problems that arise when investigating the relationship between non-employment and health. With these problems in mind there follows a critical review of published studies. This review considers both the methodologies used and the substantive findings. 'Important' studies, either from the point of view of conclusions drawn from them or aspects of their methodology, are reviewed in more detail. In studies involving men and women over a wide age range, the results reviewed will generally be those specific to middle-aged men. Results concerning the relationship between non-employment and specific outcomes will be reviewed in greater detail in the relevant chapters:

a) Morbidity prior to non-employment (Chapter 5)
b) General practitioner consultation rates (Chapter 7)
c) Other health-related behaviour (smoking/drinking/obesity) (Chapter 8)

2.2 DIFFICULTIES IN RESEARCHING NON-EMPLOYMENT AND ILL HEALTH

2.2.1 Unemployment and its social consequences

High levels of unemployment in society affect not only unemployed individuals and their families, but also all other members of the community in a wide range of different aspects of their lives. At times of high unemployment, there is an increase in job insecurity, which often leads to poorer working conditions and lower rates of pay for those in work. There is less job mobility and therefore
fewer opportunities for promotion. The more vulnerable members of the community may be forced out of the labour market. The frustration caused by being unable to find work is sometimes directed at those in work, particularly other races, increasing the prevalence of racism. 'The employment rate in the community is acting as a marker of both material and social deprivation, not just among the unemployed but for the community as a whole' (Campbell DA, et al 1991).

Apart from humanitarian considerations, there are financial costs of high levels of unemployment. The report from the House of Commons Select Committee on Unemployment in 1982 stated that 'We believe unemployment to be among the causes of ill-health, mortality, crime or civil disorder...From the evidence we conclude that it is unrealistic to confine the costs of unemployment to those which directly affect the economy, to Exchequer costs or to losses of output and personal deprivation. We must seek to include some notional sum, to reflect burdens laid on the National Health Service, the police and the judicial system, not to mention the damage to persons and property.' Unemployment benefit alone amounted to about 2 per cent of GDP in 1986 (Hawkins K 1987; p13).

There are also a few positive aspects of high levels of non-employment. In communities with high levels of unemployment, the stress of being unemployed may be less (Jackson PR, Warr PB 1987). For individuals in dangerous work environments, overall physical health may improve on loss of employment (Iversen L, et al 1989). Also, some people enjoy non-employment, and the opportunity for early retirement may be welcomed.

When studying the relationship between unemployment and ill health, concentrating only on those individuals who are unemployed will ignore any wider effects of unemployment on the health of their families and the community. Also, in a study where the cases and controls both come from the same small community any effect of unemployment on the controls must be considered.
### 2.2.2 Defining the unemployed

At times of high unemployment, the number of workers withdrawing from the labour force rises due to early retirement, and claims for disability pensions and sickness benefit increase (Westin S, et al 1989; Piachaud D 1986). Figure 2.1 using data from the General Household Surveys (GHS) shows how the percentage of men economically inactive increased as the level of unemployment rose between 1974 and 1983.

**Figure 2.1** Employment status of men aged 60-64 in Great Britain 1974-1983

(source: General Household Surveys 1974-1983)
In a cross-sectional analysis of area data of the 46 counties of England, among men aged 55-69, a substantial proportion of the overall increase in disability and the decline in economic activity was attributable to the general rise in unemployment. (Piachaud D 1986). As part of a larger study of a factory closure, the eleven people who started to claim disability benefits on being made redundant were interviewed and their medical records examined (Westin S, et al 1989). These people had not become 'more diseased' in the biomedical sense; however, the significance and experience of their symptoms had taken on another meaning in the face of unemployment and economic insecurity, ultimately justifying their entering the sick role. In times of high employment such people may well be working and therefore it is uncertain whether they should be classified as unemployed or not. Often, 'seeking work' is a prerequisite to being classified as unemployed. However, in times of high unemployment people nearing the retirement age will not believe it worthwhile to even attempt to look for work. They will classify themselves as retired (Laczko F, et al 1988).

2.2.3 Defining early retirement

In Great Britain 65 years of age is the usual retirement age for men. Anyone retiring prior to this is often classified as having retired early. There is a difference between voluntary and forced early retirement, with volunteers tending to be of a higher social class and having greater financial security (McGoldrick AE, Cooper CL 1988). Attempting to classify retirement into voluntary and mandatory categories has problems, as there is often a discrepancy between the employer's classification of voluntary redundancy and that of the employee (McGoldrick AE, Cooper CL 1980). Many of the inequalities in retirement derive from the opportunities in earlier employment. The average pension for professional and managerial workers is five times that for an unskilled manual worker; workers who were ill during their employment phase or who were unemployed for spells have made less than the appropriate number of contributions to the scheme and therefore have smaller pensions (Jackson PM 1985). There are also differences in the reasons people give for retiring, with manual workers more likely to state
redundancy and ill health than non-manual workers (Laczko F, et al 1988). People who retired due to ill health were more likely to come from lower socio-economic status, have less favourable financial circumstances and be less content with life (Parnes HS, Nestel G 1981). For these people early retirement is not a welcomed phase in life. In contrast, for many people the opportunity of early retirement is welcomed. In a study of people working in companies providing early retirement schemes, 83% were satisfied with early retirement (McGoldrick AE, Cooper CL 1980). It is unclear how to treat early retirement, as for some it is just an alternative to unemployment while for others it is a welcomed opportunity.

2.2.4 The dynamic nature of unemployment

Unemployment is one of several possible states, which may never be experienced, be experienced once or repeatedly for varying periods of time, or may be permanent. Experiencing one period of unemployment increases the probability of further periods (Narendranathan W, et al 1985; Moylan S, et al 1982; Moser KA, et al 1987; Daniel WW, Stilgoe E 1977). The Office of Population Census and Surveys Longitudinal Study found that men who were unemployed in 1971 were more likely than those who were in employment to experience in the following decade ‘further unemployment, downward social class mobility, loss of owner occupied housing, and marriage breakdown’ (Moser KA, et al 1987). In a study of people who had been unemployed for longer than a year, 40% of those whose longest held job was different from their most recent job had been ‘occupationally downgraded’ (White M, 1983). Therefore, when studying the effects of unemployment, the possible effects of previous periods of unemployment must be considered.

A further factor that needs to be considered is that people out of work at one particular point in time are a different population from those ever out of work over a period of time such as a year. For instance, at one point in the year someone who is out of work for the full year is bound to be included in the population; someone who is out of work for only a month in that year will have
a one in twelve chance of being included. Thus the unemployed population at one point in time includes very many more of the long-term unemployed than the population of people ever out of work over a period of time.

2.2.5 The individual experience of non-employment

The experience of non-employment differs amongst individuals according to many other factors, such as age, financial resources and social class. Not only early retirement, but even unemployment can be experienced as a positive change in life. The following verbatim replies were recorded to the question ‘Looking back over the time you have been unemployed. Do you think it has had any lasting effects on you? Has it changed you in any ways?’ (Jackson PR 1985):

Man Aged 20: "Has it changed me? Not really. It was when I was in the fifth year at school, they kept saying that we was going to be unemployed and this depressed me. But when I left school I found it better and I lost weight and that was good."

Man aged 60: "Unemployment has changed me in every way - outlook on life, uncertainty. You can plan things when you're working; you can't when you're not. But I don't worry about it - it doesn't bother me. As long as I've got a place to live and somewhere to sleep I'm alright."

The effect of unemployment on these individuals is less extreme than that on the following 41 year old man:

"I'm frightened when I go for a job because employers say I'm too old. They always want men about 30. I don't like going out any more. People keep asking me if I'm working and I have to keep saying no, so I don't go out any more."

Large scale studies examining trends in behaviour for a group of individuals, will fail to highlight these differences.
2.2.6 Other factors associated with non-employment
People who become unemployed tend to be disadvantaged in other respects. They tend, for example, to be on low incomes when in work, to live in poor housing, to be manual workers and to have experienced previous periods of unemployment (Moylan S, Davies B 1980; Stern J 1983b; Krahn H, et al 1985). These factors tend to contribute to poor health (Townsend P, Davidson N 1982). If such confounding factors are ignored or inadequately allowed for, a stronger association between unemployment and ill health will be observed than is really present.

2.2.7 Measuring health
Non-employed people are more likely to report symptoms of ill health than employed people (Daniel WW, Stilgoe E 1978; Ramsden S, Smee C 1981, Arber S 1987). This may reflect an increased tendency to be aware of and to report symptoms of ill health rather than a higher prevalence of ill health (Grayson JP 1989). To determine the physical effects of non-employment, both subjective and objective measurements are required. Unemployment may have different effects on different aspects of health, and thus a wide range of measures should be taken into account. Some effects of unemployment on health, for example psychological effects, may manifest themselves extremely rapidly, whilst others may take many years to become apparent, for example an increase in cardiovascular disease. Therefore morbidity needs to be measured at various points of time and a follow-up period of several years is required.

2.2.8 Health selection
An individual's state of health affects their chances both of becoming unemployed and of regaining employment once unemployed (Narendranathan W, et al 1985; Lajer M 1982). Several studies have found that prior ill health increases the duration of unemployment (Colledge M, Bartholomew R 1980; Grayson JP 1985; Moylan S, Davies B 1981). Therefore in comparing the health of employed and unemployed men, their health prior to the unemployment occurring needs to be taken into account. Illness is one of the major reasons given for early retirement.

2.2.9 Summary of the difficulties in researching non-employment and ill health
A major difficulty is in defining who is non-employed. Concentrating solely on unemployed people ignores other members of the community forced into 'economic inactivity' at times of high levels of unemployment. Unemployment is not a static condition; it may occur never, once or many times for varying lengths of time. It may also have many long term consequences. For example re-employment will often be at a less skilled level than the original employment and subsequent periods of unemployment are more likely to occur. Unemployment also affects individuals in different ways and with different degrees of severity. ‘Unemployment falls disproportionately hard on people who get the rawest deal from our society’ (Stern J 1982). This strong association of poverty and other adverse social circumstances with non-employment provides the hardest challenge to determining the degree of causality in the relationship between non-employment and ill health.

2.3 RESEARCH INTO NON-EMPLOYMENT AND PHYSICAL HEALTH:
TYPES OF STUDIES

2.3.1 Case reports
Case reports are important for several reasons:

a) The experience of non-employment varies greatly between individuals and can in a minority of cases be beneficial. These differing reactions may be overlooked in large population studies (Fagin L, Little M 1984).

b) Insight into why various changes occur can often only be gained by investigating them at an individual level; for example, there is a rise in the number of claims for disability pensions and sickness benefit at times of high unemployment. Examining one small group of individuals (Westin S 1990a) indicated that for these individuals, claiming disability pensions did not reflect an increase
c) Studying individuals may highlight possible areas which should be investigated. For example, a small study of the effect of unemployment in Marienthal in Austria in the 1930s raised many hypotheses which have subsequently been investigated by larger studies (Jahoda M, et al 1933).

d) The ‘invisibility’ of the non-employed may in some way be relieved by writing about them. One reported study was organised by non-employed men themselves (Briggs J et al 1990). Books on case studies (for example, Sinfield A 1981; Seabrook J 1982; Fagin L, Little M 1984) are much more accessible to the public than papers in academic journals.

The major disadvantage of case reports is that it is not possible to generalise from single case studies to the overall effect of unemployment on large groups of people.

2.3.2 Cross-sectional studies

These are studies in which groups of people are examined at one point in time. The advantages of these studies are that:

a) They are able to examine the health and behaviour of unemployed people at a time when they are unemployed.

b) They involve no follow-up procedures. It is therefore easy to collect the data on large and representative samples of the population. Often the data are already available, as they are collected routinely for official statistics (for example the General Household Surveys).

Cross-sectional studies have the disadvantage of being unable to distinguish reliably between association and causation. This is especially true if the effects of unemployment on health take many years to become apparent. To detect such effects in a cross-sectional study, data on previous employment experience must be obtained. Not only is self-reported data subject to recall error, but non-employment may alter the perception of past events.
Without exception, cross-sectional studies have found that unemployed people were far more likely to report a variety of health problems than employed people (Daniel WW, Stilgoe E 1978; Ramsden S, Smee C 1981; D'Arcy C, Siddique CM 1985; Cook DG, et al 1982). Few studies included objective health measurements: the Canada Health Survey (D'Arcy C, Siddique CM 1985) and the BRHS (Cook DG, et al 1982) are the exceptions. In a survey of workers made redundant due to the closure of a factory three months earlier, the higher reporting of symptoms by the employees and their wives after the closure was assumed to reflect an increased tendency to report symptoms rather than a deterioration in health (Grayson JP 1989). This was because the time lag between the closure and the survey was apparently too short for the effects of the closure to have resulted in the large differences in reported health between those affected by the closure and the control group. There do not appear to be any reported cross-sectional studies comparing the health of retired men to men still working.

The General Household Survey

In Great Britain the General Household Surveys (GHS) are annual population-based surveys with about 25 000 to 30 000 respondents carried out by the Office of Population Censuses and Surveys (OPCS) Social Survey Division. Each survey asks questions designed to discover the prevalence of 'limiting, long-standing illness'. There are also questions on health service usage.

Studies analysing these data have shown that unemployed men reported more chronic illness than employed men (Table 2.1) and visited their general practitioners more frequently. Men who retired 'early' are not separately identified in the GHS; they are classified as economically inactive, which includes men that are too ill to work. Data from the GHS demonstrated that there was a social class gradient amongst the unemployed (Arber S 1987). The prevalence of limiting, long-standing illness was much lower amongst men last employed as managers than amongst men who last worked in semi-skilled or unskilled occupations.
In 1977 the regulations for receipt of long-term disability benefits were changed.

When number in cell > 30 percentage is not given.

| Year | No.924 | 9296 | 9299 | 9212 | 9271 | 9272 | 9274 | 9224 | 9343 | 9324 | 9382 | 9384 | 9364 | 9344 | 9345 | 9364 |
|------|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Econ. inactive | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Fulltime Work | 8     | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    |

Percentages reporting a limiting long-standing illness.
The Canada Health Survey
The Canada Health Survey (CHS) collected data in 1978-79 on 12,000 households including some 32,000 people (D'Arcy C, Siddique CM 1985; D'Arcy C 1986). The sample covered the non-institutionalised population from all regions of the country. The CHS was a multi-stage survey which collected data by interviews, self-administered questionnaires and physical examination (for a sub-sample). The health of employed people was compared to those of unemployed people. A person was classified as unemployed if they were not employed and had looked for work in the past year. Unemployed people reported significantly more psychological distress, anxiety and depressive symptoms, health problems, hospitalisations and visits to doctors, than employed people did. Adjusting for income, education, occupation, age, sex, marital status and size of family, reduced these health differences, but did not eliminate them. The same pattern was seen for physician-diagnosed measures of physical health. Unemployed people were found to be at a much greater risk of heart trouble, pain in chest and heart, spells of fainting and dizziness, high blood pressure and bone-joint problems. These differences persisted after adjusting for the measured socio-demographic variables. Age and sex were found to have a strong interaction effect on the association of unemployment and psychological ill health and visits to the doctor. Unemployed people under 40 reported greater psychological distress, while older unemployed people reported more physician visits. No such interactions were apparent for the objective health measures.

Other cross-sectional studies
Many smaller studies designed to examine just one particular aspect of non-employment have been reported. Unfortunately these were usually too small to have reasonable power and due to the sampling procedures the results could not be used for generalised conclusions.
2.3.3 Longitudinal studies

These are studies where groups of subjects are identified and followed up over time. These studies have several advantages:

a) They enable some aspects of the debate over association and causation to be investigated.

b) If the follow-up time is sufficiently long they allow the long-term health effects to be investigated.

The disadvantages of these studies are that:

a) They are expensive and difficult, partly as it is essential that a high response rate over a long period of follow-up is obtained.

b) In order to adequately address the question of whether unemployment causes ill health, measures of health status need to be taken prior to unemployment occurring. This is not usually possible.

Several types of longitudinal studies have been reported:

a) Census-based longitudinal surveys

b) ‘Major’ cohort studies

c) Small cohort studies.

These will be defined and discussed in detail below.

Census-based longitudinal surveys

Several countries have linked data on employment status collected during routine population-based surveys to death registers (for example Great Britain, America, Italy, Sweden, Finland). The standardised mortality ratios of people unemployed during a specific period of time are compared to those of the rest of the population. In all published reports the unemployed were found to have significantly higher mortality.
a) Great Britain

The Longitudinal Study (LS) carried out by the OPCS was based on a 1% sample of individuals enumerated in England and Wales in the 1971 census (Moser KA, et al 1984, 1986a, 1987, 1990). Census records for sample members were linked with births, deaths and cancer registrations. The mortality between 1971 and 1981 of men aged 15-64 who were seeking work in the week before the 1971 census, was investigated and found to be 36% higher than that of the LS sample of men as a whole (Table 2.2). Standardising for social class reduced this excess to 20%. There was an indication that the excess mortality seemed greater for men under 45 years of age (Moser KA, et al 1984). Particularly high standardised mortality ratios were noted for suicide, lung cancer and ischaemic heart disease. In order to address the question of whether ill health had caused the unemployment and therefore, might explain the excess mortality, two different approaches were adopted. The first approach argued that if a high proportion of unemployed men were chronically ill, then over time these ill men would tend to die, causing the SMR to revert towards that of the whole sample. In fact the converse turned out to be true, the SMR for 1971-75 being 129 and that for 1976-81 being 144 (Table 2.2), providing evidence of a healthy selection effect (Moser KA, et al 1990). This was not surprising in that those who indicated that ill-health was preventing them from working or from seeking work were excluded from the analysis on the basis that they were economically inactive. In the second approach, the mortality of wives and all women in households containing an unemployed man was analysed and found to be significantly higher than for households of employed men. It was argued that although men might have been selected into unemployment on the basis of chronic health problems, their wives cannot have been similarly selected. It was concluded that:

'a considerable part of these mortality excesses can most readily be attributed to the direct and indirect consequences of unemployment among those most immediately affected by the experience.'
Compared to all men aged 25–64 (Steinsson CG 1991),
Compared to all men aged 15–59 (Coala C, Seemun N 1987).
Compared to all men employed for the whole of 1980 aged 30–54 (Marikainen PT 1990).
Compared to all white employed men aged 25–64 (Sorte PD, Rogal E 1990).
Compared to all men in the labour force aged 20–64 (Leverse L, et al 1987a).
Compared to all men aged 15–64 (Mooser KA, et al 1984).

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<td>163 (152–170)</td>
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<td>241 (182–205)</td>
<td>129 (110–150)</td>
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**Table 2.2**

Comparison of mortality of men who were seeking work in (a) OPCS LS in 1991, (b) Danish LS in 1970, (c) American

The main weaknesses of this study were that female unemployment could not be studied due to the questions asked; there was no information on how long the men had been unemployed for; and apart from social class, housing tenure, region of residence and marital status, no information on possible confounders was available. In 1971 only 3.6% of the sample were unemployed, which reduced the statistical power of tests due to small numbers of observed deaths, but it perhaps also indicates that the experience of unemployment might be different in the 1980s. However, initial analysis of the death rates in the first three years after the census of the 9.0% of men unemployed in the 1981 census give similar findings (Moser KA, et al 1987).

b) Denmark

The Danish longitudinal study collected additional information on education. The census was in November 1970 and the census data were linked with the Danish registry on causes of death from 1970-1980 (Iversen L, et al 1987a). Unemployed people were defined as those who were unemployed on the census day. Employed people were those who on the census day were at work, on sick leave, on maternity leave, on holiday etc. People who were receiving social welfare were not included in the analysis. The results correspond reasonably well with the results from the OPCS LS (Table 2.2). Though the relative mortality of unemployed men is higher than in the OPCS LS, this is probably due to the fact that the reference population consisted entirely of employed men, whereas the reference population in the OPCS LS consisted of all males between 15 and 64 years of age. The relative mortality was slightly smaller for unemployed unskilled manual workers than for non-manual and skilled manual workers, the differences, however, being non-significant. Again, particularly high standardised mortality ratios were noted for suicide and an increased mortality amongst younger men was also observed.

c) United States of America

In the National Longitudinal Mortality Study 452 192 records from the US Bureau of the Census Current Population Surveys over selected months during the years
1979-1983 were matched to the National Death Index for the years 1979 through 1983 (Sorlie PD, Rogot E 1990). These population surveys were designed to obtain employment information from a sample of the non-institutionalised US population in order to produce monthly estimates of the unemployment rate. Unemployed people were defined as those who had had no employment during the survey week and were available for work. This study had an advantage over the OPCS LS in that more detailed information on women’s employment status and demographic, social and economic characteristics was collected. Unemployed people had significantly higher mortality ratios compared to the employed people, even after adjusting for age, sex, race, family income and education. (see Table 2.2 for unemployed white men compared to employed white men aged 25-64 standardised for age only). Standardised mortality ratios for suicide were not reported, but this may explain why the highest standardised mortality ratios were for ‘causes of death other than cancer or cardiovascular disease’.

d) Finland

The Central Statistical Office in Finland linked the 1980 census records to data files of the Social Insurance Institution and the National Board of Taxation (Martikainen PT 1990). This resulted in additional information being available, including the duration of unemployment for up to one year before the census and some self-reported health measures. Over five years follow-up the total mortality among men aged 30-54 unemployed for any period during the year before the census was 2.54 times that among men employed for the whole year. This excess mortality fell to 2.41 when age was allowed for and to 1.93 when age, economic state, education, marital state, reimbursable medicines and number of sick allowance days were allowed for. Therefore, even after taking into account a much larger set of background variables the excess of mortality persisted. The relative mortality also increased with increasing duration of unemployment in the year before the census. The excess mortality was highest for accidental and violent causes of death and for circulatory diseases. Among neoplasms, only lung cancer was associated with excess mortality.
e) Italy
The Turin Study results were based on over one million people resident in Turin at the time of the general census in October 1981 (Costa G, Segnen N 1987). Unemployed people were defined as those who were unemployed and were looking for work during the survey week. They had a standardised mortality ratio of 202 compared to the mortality of all men in the study. Again, particularly high standardised mortality ratios were noted for suicide and an increased mortality amongst younger men was also observed.

f) Sweden
The aim of this study was to examine mortality during the period 1980-86 in a cohort of long-term unemployed (LTU) men and women in Sweden (Stefansson CG 1991). The study population comprised 28,896 long-term unemployed persons aged 25-64 who forfeited their entitlement to unemployment benefit because of the length of time they had been unemployed (10-15 months depending on age). This was 88% of the total LTU population (data were not available on the other people). The reference population was the employed population of Sweden, using data collected for national surveys on living conditions (n=18855). The standardised mortality ratio for men aged 25-64 was 1.61 (95% Confidence interval: 1.42-1.84), which is similar to the other reported studies (Table 2.2). Also in agreement with previous studies there was an increased mortality amongst younger men. No data was given on cause of death.

Conclusions from census-based longitudinal surveys
All the census-based studies found that unemployed men had a higher mortality ratio than employed men. This excess mortality ratio was reduced but not eliminated by adjusting for other factors, such as social class. Some of the studies concluded that a health selection effect was not the sole cause of this increased mortality. Census-based surveys were unable to illuminate why there is an increased mortality amongst the unemployed. For example, none of these studies had any measurements on cigarette smoking and alcohol consumption, which may account
for the increased rates of lung cancer noted. The higher standardised mortality ratios for suicide and ischaemic heart disease suggest a link between stress and unemployment.

'Major' cohort studies

These are longitudinal studies based on nationally representative samples of a country. Apart from the United Kingdom National Training Survey, none of the other studies were specifically designed to investigate the relationship between unemployment and health. However, they contain enough data on health and unemployment status, to enable some conclusions to be drawn.

United Kingdom National Training Survey

This is one of the few studies that actually aimed to look at the interaction between unemployment and health over a long period of time. During 1975-76, 17 708 men who were economically active in the labour force from 1965-75 were interviewed about spells of unemployment and sickness lasting at least three months in the previous ten years (Narendranathan W, et al 1982, 1985). The survey was conducted on behalf of the Manpower Services Commission and the only details on the sample are that 'it was designed to be nationally representative within Great Britain'. It was assumed for these men that there were only three mutually exclusive employment states: employed, unemployed or sick. The aims were to describe the individuals who are most at risk of suffering long spells of unemployment and to analyse the extent to which a spell of unemployment or sickness leads, of itself, to an increased probability of further spells of either type. They concluded that: 1) sickness and unemployment were concentrated in those population groups at the bottom of the occupational ladder; 2) each time a man had a long spell of unemployment it raised his probability of a further spell; 3) similarly, spells of sickness increased the probability of further spells of sickness; 4) there was no evidence that unemployment spells increased the probability of future sickness spells.
This study had the advantage that it involved a large number of men over a long period of time. Unfortunately, the conclusions are limited by several problems: 1) the sample consisted of only those men who remained in the labour force for the whole of the ten years; men who became economically inactive (for example, retired early) were excluded; 2) the spells of unemployment and sickness are self-reported and occurred up to ten years previously; 3) spells of sickness for at least three months may not be a good proxy measure for health; 4) three months was a long period of unemployment at that time and many men who experienced unemployment would have done so in individual spells of less than three months.

The DHSS Cohort Study
The DHSS Cohort study was primarily set up to establish income levels in and out of work and the effect of financial incentives on labour market behaviour (Moylan S, Davies B 1980; 1981; Moylan S, et al 1982; Ramsden S, Smee C 1981). A national sample was drawn from DHSS/DE computer centres from men registering as unemployed and claiming benefit in autumn 1978. Men and their wives were interviewed approximately one, four and 12 months after registration. Only 72% of the original sample had a first interview (2 300 men), falling to only 55% (1 750 men) having a third interview. At each interview men were asked if they had any disability or health problem that affected the work they could do. At the second and third interviews they were also asked about health service usage and subjective changes in health since registration. They concluded that there was no evidence of an increase in reported disability/health problems or use of health services with time unemployed. However, unemployed men did have a higher health service usage than the general population. They found that unemployed men with a disability/health problem were less likely to find re-employment than other men. Men who had experienced more unemployment in the past were also less likely to find re-employment. The strength of this study was that changes over time could be examined. The weaknesses were that there was no control group, the health measures were subjective and there was substantial attrition from the sample. Also, as a large number of the men had experienced previous periods of unemployment,
characteristics measured at the baseline (the first interview) were affected by these previous spells of unemployment.

**Small cohort studies**

These are studies based on a geographically or occupationally restricted group of people. The disadvantage of these smaller studies is that by their very nature it is difficult to generalise to other populations and they often lack power due to their small size. The most successful and useful types of these studies are factory closure studies, which study a group of employees made redundant when a factory closes. The majority of studies which have examined the relationship between retirement and physical health are small cohort studies.

**Factory closures**

The main advantage of studying the effect of a factory closure on the subsequent health of the employees made redundant, is that there is no self-selection - all the employees in a factory are made redundant. There are also several other advantages:

a) The subjects being studied are all employed (usually full time) at the beginning of the study and the majority of them will have been in stable employment for many years. Analysis restricted to such people avoids the need to consider the effects of preceding unemployment.

b) If measurements are made before the closure, measurements before and after the closure can be compared within people, which increases the power of any statistical tests.

However, there are also disadvantages of studying factory closures:

a) The populations studied are fairly homogeneous, often just men who are manual workers.

b) The people studied are likely to be fairly healthy (the 'healthy worker effect' (McMichael AJ, 1976)).

c) Two different effects are being examined - the effect of being made redundant
and also the effect of either being unemployed or adapting to a new job.

d) The self-selection bias cannot be eliminated when looking at the severity of the job loss experience, as the less healthy employees may find it harder to regain employment.

e) Any control group is unlikely to be directly comparable, as it will be selected from a different factory.

f) The numbers in the study are restricted by the size of the factory.

There have been 11 studies reported in the Index Medicus since 1980. They range from the study of effects of the closure of a large shipyard in Elsinore, Denmark on 1,000 employees (Iversen L, Sabroe S 1987b) to the closing of a Canadian Bearings factory and its effect on only 45 employees (Grayson JP 1985). Only three of the studies had more than 130 subjects. None of the studies fulfilled all the criteria for an ideal study, sometimes for avoidable reasons. Ten of these studies are reviewed in more detail in the paper by Morris and Cook bound into the back of the thesis (Morris JK, Cook DG 1991). The eleventh study is also based on the closure of a shipyard and its effect on 715 male shipyard workers (Mattiasson I, et al 1990). Two studies are reviewed in more detail here: The Michigan Study, because it was one of the earliest studies reported and has a careful methodology and The Calne Study, because it has been so widely quoted in Britain and has some good design features. These two studies are also amongst the only three studies that had objective measurements of physical health (Mattiasson I, et al 1990 is the third study).

**The Michigan Study**

The aim of the study was to investigate the health and behavioural effects of job loss and of the ensuing unemployment and/or job change experiences (Kasl SV, et al 1972; Cobb S, Kasl SV 1977; Kasl SV 1982). The mental and physical health of 100 married men with more than three years job tenure at two manufacturing plants that were due to close, was measured prior to closure and several times after closure for two years after the closure. The health of these employees was
compared to the health of 74 employees working in matched control factories. The fieldwork was done in 1967, when local unemployment was low and so there was a high rate of re-employment. The data were collected by specially trained public health nurses who visited the men in their homes.

The major finding of the study was that the greatest changes in physical and mental health took place not after the closure of the plants, but during the 'anticipation phase', when men knew they were to lose their jobs but were still working. High levels of, for example, blood pressure and serum uric acid (which may be taken as danger signs for heart disease and other chronic illnesses thought to be influenced by stress) were registered for men threatened with redundancy at the anticipation phase, but these declined towards the levels recorded in controls after the factory closed. All the differences in health measures were small.

The Caine Study

The main aim of the study was to examine the effects of a factory closure on the General Practice consultation rates (Beale N, Nethercott S 1985, 1986a-e, 1988a-d, 1989). As consultation rates were examined, data four years prior to any knowledge about the closure were available. The employees and their families and a comparable control group were followed for ten years. The employees were those people who were still employed at the Caine factory in 1982. There were only 302 employees in 1982 compared to an initial workforce of 886 in 1979 and therefore these employees may not have been representative of the original workforce. Subjects were excluded from the control group if they became economically inactive. Since similar individuals were not excluded from the study group this is likely to lead to bias. Unfortunately, the inappropriate statistical analyses (in particular a lack of statistical significance tests) also limits the validity of the conclusions drawn.

In agreement with the Michigan study, the effects of the redundancy occurred in the 'anticipation phase'. There was a significant increase in consultation rates not
only among the employees, but also among their families on becoming aware of the imminent factory closure (Beale N, Nethercott S 1985). The older employees appeared to be more affected (Beale N, Nethercott S 1986 (a),(b)). The reasons for the increase in consultations were examined (Beale N, Nethercott S 1988 (a),(b)) and the authors concluded that:

‘The results suggest that unskilled men face a serious health hazard if made redundant.’

This is a conclusion not totally justified by their data.

**Retirement and physical health**

The largest reported study on retirement and subsequent mortality was based on 3 971 US rubber tyre workers (Haynes SG, et al 1978). The survival over nine years of follow-up of male blue-collar workers who took early retirement (between ages 62-64) was compared with those blue-collar workers who retired at age 65. No significant differences in mortality were reported between the two groups. Pre-retirement health status was the only significant predictor of survival after early retirement. A study of 180 Parisian male managers also found no evidence to suggest that early retirement caused an increase in morbidity over a follow-up of only two years (Vallery-Masson J, et al 1981).

**2.3.4 Aggregate studies**

These are studies which deal with populations rather than individuals. They correlate measurements of unemployment with health measures (usually mortality rates) either across different geographic areas or else over time. Such studies examine the effect of high levels of unemployment on the whole community. They can not distinguish between the effects of unemployment on those experiencing non-employment from effects on those not directly experiencing non-employment. The main methodological criticism of these studies is that finding an association does not enable the authors to conclude causation. Also the estimates of the size of the effects will be biased by exclusion of relevant confounding variables.
Aggregate studies over time

The studies over time (Brenner MH 1975, 1979, 1987, Bunn AR 1980, Starrin B, et al 1990) have been widely reported in the literature, due to their dramatic conclusions:

‘Short-term changes in unemployment as a measure of economic loss are the most important source of influence on annual fluctuations in mortality...’ (Brenner MH 1979)

These studies have also been widely criticised (Spruit IP 1982; Gravelle HSE, et al 1981; Kasl SV 1979; Stern J 1982) for both the overall methodology and the actual specific details of particular models. In an unsuccessful attempt to replicate the results of a model of mortality and unemployment in England and Wales 1936-76 (Brenner MH 1979), it was argued that Brenner’s estimates are artefacts, arising from his choice of time period, and are no improvement on a naive model (Gravelle HSE, et al 1981). The criticism stated that:

a) the choice and omission of variables lead to bias
b) the data contained geographically inconsistent series
c) the lag structure appeared to be arbitrary and miss-specified
d) spurious correlations could be excluded
e) a test of the robustness showed considerable instability.

In an analysis of unemployment rates and mortality rates in Scotland 1952-1983, it was concluded that ‘there is in Scotland a significant long-term relation between cumulative change in unemployment rates and mortality rates’ (Brenner MH 1987). A similar, but more rigorous analysis concluded that ‘the relationship [between unemployment and mortality] is as likely to be negative as positive, but that in some cases it is certainly statistically significant’ (Forbes JF, McGregor A 1987).
Aggregate studies over geographic areas

These studies have generally found that the level of unemployment acts as a measure of social disadvantage of the populations in different areas (Brennan ME, Lancashire R 1978; Brenner MH 1979; Carstairs V, Russell M 1989; Crombie IK, et al 1989). These studies therefore give an estimate of the strength of the association between social disadvantage and mortality.

The main disadvantage in these studies lies in the difficulty of interpretation of the observed associations between mortality and unemployment. These studies generally find that a number of other variables such as income, occupational structure, educational levels, consumption patterns, and housing are also associated with mortality and that these variables are strongly correlated with unemployment rates. If these other variables are included in the analysis the reliability of the estimates of the effect of unemployment will be reduced, sometimes to the point where no significant partial correlation remains between unemployment and mortality. On the other hand, if these other variables are omitted the estimates will be biased, in that some of the effects of omitted variables on mortality will be wrongly attributed to unemployment. A further disadvantage with these studies is that there is a selection bias inherent in the data. As healthier members of the population are likely to be more mobile, areas with lower unemployment rates will tend to attract healthier job seekers and so have lower mortality rates.

Aggregate studies over time and geographic areas

In 1944 the relationship between mortality from rheumatic heart disease and levels of employment in the 83 County Boroughs of England and Wales over the 12 years from 1927-1938 was examined (Morris JN, Titmuss RM 1944a-c). The results are not applicable to the experience of unemployment in the 1980s, but the method of looking simultaneously at both area and secular trends is worthy of note, although it has not been widely used.
A similar method was used to examine population, mortality and unemployment levels in 98 Family Practitioner Committee areas (FPCs) in England and Wales from 1977 to 1983 (Charlton JR, et al 1987). The FPC areas were categorised according to the change of employment level from July 1987 to July 1981 of men aged 25-44 who had been unemployed for at least 6 months. When the mortality trends from 1975 to 1983 of the FPC areas with different employment experiences were compared, no statistically significant differences in trends were found, although areas with greater increases in unemployment appeared to have slightly worse mortality trends for men in the younger age groups. The authors concluded that:

'If changes in the level of unemployment do have an effect on changes in trends in mortality levels, this effect is not of sufficient magnitude to be statistically significant with the sample available, in spite of the fact that it included the whole of England and Wales.'

Conclusions from aggregate studies

These studies demonstrated that there was a strong association of mortality with unemployment levels, but due to the methodological problems, it is difficult to draw conclusions about causality.

2.4 RESEARCH INTO NON-EMPLOYMENT AND PSYCHOLOGICAL HEALTH

Since this thesis is concerned primarily with physical health, a detailed review of the research on psychological health and non-employment will not be carried out. There are comprehensive reviews by Warr PB 1987 and Warr PB et al 1988. However, a brief summary of several studies is given as there is a strong relationship between psychological and physical ill-health (Cooper CI 1982; Jenkins CD 1976). Studies on psychological health have the advantage over those on physical health, in that the effects of threatened or actual unemployment are assumed to occur very rapidly.
2.4.1 Cross Sectional Studies

All cross-sectional studies of unemployed men compared to employed men have reported that various aspects of mental health are worse: psychological distress (D'Arcy C, Siddique CM 1985), depression (Krahn H, et al 1985; Jackson PR 1988; Bolton W, Oatley K 1987), unpleasant emotional strain (Warr PB, Payne R 1982), an increased risk of minor affective disorder (Bebbington PE, et al 1991) and a greater degree of anxiety (Jackson PR 1988). There appears to be a differential vulnerability to the psychological effects of job loss; for example, people in difficult financial circumstances are affected more (Jackson PR, Warr PB 1983; Kessler RC, et al 1987; Hamilton VL, et al 1990; Jacobsen D 1987; Eales MJ 1988).

2.4.2 Longitudinal Studies

There are several large longitudinal studies which measured the health of subjects at several points in time in relation to their employment status. Many of these studies were carried out on school leavers (Hammerstrom A, et al 1988; Tiggerman M, Winefield A 1989; Winefield A, Tiggerman M 1989a,b; Banks MH, Jackson PR 1982) and clearly care must be taken in generalising the results to other age groups. These studies found that the psychological health of unemployed school leavers was worse than that of employed school leavers both prior to leaving school and during the unemployment. They disagree as to whether a deterioration occurred as a result of unemployment or whether employment improves the psychological health of school leavers.

Longitudinal studies on older age groups suggest that becoming unemployed or the threat of it had a detrimental effect on a person's psychological health, but that this improved on regaining employment or removing the threat. (Bolton W, Oatley K 1987; Jenkins R, et al 1982). There appeared to be an additive effect of length of unemployment only in selected groups of people (Jackson PR 1985).
One of the major longitudinal studies into the psychological health of unemployed men was carried out by Jackson et al, by approaching men outside Unemployment Benefit Offices (Jackson PR, Warr PB 1983;1984;1987; Jackson PR 1985; Fryer D, Warr P 1984).

**Unemployment Benefit Office Study**

A sample of 954 unemployed men was drawn from those registered at 41 Unemployment Benefit Offices in the mainland United Kingdom (Jackson PR, Warr PB 1983;1984;1987; Jackson PR 1985; Fryer D, Warr P 1984). Respondents were approached in the vicinity of the offices by trained interviewers of a survey research company. The sample was confined to men whose previous employment had been in a semi-skilled or unskilled manual job, and it was further specified that the job should have been held for at least three months before the man became unemployed. Target sampling was employed with quotas set in advance for numbers in ten age groups (from 16-64) and six bands of different unemployment durations. Therefore no participation or refusal rates are given since ‘this occurred before eligibility was determined’. Three interviews were completed, the second approximately ten months after the first and the third (only with those unemployed at the second interview) almost two years after the first. The response rate was 73% for the second interview and 77% (of those unemployed at the second interview) for the third. The main measure of psychological ill health used was the 30 item GHQ. The respondents were also asked to rate their health in the past month as well as questions about employment commitment, job-seeking and financial stress. In a cross-sectional analysis psychological ill health was greatest among middle-aged unemployed men and those with a longer duration out of work. There was no association between psychological health and length of time unemployed amongst teenagers, and men approaching retirement age (Jackson PR 1983). The same pattern of self reported cognitive functioning was reported, with middle-aged men experiencing the greatest decrease in cognitive functioning (Fryer D, Warr PB 1984).
In a longitudinal analysis of the data (Jackson PR 1985), the men who were re-employed at the second interview were compared to those who were still unemployed. The GHQ scores of the two groups did not differ at the initial interview. By the time of the second interview the GHQ scores of re-employed men had fallen significantly, whereas the scores were unchanged for men who were still unemployed.

The method of data collection by target sampling people in the vicinity of Unemployment Benefit Offices resulting in no information on response bias and self selection, must be considered before the results can be generalised.

2.4.3 Unemployment and parasuicide/suicide

The literature concerning the relationship between unemployment and suicide or parasuicide (deliberate self harm) has been extensively reviewed by Platt (suicide: Platt S 1984; parasuicide: Platt S 1986). He concludes that

'despite the firm evidence of an association between unemployment and suicidal behaviour, the nature of this association remains highly problematic'.

Most studies into parasuicide have been cross-sectional, demonstrating that significantly more parasuicides are unemployed than would be expected among general population samples (Jones SC, et al 1991; Hawton K, Rose N 1986) and that parasuicide rates among the unemployed are considerably higher than among the employed (Hawton K, Rose N 1986; Platt S, Kreitman N 1984, 1990). These are particularly applicable to the long-term unemployed (Hawton K, Rose N 1986; Platt S, Kreitman N 1984). The link between unemployment and parasuicide and suicide has also been investigated at the aggregate level (Crombie IK 1990; Crombie IK 1989; Pritchard C 1988; Furness JA, et al 1985; Kreitman N, Platt S 1984), with inconclusive results. The census based longitudinal studies (section 2.3.3) observed higher rates of suicide amongst unemployed people compared to employed people.
2.5 CONCLUSIONS

All reported studies showed a strong association between unemployment and both psychological and physical ill health. This association may be explained in several different ways:

Direct Causation: Unemployment leads to ill health

The main evidence of a causal link between unemployment and physical ill health comes from census-based longitudinal studies. These have observed increased mortality rates over ten years of people unemployed over a specific period in time compared to people employed then. The patterns of mortality rates and the fact that they occurred in younger men and in diseases which are known to be stress-related (in particular, suicides and ischaemic heart disease) implies a certain amount of causality. These studies did not have enough measurements on background variables to adequately overcome the problem of common background factors.

Common Background Factors: Other factors are associated with both increased morbidity and unemployment

This is observed in all reported studies. However, especially in cross-sectional studies, it was difficult to determine how much background factors were in fact due to earlier periods of unemployment. Therefore to what extent these factors should be adjusted for is debatable. Often insufficient data on these background variables were available.

Interaction: Unemployment interacts with other factors which also cause ill health

In order to detect such interaction effects large sample sizes are required. The studies reported tended to lack power to detect any interaction health effects. Also, their results were not generalisable to a wider population of unemployed people.
Selection: Men with poor health are more likely to become unemployed

None of the studies managed to investigate or adequately control for the extent to which the ill health of unemployed men can be explained by their ill health prior to unemployment.

The only study large enough to investigate the relationship between early retirement and mortality and morbidity, only examined mortality, and found no evidence of any association between early retirement and increased mortality.
CHAPTER 3

THE BRITISH REGIONAL HEART STUDY METHODOLOGY

SUMMARY

The aim of the British Regional Heart Study was to investigate large geographic variations in cardiovascular disease in Great Britain, by examining environmental, socio-economic and personal risk factors.

The data analysed in this thesis come from

(a) An Initial Screening of 7735 middle-aged men from 24 towns in Great Britain between 1978 and 1980 (Response rate = 78%).

(b) A Postal Questionnaire sent to the surviving men five years later (Response Rate = 98.4% of those screened and still alive).

(c) General Practice consultation rates collected retrospectively for eight complete calendar years after the Initial Screening (Response rate = 98.3% of those screened and still alive).

(d) Cardiovascular morbidity and all cause mortality reported over a follow-up period of up to 12 years.

Data on employment status were collected at Initial Screening, as part of the occupational data used to classify the men by social class. At Initial Screening 94% of the BRHS cohort were employed. More detailed information on employment history was collected in the Postal Questionnaire, by which time only 76% of the men were employed.
3.1 INTRODUCTION

The aim of The British Regional Heart Study (BRHS) was to investigate the large geographical variations in cardiovascular disease in Great Britain, by examining environmental, socio-economic and personal risk factors. The data have been collected at different times for a period of over 12 years (see Figure 3.1). This chapter covers the methods of data collection. The representativeness of the study population of middle-aged men in Great Britain is evaluated and any potential sources of bias due to missing data are investigated. Finally, the problem of linking data collected over different time spans is discussed.

3.2 DATA COLLECTED IN THE BRHS

3.2.1 Initial Screening

Using national mortality statistics a large range of environmental and socio-economic variables were examined for their effect on cardiovascular mortality between 1969 and 1973 in 253 towns in England, Scotland and Wales. Five principal factors were found to explain a large amount of the geographic variation in cardiovascular mortality: water hardness, rainfall, temperature, percentage of manual workers and car ownership (Pocock SJ, et al 1980). Twenty-four towns were selected to represent all regions of Great Britain and the full range of cardiovascular mortality; and 7735 middle-aged men from these 24 towns were interviewed and clinically examined between 1978 and 1980 (Initial Screening). The main aim was to examine the geographic variation of risk factors for cardiovascular disease. Details of employment status were recorded only as part of the information on occupation in order to classify the men by social class.
3.2.2 Postal Questionnaire

Five years after Initial Screening (1983 - 1985) men who were still alive and resident in Great Britain were located and sent a questionnaire (98% response rate).

The level of unemployment rose dramatically in the early 1980s and the importance of examining the effects of unemployment on health became apparent. Therefore at this stage in the study more detailed information on employment history was collected. Details of employment status during a five year period prior to Initial Screening as well as current employment status and employment status during the five years between Initial Screening and the Postal Questionnaire period were recorded.
3.2.3 General Practitioner Consultation Rate Data

Eight complete calendar years after Initial Screening the General Practitioner records for each subject were examined to determine the number of recorded consultations each man had had with his GP in each calendar year of the eight year period.

3.2.4 CVD Morbidity and All-Cause Mortality

The 7735 men examined have been followed up for at least nine and a half years to record the incidence of cardiovascular morbidity and all-cause mortality (Walker M, Shaper AG 1984).

3.3 SELECTION OF THE STUDY POPULATION

The 24 towns were selected using the following criteria:

1. All major geographic regions of England, Wales and Scotland were represented.
2. The towns were representative of their regions in socio-economic terms.
3. The towns were discrete geographic entities with a population of 50,000 - 100,000 at the 1971 census. Ipswich (120,000) and the three Scottish towns (<50,000) were exceptions to this rule.
4. Towns with an unusual population structure, large recent housing developments or noticeable population movement were excluded.

The towns selected are shown in Figure 3.2. A pilot study was carried out in Peterborough (not shown).
To ensure a high response rate and good follow-up, and for administrative convenience, subjects were selected from one general practice in each town. Shrewsbury was the exception where two smaller practices were used. Other than in Shrewsbury, group practices were identified that had three or more general
practitioners, practice populations over 7,500 and were representative of the overall socio-economic composition of the town. The list of eligible practices was compiled with the help of the local District Medical Officer and the final selection was made after discussions with the interested practices.

Once the practice had agreed to participate, about 450 men aged 40-59 years were randomly selected from the age-sex register to produce four 5-year age groups of equal size. The doctors were then asked to exclude any men whom they considered could not participate because of severe mental or physical disability. It was emphasised that no attempt should be made to exclude subjects with cardiovascular or other problems. The number of these exclusions was about 6-10 per practice. The remaining men were invited in a letter signed by their general practitioner to participate in the study. On average, the response rate was 78%.

The non-responders were men who:

1. Did not reply to the invitation and one reminder, but as far as was known, lived at the address supplied by the practice.
2. Were not available to attend the Initial Screening in the two-week period offered because of holidays or work commitments.
3. Refused without reason.
4. Did not receive the invitation.

3.4 REPRESENTATIVENESS OF THE STUDY POPULATION

Ideally the BRHS cohort should be representative of all middle-aged men living in Great Britain. However, bias in the sample may have arisen due to the selection of the towns, or the general practices or because of non-response.

The towns were selected to be as representative as possible of their region in socio-economic terms using the classification of Webber R, Craig J 1978. Overall,
the 24 BRHS towns had a social class distribution in 1981 similar to that for Great Britain in the 1981 census (Table 3.1).

**Table 3.1  Social class distribution of BRHS men, of the 24 towns at the 1981 census, and of Great Britain at the 1981 census**

<table>
<thead>
<tr>
<th>Social Class</th>
<th>BRHS Men</th>
<th>1981 Census</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>All Men</td>
<td>7720*</td>
<td>100</td>
</tr>
<tr>
<td>I Professional</td>
<td>606</td>
<td>7.8</td>
</tr>
<tr>
<td>II Managerial</td>
<td>1735</td>
<td>22.5</td>
</tr>
<tr>
<td>IIINM Clerical</td>
<td>720</td>
<td>9.3</td>
</tr>
<tr>
<td>IIIM Skilled manual</td>
<td>3326</td>
<td>43.1</td>
</tr>
<tr>
<td>IV Semi-skilled manual</td>
<td>784</td>
<td>10.2</td>
</tr>
<tr>
<td>V Unskilled manual</td>
<td>318</td>
<td>4.1</td>
</tr>
<tr>
<td>Armed Forces</td>
<td>231</td>
<td>3.0</td>
</tr>
</tbody>
</table>

15 men could not be classified.

Based on economically active Heads of Households (10% sample) in 1981 Census Data County Reports (OPCS 1981). Each town was weighted by its population size.

Based on men aged 16-64 usually resident in private households (OPCS 1983).

The selection of the 24 BRHS towns was not random, and excluded rural areas, large metropolitan conurbations and towns with noticeable population movement. The effects of this on General Practice consultation rates are discussed in Chapter 6.
as recorded in the 1981 census (Figure 3.3, \( r=0.8 \)). However, as can be seen from Table 3.1, skilled manual workers are over-represented within the larger manual category and professional and managerial workers are over-represented within the non-manual workers category. Some of this 'over-representation' may be due to BRHS social class being based on longest held occupation rather than current or most recently held occupation as used in the 1981 census.

Figure 3.3 Percentage of manual workers in the 24 BRHS towns

Within each five year age group within each practice, men were selected at random with only 6-10 being excluded per practice. However, the 22% of non-responders represents a potential source of bias. Table 3.2 shows non-responders tended to be younger, as in each practice five year age groups of equal size were invited.
Table 3.2  Age structure of BRHS sample

<table>
<thead>
<tr>
<th>Age</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men</td>
<td>7735</td>
<td>100</td>
</tr>
<tr>
<td>40-44</td>
<td>1838</td>
<td>23.8</td>
</tr>
<tr>
<td>45-49</td>
<td>1898</td>
<td>24.5</td>
</tr>
<tr>
<td>50-54</td>
<td>1974</td>
<td>25.5</td>
</tr>
<tr>
<td>55-59</td>
<td>2025</td>
<td>26.2</td>
</tr>
</tbody>
</table>

During the first three years of follow-up, the death rate of non-responders was significantly higher than that of participants. Subsequently it fell to a level not significantly different from that of participants. The higher death rate during the first three years of follow-up did not appear to be due to any one specific cause of death (Walker M, et al 1987).

3.5 INITIAL SCREENING AND CLINICAL EXAMINATION PROCEDURES

A team of three nurses visited one town a month for a period of two weeks, from January 1978 through to June 1980, excluding Christmas and summer holidays. A questionnaire was administered by one of the nurses (Appendix A). Height, weight, blood pressure and lung function were measured by the second nurse. The third nurse recorded an electrocardiogram and took a blood sample. The duties of the nurses were rotated so that each nurse spent one third of her time at each station in each practice.

The questionnaire contained questions on family history, occupation, health, alcohol consumption, smoking and exercise. Details of the precise questions on health will be discussed in chapter 5 and those on smoking and alcohol in chapter 8, the
chapters that first analyse that part of the data. Here, only questions concerning occupation and employment status will be covered.

3.6 OCCUPATION AND EMPLOYMENT STATUS RECORDED AT INITIAL SCREENING

Section 4 of the questionnaire (Figure 3.4) asked about occupation and current employment status.

Figure 3.4 Current employment status questions in questionnaire at Initial Screening

4. OCCUPATION

4.1 What is your present job?
   If employed go to question 4.4

4.2 If you are unemployed, for how long has this been?
   < 6 weeks
   6 weeks - 5 months
   6 months - 1 year
   > 1 year

   (additional codes were added for men who were employed retired)

4.3 Is this because of ill health? (Y/N)

4.4 What kind of work have you done for the longest period of time?

4.5 What business or industry is this?

4.6 How many years have you done this kind of work?

4.7 Are/were you:
   SELF EMPLOYED with 25 or more employees
   with less than 25 employees
   without employees
   MANAGER of 25 or more people
   of less than 25 people
   FOREMAN
   ORDINARY EMPLOYEE
   ARMED SERVICES

3.6.1 Employment status at Initial Screening

From question 4.2 men were classified as follows:
1. Employed  Those who said they were employed
2. Retired  Those who said they were retired
3. Unemployed Ill  Those who said their unemployment was due to ill health
4. Unemployed Not-Ill  Those who said their unemployment was not due to ill health.
5. Unclassified  Those who said they were unemployed, but did not reply to whether it was due to ill health or not.

Table 3.3 shows employment status at Initial Screening.

Table 3.3  Employment status of BRHS men at Initial Screening

<table>
<thead>
<tr>
<th>Status</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men</td>
<td>7735</td>
<td>100</td>
</tr>
<tr>
<td>Employed</td>
<td>7265</td>
<td>93.9</td>
</tr>
<tr>
<td>Unemployed Ill</td>
<td>258</td>
<td>3.3</td>
</tr>
<tr>
<td>Unemployed Not-Ill</td>
<td>150</td>
<td>1.9</td>
</tr>
<tr>
<td>Retired</td>
<td>55</td>
<td>0.7</td>
</tr>
<tr>
<td>Unclassified</td>
<td>7</td>
<td>0.1</td>
</tr>
</tbody>
</table>

3.6.2 Social class at Initial Screening

Social class was coded using the Registrar General's classification (OPCS 1970) for each man's longest-held occupation (Question 4.4), not his occupation at the time of screening (Question 4.1). This allowed men who were unemployed or retired to be classified in analyses by social class. More important, biases due to downward social mobility as a result of unemployment or illness in middle age are minimised. Men whose longest-held occupation was one of the armed services formed a separate category.
3.6.3 Length of time in longest held occupation at Initial Screening

From the responses to Question 4.6 men were classified into four categories:
- Up to 10 years
- 11-20 years
- 21-30 years
- More than 30 years

3.6.4 Type of employment at Initial Screening

From Question 4.7 men were classified as follows:
- Self-employed with employees
- Self-employed without employees
- Manager
- Foreman / Employee
- Armed Services

The distinction between being self-employed or not is an important one to investigate when examining unemployment. In the majority of analysis the usual social class classification will be used. However in Chapter 4 this alternative classification will also be used.

3.7 FOLLOW-UP OF MORTALITY AND CARDIOVASCULAR MORBIDITY

All 7735 men in the BRHS cohort have been "tagged" at the National Health Service Central Registries in Southport and Edinburgh. The BRHS regularly receives copies of the death certificates of any subject who dies in Great Britain, and is also notified if anyone in the study emigrates (assuming they hand in their NHS card on leaving the country).

To ensure that all non-fatal major cardiovascular events were reported, a blue card was placed in each man's medical record, as held by his general practice. The
doctors in the practice were asked to complete the card and forward it to the
BRHS centre if any consultation for a cardiovascular event (myocardial infarction,
angina, transient ischaemic attack and stroke) occurred. A replacement card was
then sent back to the practice to be placed in that man's file.

One member of staff within each practice (usually a part-time receptionist) was
paid an annual honorarium to act as practice co-ordinator. This involved the
mailing and replacement of the blue cards, notifying the BRHS centre of all deaths,
removals and changes of address, and at set intervals (1½, 3, 5, 6½, 8 and lastly
between 10 and 12 years) carrying out a review of all the medical records of men
in the study to ensure that all cardiovascular events had been reported.

Any man who left the original study practice and registered with another GP in
Great Britain was traced through Family Practitioner Committees (FPC) records,
which are responsible for transferring medical records from one practice to another.
The new GP was then asked to keep a blue card in that man's notes, and to
notify the BRHS centre of any cardiovascular event that occurred (Walker M,
Shaper AG 1984). After eight years of follow-up only six men could not be traced.

3.8 POSTAL QUESTIONNAIRE

The fifth-year review of general practitioner records supplied up-to-date
information on the current addresses of all men in the study. Using this
information, a questionnaire with a letter and prepaid envelope was sent to each
man who was still alive and resident in Great Britain five years after his initial
screening (Appendix B). If no reply was received within two weeks, a reminder
letter was sent with another copy of the questionnaire. If there was still no reply
after a further two weeks, a third questionnaire was sent with an altered text in
the letter, indicating the very small number of people who had not replied. The
practice coordinator then tried to contact non-responders, by telephone whenever
possible, to offer assistance with completion of the questionnaire if help was required. For those men who could not be reached by telephone a fourth letter and questionnaire were sent by recorded delivery. The date of receipt of the completed forms was recorded but was not coded, and for simplicity it was assumed that the forms were returned in the same month as they were sent out.

Of the 7735 men originally examined, 297 had died and 41 had emigrated, leaving 7397 men alive and living in Great Britain. Of these, 7275 completed the Postal Questionnaire, a response rate of 98.4%. Non-responders comprise those who did not wish to complete the questionnaire although they took part in the original study, and those who could not be traced.

3.9 EMPLOYMENT STATUS AT TIME OF POSTAL QUESTIONNAIRE

Section 11 of the Postal Questionnaire (Figure 3.5) asked about current employment status. Men were classified as follows:

1. If the box ‘Employed Full-Time’ was ticked, employment status was ‘Employed Full-Time’ regardless of any other boxes that were ticked.

2. If the box ‘Employed Part-Time’ was ticked, employment status was ‘Employed Part-Time’ regardless of any other boxes that were ticked.

3. If the box ‘Unemployed’ was ticked, the employment status was ‘Unemployed’, the unemployment group depending on the reason given for unemployment. If no reason was given then the employment status was ‘unknown’.
The British Regional Heart Study Methodology

Figure 3.5  Current employment status questions in the Postal Questionnaire

11  PRESENT EMPLOYMENT

11.1  AT PRESENT are you:

   Employed full-time
   Employed part-time
   Unemployed
   Registered Disabled
   Retired

   (An additional code was added for men with Invalidity Pension)

   (Up to two boxes could be filled in)

11.2  IF RETIRED:

   Age at retirement
   Reason for retirement:
   Normal retiring age
   Illness (completely or in part)
   Other Reasons

   (Additional codes were added for Redundancy Redundancy & Illness)

IF UNEMPLOYED AT PRESENT please answer the following questions:-

11.3  How long have you been unemployed on this occasion?
   No of months

11.4  Reasons for present unemployment
   Redundancy
   Illness (completely or in part)
   Other Reasons

4.  If the box 'Retired' was ticked:
   a)  If the box 'Employed Part-Time' was ticked see (2).
   b)  Otherwise the employment status was 'Retired', the retirement group
depending on the reason given for retirement. If no reason was given
then the employment status was 'unknown'.

5.  If the box 'Invalidity Pension' was ticked:
   a)  If any of the above boxes were ticked code as stated.
   b)  Otherwise the employment status was 'Unemployed Ill'.


6. If the box 'Registered Disabled' was ticked:
   a) If any of the above boxes were ticked code as stated.
   b) If only 'Registered Disabled' was ticked code as 'unknown'.

(see Appendix D, for details about cleaning and coding the unemployment data)

Table 3.4 shows employment status of men at the time of the Postal Questionnaire.

<table>
<thead>
<tr>
<th>Status</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men</td>
<td>7275</td>
<td>100</td>
</tr>
<tr>
<td>Employed Full Time</td>
<td>5344</td>
<td>73.5</td>
</tr>
<tr>
<td>Employed Part Time</td>
<td>171</td>
<td>2.4</td>
</tr>
<tr>
<td>Unemployed - Ill</td>
<td>313</td>
<td>4.3</td>
</tr>
<tr>
<td>Unemployed - Redundancy</td>
<td>409</td>
<td>5.6</td>
</tr>
<tr>
<td>Unemployed - Other</td>
<td>107</td>
<td>1.5</td>
</tr>
<tr>
<td>Retired - Ill</td>
<td>329</td>
<td>4.5</td>
</tr>
<tr>
<td>Retired - Age</td>
<td>147</td>
<td>2.0</td>
</tr>
<tr>
<td>Retired - Other</td>
<td>426</td>
<td>5.9</td>
</tr>
<tr>
<td>Unclassified</td>
<td>29</td>
<td>0.4</td>
</tr>
</tbody>
</table>

3.10 EMPLOYMENT STATUS BETWEEN INITIAL SCREENING AND THE POSTAL QUESTIONNAIRE

Section 12 of the Postal Questionnaire (Figure 3.6) asked about experience of any unemployment between Initial Screening and the time of the Postal Questionnaire.
Men who answered 'yes' were asked how many periods of unemployment they had experienced, how long the longest period was and the reasons for it. Tables 3.5 and 3.6 show the amount of unemployment experienced, and the reasons for it. Men who were unemployed at the Postal Questionnaire, and had not experienced any other periods of unemployment between screening and the Postal Questionnaire, were coded as experiencing 'current and continuous unemployment' in Table 3.5.

**Figure 3.6** Employment status between Initial Screening and Postal Questionnaire: questions in Postal Questionnaire

<table>
<thead>
<tr>
<th>12</th>
<th>This question is about any unemployment in the last five years, i.e. since you were examined by our nurses.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1</td>
<td>Have you had any periods of unemployment in the past five years? (apart from any present unemployment)</td>
</tr>
<tr>
<td></td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>CURRENT AND CONTINUOUS UNEMPLOYMENT</td>
</tr>
</tbody>
</table>

if YES, please answer the following questions:-

| 12.2 | How many separate periods of unemployment have you had in the past five years (excluding any present unemployment)? |
|      | 1                                                                                                          |
|      | 2                                                                                                          |
|      | 3 or more                                                                                                  |

| 12.3 | How long was the longest of these periods of unemployment? (not counting any present unemployment)? |
|      | No of months                                                                                                |

| 12.4 | Reasons for longest period of unemployment |
|      | Redundancy                                 |
|      | Illness (completely or in part)             |
|      | Other Reasons                              |

3.11 **EMPLOYMENT STATUS BEFORE INITIAL SCREENING**

Section 13 of the questionnaire (Figure 3.7) asked about experience of unemployment in the five years before Initial Screening. Men who answered 'yes' were asked how long the longest period was and the reasons for it. Tables 3.7 and 3.8 show the amount of unemployment experienced, and the reasons for it.
### Table 3.5 Unemployment between Initial Screening and the Postal Questionnaire

<table>
<thead>
<tr>
<th>Number of Periods of Unemployment</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men</td>
<td>7275</td>
<td>100</td>
</tr>
<tr>
<td>None</td>
<td>6053</td>
<td>83.2</td>
</tr>
<tr>
<td>1</td>
<td>579</td>
<td>8.0</td>
</tr>
<tr>
<td>2 or more</td>
<td>302</td>
<td>4.1</td>
</tr>
<tr>
<td>Continuous</td>
<td>196</td>
<td>2.7</td>
</tr>
<tr>
<td>Some Unemployment, but exact amount missing</td>
<td>42</td>
<td>0.6</td>
</tr>
<tr>
<td>Missing data</td>
<td>103</td>
<td>1.4</td>
</tr>
</tbody>
</table>

### Table 3.6 Reasons for longest period of unemployment between Initial Screening and the Postal Questionnaire

<table>
<thead>
<tr>
<th>Reason</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men</td>
<td>921</td>
<td>100</td>
</tr>
<tr>
<td>Redundancy</td>
<td>570</td>
<td>62</td>
</tr>
<tr>
<td>Illness</td>
<td>170</td>
<td>18</td>
</tr>
<tr>
<td>Other</td>
<td>164</td>
<td>18</td>
</tr>
<tr>
<td>Missing</td>
<td>19</td>
<td>2</td>
</tr>
</tbody>
</table>
Figure 3.7  Employment status before Initial Screening: questions in Postal Questionnaire

13  In the 5 years BEFORE you were examined by the nurses:
13.1 Were you unemployed at any time?
   YES
   NO
   CONTINUOUSLY UNEMPLOYED

If YES, please answer the following questions:

13.2 How long was the longest period of unemployment?
   No of months

13.3 Reasons for longest period of unemployment
   Redundancy
   Illness (completely or in part)
   Other Reasons

Table 3.7  Unemployment before Initial Screening

<table>
<thead>
<tr>
<th>Unemployment</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men</td>
<td>7275</td>
<td>100</td>
</tr>
<tr>
<td>None</td>
<td>6342</td>
<td>87.2</td>
</tr>
<tr>
<td>Some</td>
<td>665</td>
<td>9.1</td>
</tr>
<tr>
<td>Continuous#</td>
<td>129</td>
<td>1.8</td>
</tr>
<tr>
<td>Missing data</td>
<td>139</td>
<td>1.9</td>
</tr>
</tbody>
</table>

# : men who were unemployed at Initial Screening were classified as experiencing continuous unemployment before Initial Screening.
### Table 3.8 Reasons for longest period of unemployment before Initial Screening

<table>
<thead>
<tr>
<th>Reason</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men</td>
<td>655</td>
<td>100</td>
</tr>
<tr>
<td>Redundancy</td>
<td>299</td>
<td>46</td>
</tr>
<tr>
<td>Illness</td>
<td>163</td>
<td>25</td>
</tr>
<tr>
<td>Other</td>
<td>169</td>
<td>25</td>
</tr>
<tr>
<td>Missing data</td>
<td>24</td>
<td>4</td>
</tr>
</tbody>
</table>

#### 3.12 GENERAL PRACTICE CONSULTATION RATES OVER 8 YEARS

The eighth-year review of general practitioner records supplied up-to-date information on removals, deaths and emigrations of all men in the study. Removals were traced to their new general practitioner, and any missing death certificates (about 5%) were requested from the National Health Service Central Registries. Eight complete calendar years after Initial Screening had occurred, the current general practitioners of all surviving men were sent a form (see appendix C). The form asked for the date of the last consultation and the number of times the man had consulted with a GP for each calendar year of the previous eight years, where the first year was the calendar year in which Initial Screening took place. The practice co-ordinators in each of the original 24 practices were responsible for completing the forms. For men who had moved to new practices the new GPs were sent the form. If these were not returned after one reminder, a fee of £5 was offered for its completion.

Of the original 7397 men who were alive and living in Great Britain at the time of the Postal Questionnaire, a further 248 had died and 18 had emigrated by the end of the eight calendar years. Their notes were therefore not available. Fifty-
five men had totally missing data, due to the forms being either completed incorrectly or left blank because the notes had been summarised for computerisation of patient records. Sixty men had incomplete data for various reasons: being out of the country for several years, changing GPs and loss of information. Six men were not currently registered with a GP. Complete forms were available on 7010 men. Therefore after eight years, there were 7131 men alive and living in Great Britain of whom

- 7010 (98.3%) had complete information on consultation rates
- 60 (0.8%) had incomplete information
- 61 (0.9%) had no data.

(see Appendix E for details about cleaning and coding this data).

3.13 LINKING INITIAL SCREENING DATA, POSTAL QUESTIONNAIRE DATA AND GP CONSULTATION RATE DATA

Figure 3.8 Data available on the 7735 Men Screened in the BRHS.

NR : Non Response  EMIG : Emigrated

# : Died/Emigrated before Postal Questionnaire
* : Died/Emigrated after PQ, before 8 Year review.
The consultation rate data cover eight complete calendar years (Year 1 - Year 8), whereas Initial Screening occurred throughout the year and the Postal Questionnaire was sent out exactly five years after Initial Screening. This means that if a man (A) was examined in January 1978, the first year of the consultation rate data (Year 1; 1978) refers to the following 12 months after Initial Screening (see Figure 3.9). However, if a man (B) was examined in December 1978, the first year of the consultation rate data (Year 1; 1978) refers to the 12 months before and including the month he was examined in. Similarly for man (A) examined in January 1978, the sixth year of the consultation rate data (Year 6; 1983) refers to the 12 months after he was sent the Postal Questionnaire, whereas for man (B) examined in December 1978, the sixth year of the consultation rate data (Year 6; 1983) refers to the 12 months before and including the month he was sent the Postal Questionnaire. This is important if, for example, the effects of being unemployed for a year at the time of the Postal Questionnaire are being examined. For man (A) examined in January, Year 5 of the consultation rate data will be the time that he was unemployed, whereas for man (B) examined in December, Year 6 of the consultation rate data will be the time of his unemployment.

Figure 3.9 Timing of Initial Screening, Postal Questionnaire, consultation rate data and period of unemployment for two men unemployed for one year at the time of the Postal Questionnaire.
Table 3.9 shows the number of months in Year 6 before the Postal Questionnaire was sent and the number of months in Year 6 after it was sent, for the 7010 men with complete GP consultation rate data. For 62% of men, Year 6 of the consultation rate data covered a longer period after the Postal Questionnaire than before the Postal Questionnaire and for 38%, it covered more time before the Postal Questionnaire than after. For all men, Year 5 of the consultation rate data refers to the year prior to the Postal Questionnaire being sent and Year 7 to the year after the Postal Questionnaire had been sent. As illustrated in Figure 3.9, the relative timing of periods of unemployment and GP consultation rates is important and it will be discussed further in Chapter 7.

<table>
<thead>
<tr>
<th>Number of Complete Months</th>
<th>Before PQ Sent</th>
<th>After PQ Sent</th>
<th>Number of Men</th>
<th>Cumulative Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>11</td>
<td>227</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>867</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>740</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>740</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>940</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>857</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>518</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>0</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>317</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>651</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>602</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>551</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Note that in the above table, the number of months in Year 6 before the Postal Questionnaire was sent is equivalent to the number of months in Year 1 before Initial Screening occurred. Similarly the number of months in Year 6 after the Postal Questionnaire was sent is equivalent to the number of months in Year 1 after Initial Screening occurred.
CHAPTER 4

EMPLOYMENT EXPERIENCE DURING FIVE YEARS FROM INITIAL SCREENING TO THE POSTAL QUESTIONNAIRE

SUMMARY

At Initial Screening 94% of the BRHS cohort were employed, but five years later at the time of the Postal Questionnaire only 74% were employed full time. In this thesis a man is said to be ‘stably’ employed at the Initial Screening if he stated at the Initial Screening that he was employed and at the Postal Questionnaire that he had experienced no unemployment in the five years prior to the Initial Screening. Analyses in chapters 5-9 will be restricted to ‘stably’ employed men (85% of the BRHS cohort). Chapter 10 will consider the men who were not ‘stably’ employed at Initial Screening.

The men are categorised into eight employment categories based primarily on a man’s employment status at the Postal Questionnaire (PQ), but also taking account of whether he had been unemployed at the time of the Initial Screening (IS) or at sometime in the five years between Initial Screening and the Postal Questionnaire:

1) Continuously Employed between IS & PQ  
2) Discontinuously Employed between IS & PQ  
3) Part Time Employed at PQ  
4) Unemployed Ill at PQ  
5) Unemployed Not-Ill at PQ  
6) Retired Ill at PQ  
7) Retired Not-Ill at PQ  
8) Unclassified/Dead/Missing

To examine the relationship between non-employment and other factors, continuously employed men (1) are compared to non-employed men (2,4,5,6,7). Men
employed part-time (3) and men in category 10 are excluded from the analyses in chapters 5-9.

Non-employed men were more likely to be manual workers, to be older and to come from the North than continuously employed men. Men who retired for reasons other than illness were the exceptions to this; they were more likely to come from the South and be non-manual workers.

Amongst men 'stably' employed at Initial Screening, age, town of residence, social class, length of time in longest held occupation at screening, marital status and the number of children all independently affected the odds of experiencing non-employment. Whenever the relationship between other factors (for example health) and the odds of becoming non-employed are investigated these socio-economic factors will need to be controlled for. However, when employment status is used to predict other factors (for example changes in smoking habits) these socio-economic variables only need to be controlled for if they are associated with the factor of interest. In general, controlling for age, town of residence and social class is sufficient.
EMPLOYMENT EXPERIENCE DURING FIVE YEARS FROM INITIAL SCREENING TO THE POSTAL QUESTIONNAIRE

4.1 INTRODUCTION

The official seasonally adjusted level of unemployment for men aged 15-64 in Great Britain rose from 5.5% in January 1978 (the first month Initial Screening took place) to 12.7% in June 1985 (the last month the Postal Questionnaire was completed) (Employment Gazette: December 1988). This chapter examines the changes in employment status that men in the British Regional Heart Study experienced. In an attempt to standardise for previous unemployment experience, further analyses are restricted to 'stably' employed men (men who were employed at Initial Screening and had experienced no unemployment in the five years prior to Initial Screening). Socio-demographic characteristics of these men are examined to determine which factors affected the odds of them subsequently experiencing non-employment after Initial Screening.

4.2 EMPLOYMENT EXPERIENCE OF MEN IN THE BRHS

4.2.1 Definition of employment categories used in the BRHS

Men were classified into the following eight employment categories, which will be used throughout the rest of the thesis. The classification is primarily based on a man's employment status at the Postal Questionnaire, but also takes account of whether he was unemployed at the time of Initial Screening or some time in the five years between Initial Screening and the Postal Questionnaire.

1. **Continuously Employed**: \( N = 4690 \)

These men were employed full time at the Postal Questionnaire and
experienced no periods of unemployment from the time of Initial Screening through the five years to the Postal Questionnaire.

2. Discontinuously Employed : N = 654
These men were employed full time at the Postal Questionnaire, but had been unemployed at some period either at the time of Initial Screening or through the five years to the Postal Questionnaire.

3. Part Time Employed : N = 171
These men were employed part-time at the Postal Questionnaire.

4. Unemployed Ill : N = 313
These men were unemployed at the Postal Questionnaire due to illness.

5. Unemployed Not-Ill : N = 516
These men were unemployed at the Postal Questionnaire not due to illness.

6. Retired Ill : N = 329
These men were retired at the Postal Questionnaire due to illness.

7. Retired Not-Ill : N = 573
These men were retired at the Postal Questionnaire, not due to illness. Note that due to the sampling procedure all these men are under 65 years of age.

8. Dead/Missing/Unclassified : N = 489
These were men who did not fall into the above categories for various reasons. They included 297 men who had died and 41 men who had emigrated prior to the Postal Questionnaire. There were 122 men who did not complete the Postal Questionnaire at all and 29 men who completed the Postal Questionnaire, but for whom it was not possible to determine their
employment status.

The above categorisation was chosen for several reasons. Firstly it was thought important to be able to distinguish between men who stated that they were unemployed and those who stated that they had retired. The implication is that retired men are no longer aiming to return to the workforce. The advantage of classifying men by whether they attributed their non-employment to illness or not, is that any ill health that is observed in unemployed not-ill and retired not-ill men is unlikely to have been the cause of their non-employment. Discontinuously employed men were distinguished from continuously employed men, as although they were employed at both Initial Screening and the Postal Questionnaire, they had experienced some unemployment between the two. They were distinguished from unemployed men, because they were actually employed at the time of the Postal Questionnaire. In this thesis the term non-employed is used to include unemployed and retired men. This is because at times of high unemployment many people are forced out of the workforce (Westin S, et al 1989; Piachaud D 1986). Therefore the high levels of unemployment may have contributed to them leaving the workforce. How they differ as a group from continuously employed men is of interest.

No information was collected on whether men were 'seeking work'. Therefore the requirement that men not working must be seeking work in order to be classified as unemployed could not be applied. However it might be assumed that the majority of unemployed not-ill men were actively seeking work. If they were not they would probably have classified themselves as retired not-ill.

4.2.2 Comparison with other definitions of unemployment

The Department of Employment defines unemployed people as:

'Persons registered for employment at a local employment office or careers service office on the day of the monthly count who on that day have no job and are capable of and available for work'
Employed people are defined as people in civilian employment excluding those who are self-employed. The employment rate is the number of unemployed people expressed as a percentage of the total number of employed and unemployed people. This means that people who are too ill to work are excluded.

The majority of published studies use less restrictive criteria and define unemployed people as those who are 'seeking work', and employed people as those who are in employment, again excluding people who are too ill to work. In the BRHS, a large proportion of unemployed ill men would probably be classified as too ill to work, and therefore not be considered as 'unemployed'. All retired men would not be considered to be seeking work and therefore also not considered as 'unemployed'. The percentages of unemployed men in the BRHS in section 4.2.4 are the numbers of unemployed ill and not-ill men expressed as a percentage of the total number of continuously employed, discontinuously employed, employed part-time and unemployed ill and not-ill men.

4.2.3 Comparison of employment at Initial Screening and at the Postal Questionnaire

Table 4.1 compares employment status at Initial Screening with that at the Postal Questionnaire. At Initial Screening 94.0% of men were employed, with only 5.3% being unemployed and 0.7% stating that they had retired. Five years later at the Postal Questionnaire the situation had changed dramatically, with only 76.2% being employed (full time or part time), 11.4% being unemployed and 12.4% stating that they had retired. Some of this increase was due to men being five years older at the Postal Questionnaire and thus being more likely to have retired. This is examined in the next two columns in Table 4.1, where employment status at Initial Screening of only those men who were aged 45-59 at the time of Initial Screening is compared to employment status at the Postal Questionnaire of only those men who were aged 45-59 at the time of the Postal Questionnaire. That is, men aged under 45 at Initial Screening were excluded from the third column and men aged over 59 at the Postal Questionnaire were excluded from the fourth column.
Excluding men aged under 45 at screening did not affect the proportions of men employed at screening very much. However, excluding men aged over 59 at the Postal Questionnaire did alter the proportions significantly, with the proportions of employed men increasing (73.8% to 84.3%) and the proportion retired falling (12.4% to 3.7%). However, the proportion of men employed at Initial Screening was still higher than the proportion employed at the Postal Questionnaire (93.3% versus 84.3%).

Table 4.1 Number of men by employment status at Initial Screening and the Postal Questionnaire; the whole BRHS cohort; men aged 45-59 at Initial Screening; men aged 45-59 at the Postal Questionnaire. (Column percentages excluding those unclassified or missing)

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Total BRHS Cohort</th>
<th>Men aged 45-59</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At Screening</td>
<td>At Postal Questionnaire</td>
</tr>
<tr>
<td>All Men</td>
<td>7735 (100)</td>
<td>7735 (100)</td>
</tr>
<tr>
<td>Employed FT *</td>
<td>7265 (94.0)</td>
<td>5344 (73.8)</td>
</tr>
<tr>
<td>Employed PT</td>
<td>- (-)</td>
<td>171 (2.4)</td>
</tr>
<tr>
<td>Unemployed - Ill</td>
<td>258 (3.3)</td>
<td>313 (4.3)</td>
</tr>
<tr>
<td>Unemployed - Not Ill</td>
<td>150 (2.0)</td>
<td>516 (7.1)</td>
</tr>
<tr>
<td>Retired #</td>
<td>55 (0.7)</td>
<td>902 (12.4)</td>
</tr>
<tr>
<td>Dead/Missing /Unclassified</td>
<td>7 (-)</td>
<td>489 (-)</td>
</tr>
</tbody>
</table>

* : Employed at Postal Questionnaire includes 'Continuously employed' and 'Discontinuously employed'.

# : Retired at Postal Questionnaire includes 'Retired-ill' and 'Retired not-ill'.

* : Employed at Postal Questionnaire includes 'Continuously employed' and 'Discontinuously employed'.

# : Retired at Postal Questionnaire includes 'Retired-ill' and 'Retired not-ill'.
4.2.4 Comparison of levels of unemployment in the BRHS with official levels of unemployment.

The levels of unemployment in the 24 BRHS towns were reasonably representative of the levels of unemployment in Great Britain as a whole over the years of the study (Figure 4.1: Comparison of the average male unemployment rate in the 24 BRHS towns and the average male unemployment rate in Great Britain in January of each year 1978-1985). There is a high degree of correlation between the percentage of unemployed men participating from each BRHS practice and the official percentages of unemployed men aged 15-64 in the months that Initial Screening occurred and the Postal Questionnaire was completed (Figure 4.2, Table 4.2). The percentages of unemployed men participating in the BRHS do not correspond precisely to the official unemployed percentages due to different age ranges and different definitions of unemployment. The percentages of men unemployed at the Postal Questionnaire correspond less well, perhaps partly due to over 7% having moved from their town of residence at Initial Screening by the time of the Postal Questionnaire.

**Figure 4.1** Comparison of the average male unemployment rate in the 24 BRHS towns and the male unemployment rate in Great Britain in January of each year 1978-1985

*Each town was weighted by its population size.*
Table 4.2  Percentage of unemployed men by town of residence at Initial Screening and the Postal Questionnaire: (a) BRHS men (b) Department of Employment male unemployment rate

<table>
<thead>
<tr>
<th>Town of Residence</th>
<th>Initial Screening</th>
<th>Postal Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BRHS % Unemployed</td>
<td>Official % Unemployed#</td>
</tr>
<tr>
<td>Harrogate</td>
<td>4.3</td>
<td>4.6</td>
</tr>
<tr>
<td>Shrewsbury</td>
<td>2.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Lowestoft</td>
<td>1.9</td>
<td>6.2</td>
</tr>
<tr>
<td>Mansfield</td>
<td>5.9</td>
<td>5.3</td>
</tr>
<tr>
<td>Southport</td>
<td>3.1</td>
<td>8.1</td>
</tr>
<tr>
<td>Merthyr Tydfil</td>
<td>13.8</td>
<td>13.5</td>
</tr>
<tr>
<td>Guildford</td>
<td>0.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Burnley</td>
<td>6.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Newcastle-U-Lyne</td>
<td>6.2</td>
<td>3.8</td>
</tr>
<tr>
<td>Exeter</td>
<td>2.7</td>
<td>5.9</td>
</tr>
<tr>
<td>Dewsbury</td>
<td>4.9</td>
<td>5.1</td>
</tr>
<tr>
<td>Falkirk</td>
<td>6.8</td>
<td>6.8</td>
</tr>
<tr>
<td>Ipswich</td>
<td>2.0</td>
<td>3.6</td>
</tr>
<tr>
<td>Gloucester</td>
<td>7.4</td>
<td>4.6</td>
</tr>
<tr>
<td>Ayr</td>
<td>9.8</td>
<td>9.5</td>
</tr>
<tr>
<td>Dunfermline</td>
<td>3.1</td>
<td>7.7</td>
</tr>
<tr>
<td>Darlington</td>
<td>3.7</td>
<td>6.5</td>
</tr>
<tr>
<td>Carlisle</td>
<td>4.4</td>
<td>5.3</td>
</tr>
<tr>
<td>Maidstone</td>
<td>2.2</td>
<td>2.8</td>
</tr>
<tr>
<td>Grimsby</td>
<td>6.9</td>
<td>6.7</td>
</tr>
<tr>
<td>Bedford</td>
<td>3.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Wigan</td>
<td>8.1</td>
<td>9.8</td>
</tr>
<tr>
<td>Scunthorpe</td>
<td>5.5</td>
<td>7.8</td>
</tr>
<tr>
<td>Hartlepool</td>
<td>14.1</td>
<td>14.5</td>
</tr>
</tbody>
</table>

Average * 5.4 6.4 13.4 13.6
Correlation r=0.81 r=0.74

# : Department of Employment unemployed percentages are for the relevant month that the Initial Screening or the Postal Questionnaire occurred for each town.

* : The average percentages of unemployed men are unweighted averages.
Figure 4.2
Percenage of unemployed men in the 24 BRHS towns
4.2.5 Changes in employment status between Initial Screening and the Postal Questionnaire

Table 4.3 examines the individual changes in employment status between Initial Screening and the Postal Questionnaire. Of men who were employed at Initial Screening, 68% were in full time employment at the Postal Questionnaire and had experienced no unemployment in the intervening five years; a further 9% had experienced some unemployment but were re-employed by the time of Postal Questionnaire; 9% were unemployed at the Postal Questionnaire and 11% had retired. The employment situation was very different for men who were unemployed at Initial Screening, with only 17% being employed full time at the Postal Questionnaire. The majority were unemployed at the Postal Questionnaire (55%), and 25% had retired by the Postal Questionnaire. There was also a difference between men who said that they were unemployed due to illness at Initial Screening and those who did not, in that the ill group were much less likely to be in full time employment at the Postal Questionnaire (only 11% compared to 27%). In fact, of those unemployed due to illness at Initial Screening, 46% were unemployed due to illness and 27% were retired due to illness at the Postal Questionnaire.

4.3 MEN ‘STABLY’ EMPLOYED AT INITIAL SCREENING

In this thesis a man is said to be ‘stably’ employed at Initial Screening if he stated at Initial Screening that he was employed and at the Postal Questionnaire that he had experienced no unemployment in the five years prior to Initial Screening. It is used to identify a group of employed men who had experienced no recent periods of unemployment. This term is not used to mean that the men had been and remained in jobs that they were confident were secure, as is its usual usage.
Percentages of all men excluding those unclassified or missing at the Postal Questionnaire.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>6</th>
<th>22</th>
<th>42</th>
<th>145</th>
<th>489</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dead/missing/lost

Total

No. I

No. II

No. III

Number of men by employment status at the Postal Questionnaire and employment status at Initial Screening (Column)

<table>
<thead>
<tr>
<th></th>
<th>25 (100)</th>
<th>48 (100)</th>
<th>28 (100)</th>
<th>7 (100)</th>
<th>77 (100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.3.1 Comparison of men who were 'stably' employed at Initial Screening with those who were not.

Table 4.4 shows that men who were 'stably' employed at screening differed significantly from those who were not 'stably' employed. This was true for their socio-demographic profile at screening and for their employment status five years later, at the Postal Questionnaire.

Table 4.4 Comparison of men who were 'stably' employed at Initial Screening with those who were not.

<table>
<thead>
<tr>
<th>Employment status at Initial Screening</th>
<th>'Stable'</th>
<th>'Not Stable'</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men (Row %)</td>
<td>6191 (85.4)</td>
<td>1055 (15.6)</td>
</tr>
</tbody>
</table>

At Screening

<table>
<thead>
<tr>
<th></th>
<th>'Stable'</th>
<th>'Not Stable'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age : years (se)</td>
<td>49.9 (0.07)</td>
<td>51.0 (0.18)</td>
</tr>
<tr>
<td>% From the 'South' ~</td>
<td>31.0</td>
<td>24.5</td>
</tr>
<tr>
<td>% Non-Manual Workers #</td>
<td>44.1</td>
<td>26.7</td>
</tr>
<tr>
<td>Length of Time in longest held occupation : years (se)</td>
<td>23.6 (0.2 )</td>
<td>21.9 (0.3 )</td>
</tr>
</tbody>
</table>

At Postal Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>'Stable'</th>
<th>'Not Stable'</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Employed Full Time</td>
<td>78.5</td>
<td>46.0</td>
</tr>
<tr>
<td>% Unemployed</td>
<td>8.2</td>
<td>30.7</td>
</tr>
<tr>
<td>% Retired</td>
<td>11.1</td>
<td>19.8</td>
</tr>
</tbody>
</table>

~ : The 'South' is defined as all those towns south of a line drawn from the Wash to the Bristol Channel (see Figure 3.2).

# : Excluding men from the Armed Forces
At Initial Screening 85.4% of men were 'stably' employed. 'Stably' employed men were slightly younger than 'non-stably' employed men (49.9 years versus 51.0), more likely to come from the 'South' (31.0% versus 24.5%), more likely to be non-manual workers (44.1% versus 26.7%) and to have been in their longest held occupation at screening for longer (23.6 years versus 21.9 years).

Five years later at the Postal Questionnaire, 'stably' employed men were more likely to be in full time employment (78.5% versus 46.0%) and less likely to be unemployed (8.2% versus 30.7%) or retired (11.1% versus 19.8%), than 'non-stably' employed men.

4.3.2 Reasons for analysing 'stably' employed men only

The aims of this thesis are to examine the health and health-related behaviour of men before they become non-employed and to further examine any changes that occur on becoming non-employed. Therefore the main analyses in this thesis are restricted to men who were employed at Initial Screening, as unemployed men may have already been affected by their current unemployment and altered their health-related behaviour.

Unemployment can have many long lasting effects, even after re-employment occurs. For example, re-employment may be in a less skilled, less secure and less well-paid job (White M, 1983). Also studies have shown that men who are currently unemployed are more likely to have been unemployed in the past (Narendranathan W, et al 1985; Moylan S, et al 1982; Daniel WW, Stilgoe E 1977). Therefore if a group of unemployed men are compared to a group of employed men, prior employment history should be standardised for. This was attempted in this thesis by further restricting the analysis to those men who were 'stably' employed at Initial Screening. At Initial Screening all these men were employed and had experienced no periods of unemployment for at least five years. Therefore any effects of previous periods of unemployment are hopefully negligible in this group of men. 71% of these men remained continuously employed, with the remaining
29% experiencing some non-employment in the next five years up until the time of the Postal Questionnaire. Any differences observed between these continuously employed men and the other men can be assumed to be associated with the recent period of non-employment. Also any differences observed between these two groups at Initial Screening, are clearly factors that are associated with the probability of becoming non-employed and are not due to any recent or current unemployment.

Because ‘non-stably’ employed men have a much greater experience of recent unemployment, some associations found in chapters 5-9 which concentrate only on ‘stably’ employed men may differ when considering ‘non-stably’ employed men. For example changes associated with non-employment might be less pronounced amongst ‘non-stably’ employed men since many of these changes may already have occurred prior to the Initial Screening. On the other hand the prevalence of ill health might be higher at Initial Screening, due to their recent experiences of unemployment. Chapter 10 investigates these issues in detail.

4.4 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF ‘STABLY’ EMPLOYED MEN AT INITIAL SCREENING AND THEIR EMPLOYMENT EXPERIENCES AFTER INITIAL SCREENING.

In this section the socio-demographic characteristics of ‘stably’ employed men at Initial Screening are examined to determine if they are related to their subsequent employment status after screening.

4.4.1 Town of residence at Initial Screening

Table 4.5 shows that men from the ‘South’ were more likely to remain continuously employed than men from the ‘North’ (74.5% vs 69.8%). There was considerable variation between towns, from 81.4% for Shrewsbury down to 59.9% for Scunthorpe (both in the ‘North’). The percentages of men either unemployed ill or retired ill
The towns are presented within region by decreased percentage of continuously employed men.

<table>
<thead>
<tr>
<th>Town</th>
<th>North</th>
<th>South</th>
<th>All Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aycliffe</td>
<td>1.04</td>
<td>1.04</td>
<td>1.99</td>
</tr>
<tr>
<td>Aylsham</td>
<td>1.7</td>
<td>1.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Attleborough</td>
<td>2.17</td>
<td>2.17</td>
<td>4.34</td>
</tr>
<tr>
<td>Attleborough</td>
<td>2.17</td>
<td>2.17</td>
<td>4.34</td>
</tr>
<tr>
<td>Attleborough</td>
<td>2.17</td>
<td>2.17</td>
<td>4.34</td>
</tr>
</tbody>
</table>

Table 4.5 Employment Status of the Postal Questionnaires of Study, Employed Men by Town of Residence at Initial Screening (low percentages)
were twice as high in the 'North' as in the 'South' (2.5% and 4.0% in the 'North' compared to 1.2% and 2.0% in the 'South'). The percentage of men who were unemployed not-ill was also higher in the 'North' than in the 'South'. However, there was a wide range of proportions both in the 'North' and the 'South'; in the 'South' from 1.4% (Guildford) to 9.4% (Gloucester) and in the 'North' from 1.0% (Shrewsbury) to 13.4% (Falkirk). To retire not-ill was however, more common in the 'South' than in the 'North' (8.0% compared to 7.7%).

4.4.2 Age at Postal Questionnaire

The percentage of men who remained continuously employed at the Postal Questionnaire fell steadily with increasing age, from 86% of men aged 45-49 remaining continuously employed to only 43% of men aged 60-64 (Table 4.6). Only 47% of men aged 60-64 were in full time employment at the Postal Questionnaire, compared to almost 95% of men aged 45-49. The percentage of men who had retired or become unemployed not-ill rose steadily with increasing age. However, the percentage of men who became unemployed ill did not increase. This may be because older men were more likely to classify themselves as retired rather than unemployed. Of the men who retired, the percentage stating that the reason was not due to illness rose dramatically in the oldest age group, being about 50% (73/151) up to age 59 and 75% after age 59 (409/542).

In analysing further characteristics, age is adjusted for by fitting nominal polytomous regression models with employment status at Postal Questionnaire as the outcome variable, and age and the factor of interest as independent variables (Appendix F) and using Wilcosky's marginal prediction method to adjust for age (Appendix G).
Table 4.6  Employment status at Postal Questionnaire by age at Postal Questionnaire: no of men (column %)

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>Age of men at Postal Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45-49 (100)</td>
</tr>
<tr>
<td></td>
<td>50-54 (100)</td>
</tr>
<tr>
<td></td>
<td>55-59 (100)</td>
</tr>
<tr>
<td></td>
<td>60-64 (100)</td>
</tr>
<tr>
<td>All Men</td>
<td></td>
</tr>
<tr>
<td>Employed Full Time</td>
<td></td>
</tr>
<tr>
<td>Continuously</td>
<td></td>
</tr>
<tr>
<td>Discontinuously</td>
<td></td>
</tr>
<tr>
<td>Employed Part Time</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
</tr>
<tr>
<td>Ill</td>
<td></td>
</tr>
<tr>
<td>Not Ill</td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td></td>
</tr>
<tr>
<td>Ill</td>
<td></td>
</tr>
<tr>
<td>Not Ill</td>
<td></td>
</tr>
</tbody>
</table>

4.4.3 Social class at Initial Screening

After adjusting for age the proportion of men who remained continuously employed at the Postal Questionnaire fell steadily from 77.3% for Social Class I to 65.6% and 67.1% for Social Classes 5 and 6 (Table 4.7). Not only was non-employment less common in social classes I and II, but the reasons given for the non-employment tended to differ. In social classes I and II non-employed men were more likely to classify themselves as retired than unemployed, whereas in the other social classes men were more likely to classify themselves as unemployed rather than retired. Also men from Social Classes III Manual, IV and V were more likely to give their reason for retirement as illness.
Table 4.7  Employment experience after Initial Screening by social class at Initial Screening: column percentages adjusted for age

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>Social Class at the Initial Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>All Men (No. of Men)</td>
<td>100</td>
</tr>
<tr>
<td>(549)</td>
<td>(1506)</td>
</tr>
<tr>
<td>Employed Full Time</td>
<td></td>
</tr>
<tr>
<td>Continuously</td>
<td>77.3</td>
</tr>
<tr>
<td>Discontinuously</td>
<td>3.3</td>
</tr>
<tr>
<td>Employed Part Time</td>
<td>3.6</td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>0.9</td>
</tr>
<tr>
<td>Not III</td>
<td>2.5</td>
</tr>
<tr>
<td>Retired</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>1.9</td>
</tr>
<tr>
<td>Not III</td>
<td>10.6</td>
</tr>
</tbody>
</table>

4.4.4 Type of employment for the longest period at Initial Screening

Social class classification does not explicitly identify self-employed men, whereas the classification by type of employment does (Section 3.6.4). Thirty-one percent of self-employed men were classified as managers (Social Class II) and 36% were classified as skilled manual (Social Class III-Manual). After adjusting for age, self-employed men with employees were the most likely to have remained continuously employed (81% were) and foremen or employees were the least likely (only 68.5% were), with self-employed men with no employees and managers lying in the middle (75.9% and 74.7% respectively) (Table 4.8). Self-employed men with employees were more likely to be retired than unemployed (6.9% vs 2.5% respectively). Foreman or employees were equally likely to be unemployed or retired (10.7% vs 11.6% respectively). Managers were the most likely to have retired not due to illness, perhaps indicating the early retirement incentives offered to managers rather than employees in many companies. Men in the Armed Forces seemed the most likely to have been discontinuously employed, perhaps due to having to leave the Armed Forces once they had been there for 22 years. Self-employed men with
no employees were the most likely to work part time, reflecting perhaps the greater opportunities they have to do so. In analysing the odds of experiencing non-employment, the best fit is obtained by using the usual social class classification plus whether a man was self-employed with employees or not.

Table 4.8 Employment experience after Initial Screening by type of employment for longest period at Initial Screening: column percentages adjusted for age

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>Self-employed</th>
<th>Manager</th>
<th>Foreman/Employee</th>
<th>Armed Forces</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men (No. of Men)</td>
<td>100 (448)</td>
<td>100 (1490)</td>
<td>100 (3846)</td>
<td>100 (155)</td>
</tr>
<tr>
<td>Employed Full Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuously</td>
<td>81.0</td>
<td>74.7</td>
<td>68.5</td>
<td>72.6</td>
</tr>
<tr>
<td>Discontinuously</td>
<td>5.3</td>
<td>5.9</td>
<td>7.9</td>
<td>11.5</td>
</tr>
<tr>
<td>Employed Part Time</td>
<td>4.3</td>
<td>3.0</td>
<td>1.4</td>
<td>0.7</td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ill</td>
<td>1.1</td>
<td>0.9</td>
<td>2.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Not Ill</td>
<td>1.4</td>
<td>2.8</td>
<td>8.1</td>
<td>4.0</td>
</tr>
<tr>
<td>Retired</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ill</td>
<td>2.8</td>
<td>2.5</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Not Ill</td>
<td>4.1</td>
<td>10.3</td>
<td>7.6</td>
<td>5.2</td>
</tr>
</tbody>
</table>

4.4.5 Length of time in longest held occupation at Initial Screening

Time in the longest held occupation can be taken as a crude measure of job stability. After adjusting for age, men with the lowest level of job stability (men who had been in their longest held job for less than ten years at Initial Screening) were less likely to be continuously employed at the Postal Questionnaire, with under 62.6% being so compared to over 71% for other men (Table 4.9). They were more likely to be discontinuously employed and also to be unemployed than retired. Men with the greatest level of job stability (men who had been in their jobs their longest held job for more than 30 years) were the least likely to give illness as their reason for retiring at the Postal Questionnaire.
Table 4.9  Employment experience after Initial Screening by length of time in longest held occupation at Initial Screening: column percentages adjusted for age

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>Up to 10 Years</th>
<th>11 to 20 Years</th>
<th>21 to 30 Years</th>
<th>More than 30 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men (No. of Men)</td>
<td>100 (346)</td>
<td>100 (2112)</td>
<td>100 (2440)</td>
<td>100 (1260)</td>
</tr>
<tr>
<td>Employed Full Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuously</td>
<td>62.6</td>
<td>71.1</td>
<td>72.3</td>
<td>72.1</td>
</tr>
<tr>
<td>Discontinuously</td>
<td>10.2</td>
<td>7.1</td>
<td>6.9</td>
<td>7.1</td>
</tr>
<tr>
<td>Employed Part Time</td>
<td>2.7</td>
<td>1.9</td>
<td>2.5</td>
<td>1.9</td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ill</td>
<td>3.4</td>
<td>2.3</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>Not Ill</td>
<td>10.8</td>
<td>7.2</td>
<td>5.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Retired</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ill</td>
<td>4.8</td>
<td>4.4</td>
<td>3.3</td>
<td>2.8</td>
</tr>
<tr>
<td>Not Ill</td>
<td>5.5</td>
<td>6.0</td>
<td>7.8</td>
<td>8.9</td>
</tr>
</tbody>
</table>

4.4.6 Marital status at Initial Screening

After adjusting for age, married men were more likely to remain continuously employed at the Postal Questionnaire (71.9%), than other men (about 64%). There were no other distinct patterns (data not shown).

4.4.7 Number of children at Initial Screening

After adjusting for age, men with three or more children were less likely to be continuously employed at the Postal Questionnaire (68.2%), compared to other men (over 71%). There were no other distinct patterns (data not shown).
4.5 FACTORS ASSOCIATED WITH BECOMING NON-EMPLOYED

Section 4.4 demonstrated that amongst 'stably' employed men at Initial Screening, age, town of residence, social class, type of employment, length of time in longest held job, marital status and the number of children were associated with subsequent employment status. In this section, in order to assess the independence and relative strengths of these relationships, a logistic model is fitted in which whether or not a man experienced any non-employment after screening is regressed on age, town of residence, social class, occupation, time in longest held job at Initial Screening, marital status and number of children. The results of this analysis are shown in Table 4.10.

Age was clearly the most important determinant of whether a man experienced non-employment or not, with the relative odds of experiencing non-employment for men aged 60-64 compared to those aged 45-49, being 8.59. The next most important determinant was town of residence, with men from Shrewsbury, Mansfield, Exeter and Bedford being under half as likely to experience non-employment, than men from Hartlepool. Social class, type of job and the length of time in longest held occupation also influenced whether or not a man experienced non-employment, with men from higher social classes, over ten years in the longest held occupation and self-employed men with employees being the least likely to experience non-employment.

A nominal polytomous regression model was then fitted, with employment status at the Postal Questionnaire as the outcome. The odds of being in one of the non-employment groups as opposed to being continuously employed are given in Table 4.11. Age did not increase the odds of being discontinuously employed rather than continuously employed. Manual workers were significantly more likely to be unemployed, but significantly less likely to be retired at the Postal Questionnaire. Self-employed men are significantly less likely to be unemployed not-ill or retired not-ill. In particular, self-employed men, with no employees are more likely to be
Table 4.10  Factors simultaneously influencing the odds of experiencing non-employment after Initial Screening.

<table>
<thead>
<tr>
<th>Variable of Interest</th>
<th>Comparison</th>
<th>Relative Odds of Experiencing Non-Employment (95% C.I.)</th>
<th>Chi Square</th>
<th>Overall Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age at Postal Questionnaire</strong></td>
<td>45-49 vs 50-54</td>
<td>1.00 (1.07-1.58)</td>
<td>6.76</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>55-59 vs 60-64</td>
<td>2.52 (2.09-3.04)</td>
<td>93.43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60-64</td>
<td>8.61 (7.15-10.36)</td>
<td>516.86</td>
<td></td>
</tr>
<tr>
<td><strong>Town of Residence at Screening</strong></td>
<td>Exeter vs Guildford</td>
<td>0.43 (0.28-0.67)</td>
<td>14.04</td>
<td>116.96</td>
</tr>
<tr>
<td></td>
<td>Ipswich</td>
<td>0.77 (0.66-0.91)</td>
<td>3.06</td>
<td>P&lt;0.005</td>
</tr>
<tr>
<td></td>
<td>Lowestoft</td>
<td>0.56 (0.36-0.86)</td>
<td>6.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bedford</td>
<td>0.49 (0.32-0.76)</td>
<td>9.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ipswich</td>
<td>0.40 (0.36-0.86)</td>
<td>6.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lowestoft</td>
<td>0.56 (0.36-0.86)</td>
<td>6.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bedford</td>
<td>0.49 (0.32-0.76)</td>
<td>9.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ipswich</td>
<td>0.40 (0.36-0.86)</td>
<td>6.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lowestoft</td>
<td>0.56 (0.36-0.86)</td>
<td>6.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bedford</td>
<td>0.49 (0.32-0.76)</td>
<td>9.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ipswich</td>
<td>0.40 (0.36-0.86)</td>
<td>6.89</td>
<td></td>
</tr>
<tr>
<td><strong>Social Class</strong></td>
<td>I vs II</td>
<td>0.71 (0.56-0.91)</td>
<td>4.31</td>
<td>18.86</td>
</tr>
<tr>
<td></td>
<td>II vs III Man</td>
<td>0.77 (0.66-0.91)</td>
<td>3.06</td>
<td>P&lt;0.005</td>
</tr>
<tr>
<td></td>
<td>III Non Man vs III Man</td>
<td>1.00</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td><strong>Self-emp with employees at Screening</strong></td>
<td>Self-emp with employees vs Other Men</td>
<td>0.58 (0.44-0.75)</td>
<td>16.57</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td><strong>Time in longest held occupation at screening</strong></td>
<td>'0-10' years vs '&gt;10' Years</td>
<td>1.46 (1.12-1.90)</td>
<td>7.71</td>
<td>P&lt;0.006</td>
</tr>
<tr>
<td><strong>Marital Status at Screening</strong></td>
<td>Married vs Not Married</td>
<td>1.00</td>
<td>1.40 (1.14-1.73)</td>
<td>10.24</td>
</tr>
<tr>
<td><strong>No. of children at screening</strong></td>
<td>&lt; 3 vs 3 or more</td>
<td>1.00</td>
<td>1.23 (1.04-1.47)</td>
<td>5.76</td>
</tr>
<tr>
<td>Variable of Comparison</td>
<td>Odds Ratio (95% CI)</td>
<td>p-value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Class</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III vs. Other</td>
<td>2.34 (1.44 - 3.80)</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV vs. III</td>
<td>2.72 (1.11 - 6.77)</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V vs. IV</td>
<td>2.46 (1.00 - 6.42)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-9 years</td>
<td>2.37 (1.00 - 6.05)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-19 years</td>
<td>2.43 (1.00 - 6.85)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29 years</td>
<td>2.46 (1.00 - 6.42)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30+ years</td>
<td>2.37 (1.00 - 6.05)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4 cases</td>
<td>2.37 (1.00 - 6.05)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5+ cases</td>
<td>2.43 (1.00 - 6.85)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>2.34 (1.44 - 3.80)</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>2.72 (1.11 - 6.77)</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Ages</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-64 group</td>
<td>2.37 (1.00 - 6.05)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65+ group</td>
<td>2.43 (1.00 - 6.85)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2.34 (1.44 - 3.80)</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2.72 (1.11 - 6.77)</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever Smoked</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Smokers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-3 smokers</td>
<td>2.37 (1.00 - 6.05)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4+ smokers</td>
<td>2.43 (1.00 - 6.85)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Table 4.11 Factors influencing the odds of experiencing different types of non-employment after initial screening.
working part time at the Postal Questionnaire. Interestingly, men who had been in their longest held job for less than ten years had raised odds of being discontinuously employed.

### 4.6 Socio-Demographic Characteristics of Non-Employed Men: Other Studies

In agreement with the BRHS data many studies report that unemployed men in the late 1970s and early 1980s were more likely to come from the 'North', to be manual workers and to have experienced previous periods of unemployment (Moylan S, Davies B 1980; Stern J 1983b; Colledge M, Bartholomew R 1980). They were also less likely to be married. Men with four or more children were more likely to become unemployed in autumn 1978 than men with one or two children (Stern J 1983b). There is a class effect on whether a man classifies himself as unemployed or retired, with non-manual workers being more likely to be retired rather than unemployed (Lackzo F, et al 1988). These men were also more likely to state that their retirement was not due to illness (Parnes HS, Nestel G 1981).

### 4.7 Conclusions

Eighty-five percent of men in the British Regional Heart Study were 'stably' employed at Initial Screening. 'Non-stably' employed men were generally older, more likely to come from the 'North', to be manual workers and to have been in their longest held job for less time than 'stably' employed men. They were also more likely to be non-employed at the Postal Questionnaire.

The aims of this thesis are to examine the health and health-related behaviour of men before they become non-employed and to further examine any changes that occur on becoming non-employed. The main analyses in this thesis are restricted
to 'stably' employed men at Initial Screening, as 'non-stably' employed men may have already been affected by their recent or current unemployment. This, for example, may have caused them to change their health-related behaviour by the time of Initial Screening. Chapter 10 investigates in more detail the 'non-stably' employed men. It is unclear if part-time workers are employed or non-employed. They are therefore also excluded from the main analyses and are investigated in more detail in Chapter 10.

Amongst 'stably' employed men at Initial Screening, older men were much less likely to be continuously employed at the Postal Questionnaire. The town of residence, type of employment, length of time in longest held job at screening, marital status and the number of children were all significantly associated with an increased risk of experiencing non-employment.

This chapter demonstrates that various factors have a significant association with the employment status after screening. Therefore, whenever the relationship between other factors (for example health) and the odds of becoming non-employed are investigated the effects on of age, town of residence, social class, time in longest held occupation, marital status and the number of children need to be controlled for. However, when employment status is used to predict other factors (for example changes in smoking habits) these socio-economic variables only need to be controlled for if they are associated with the factor of interest. In general controlling for age, town of residence and social class is sufficient.
CHAPTER 5

HEALTH STATUS PRIOR TO NON-EMPLOYMENT

SUMMARY

Data assessing the health status of the men at Initial Screening included: self reported cardio-respiratory symptoms of ill health, recall of specific doctor diagnoses, taking of specified types of medication and various physiological measurements. First, the health status of men who subsequently became non-employed was compared with the health status of men who remained continuously employed. This determined to what extent the reported ill health amongst unemployed men was present prior to their loss of employment, after controlling for age, town and social class. Second, loss of employment was predicted from health status and other data at Initial Screening using logistic regression models. This examined the strength of the association between ill health and subsequent loss of employment, after socio-economic variables had been controlled for.

Men who later became non-employed showed evidence of ill health at screening in a variety of subjective and objective measures. Even men who became unemployed for reasons other than ill health appeared to have some evidence of ill health on some of the measures. In contrast, men who retired for reasons other than ill health appeared healthier than continuously employed men.

Recall of a doctor's diagnosis of angina, reported symptoms of chronic phlegm production or moderate/severe breathlessness, a measured high blood pressure and being on any regular medication were all independently associated with an increased risk of becoming non-employed. This occurred even amongst men who stated their unemployment was not due to illness. The increased risk of non-employment due to ill health was similar amongst manual and non-manual workers.
5.1 INTRODUCTION

Several types of data assessing the men's health status were collected at Initial Screening, ranging from subjective measurements, such as self-reported symptoms of ill health to objective measurements, such as an electrocardiogram. As the data were all collected as part of the British Regional Heart Study, there is an emphasis on cardiovascular and respiratory health measures. The first aim of this chapter is to determine if the health status of non-employed men differed from that of continuously employed men prior to the non-employment occurring, particularly amongst men who stated their non-employment was not due to illness. The second aim of this chapter is to examine the question of whether certain types of ill health were more likely to be associated with subsequent non-employment than other types. Due to non-employed men being older than continuously employed men, all the percentages quoted in this chapter are adjusted for age using Wilcosky's marginal prediction method (Appendix G).

5.2 SELF-REPORTED SYMPTOMS OF ILL HEALTH

5.2.1 Severe chest pain and chest pain on exertion

The questions on chest pain (Appendix A; Questions 5 and 6) are a standardised set adapted from the London School of Hygiene Cardiovascular Questionnaire (Rose GA, et al 1982). The questions divide into two sets. The first asks about severe chest pain suggestive of a previous myocardial infarction and is referred to as severe chest pain or possible myocardial infarction (MI). The second set of questions is more detailed and inquires about angina-like chest pain on exercise. Both possible and definite angina are regarded as angina (Shaper AG, et al 1984;

Overall, 7.5% of men reported severe chest pain and 6.0% chest pain on exertion, with 11.7% reporting either symptom and 1.8% reporting both symptoms (Table 5.1). Significantly higher percentages of non-employed men reported one of these symptoms (13.7%) than continuously employed men (10.8%). Amongst non-employed men, only unemployed ill and retired ill men were statistically significantly more likely to report these symptoms than continuously employed men. Adjusting for social class and town of residence does not markedly alter the results. Figure 5.1 shows the relative odds (and 95% Confidence Intervals) of non-employed men reporting either of these symptoms at Initial Screening compared to continuously employed men (horizontal line at 1.00), after adjusting for age, town and social class. Unemployed ill and retired ill men were twice as likely to report either of these symptoms prior to the non-employment occurring.

5.2.2 Chronic phlegm production, wheeze and breathlessness

Questions 7 and 8 of the questionnaire were adapted from the 1966 version of the MRC questionnaire on respiratory symptoms (Figure 5.2). A man was considered to have chronic phlegm production if he answered 'Yes' to both the first two questions (7.1 and 7.2); otherwise he was considered to be asymptomatic. If a response to either question was missing, the man was excluded from analysis. Men who replied 'Yes' to question 7.4 were classified as wheezing (on most days or nights). A man was considered to have moderate or severe breathlessness if he answered 'Yes' to at least two of the questions 8.1 to 8.3.

Overall, 16.2% of men wheezed, 13.9% had chronic phlegm production and 5.7% had moderate or severe breathlessness, with 24.7% having at least one of the three symptoms (Table 5.1). The percentages of men reporting any of these symptoms were significantly higher amongst non-employed men (20.0%, 18.3% and 8.1% respectively) than continuously employed men (14.8%, 12.2% and 4.5%).
<table>
<thead>
<tr>
<th>Symptom</th>
<th>No. of men</th>
<th>% of men</th>
<th>No. of All</th>
<th>% of All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac pain</td>
<td>43</td>
<td>13.9</td>
<td>362</td>
<td>17.8</td>
</tr>
<tr>
<td>Angina and chest pain</td>
<td>108</td>
<td>15</td>
<td>1000</td>
<td>1.0</td>
</tr>
<tr>
<td>Asthma</td>
<td>452</td>
<td>7.5</td>
<td>6000</td>
<td>0.8</td>
</tr>
<tr>
<td>Severe chest pain</td>
<td>7</td>
<td>1</td>
<td>300</td>
<td>0.0</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>1488</td>
<td>24.7</td>
<td>6000</td>
<td>2.5</td>
</tr>
<tr>
<td>Loss of voice</td>
<td>4</td>
<td>0.6</td>
<td>300</td>
<td>0.0</td>
</tr>
<tr>
<td>Loss of production</td>
<td>14</td>
<td>2.2</td>
<td>300</td>
<td>0.0</td>
</tr>
<tr>
<td>Worsened health</td>
<td>23</td>
<td>3.8</td>
<td>300</td>
<td>0.0</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>9</td>
<td>1.5</td>
<td>300</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Significantly different from percentage of continuously employed men (p<0.05).
Figure 5.1 Relative odds (95% CI) of different measures of ill health amongst non-employed men compared to a continuously employed man (adjusted for age, town and social class).

NON EMP - All Non-Employed groups
U ILL - Unemployed Ill
R ILL - Retired Ill

ANGINA AND/OR MI

WHEEZE/PHLEGM OR BREATHELESSNESS

2 OR MORE DIAGNOSES

ON MEDICATION

POOR LUNG FUNCTION

IHD (ECG)
Men in all non-employment groups, apart from retired not-ill men, were significantly more likely than continuously employed men to report experiencing these symptoms. This is in contrast to the reporting of chest pain, which unemployed not-ill and discontinuously employed men were not more likely to report. After adjustment for town and social class, the odds of reporting at least one of these symptoms remained clearly raised amongst unemployed not-ill, unemployed ill and retired ill men (Figure 5.1).

5.2.3 Calf pain on exercise

A man was considered to have calf pain on exercise (intermittent claudication) if he answered ‘Yes’ to question 9.1 or 9.2 (Figure 5.2). Data from the first three
tells were excluded, as men were only asked question 9.2.

Overall, 10.1% of men had calf pain on exercise (Table 5.1). The prevalence of reported calf pain was significantly higher amongst non-employed men (12.7%) than amongst continuously employed men (9.0%). Amongst non-employed men, unemployed ill, retired ill and unemployed not-ill men were more likely to report symptoms of calf pain. Adjustment for town and social class did not markedly alter these results.

5.3 MEDICAL HISTORY

5.3.1 Recall of doctor diagnoses
Figure 5.3 shows the questions asked about recall of doctor diagnoses at Initial Screening. All men answering 'Yes' to any of the second, third or fourth diagnoses were classified as having a doctor diagnosis of myocardial infarction. A large percentage of men ticking the box ‘Other Heart Trouble’ had had rheumatic fever (43%). The number of doctor diagnoses was also calculated, excluding the ‘other conditions’ category and counting ‘Yes’ to any of the first five questions as one diagnosis (coronary heart disease).

Overall, 59.8% of men recalled at least one diagnosis, with 24.9% recalling two or more (Table 5.2). A significantly higher percentage of non-employed compared to continuously employed men recalled at least two diagnoses (28.7% compared to 23.4%). Amongst non-employed men, unemployed ill, retired ill and unemployed not-ill men were more likely to recall at least two diagnoses. Adjusting for town and social class did not markedly alter these results (Figure 5.1). Bronchitis (with no distinction between acute and chronic episodes) was the most common diagnosis recalled, with 16.3% of men recalling such a diagnosis. Stroke was the least common diagnosis; only 0.4% (27 men) recalled a diagnosis of stroke.
### 10. MEDICAL HISTORY

**10.1 Have you ever been told by a doctor that you have, or have had, any of the following?**

- Angina
- Heart Attack
- Coronary thrombosis
- Myocardial infarction
- Other heart trouble
- High blood pressure
- Stroke
- Diabetes
- Peptic ulcer
- Gout
- Gall bladder disease
- Thyroid disease
- Arthritis
- Bronchitis
- Asthma
- Other condition(s) including surgery

**10.2 Are you on any regular medical treatment from a doctor for any condition?**

Do you know if the pills/medicines/ injections are:-

- Tranquillizer
- Pain Killers
- Antihypertensive drugs
- Anticoagulants
- Lipid lowering drugs
- Oral antidiabetics
- Injection of insulin
- Any others
- Don't know

Recall of each different diagnosis, except gall bladder disease, was more frequent amongst non-employed men than amongst continuously employed men. However, these differences were significant only for bronchitis and angina. Amongst non-employed men, unemployed ill and retired ill men were more likely to recall a diagnosis of high blood pressure, bronchitis, angina, myocardial infarction and arthritis. Retired ill men were, in addition, more likely to recall a diagnosis of a peptic ulcer, asthma and other heart trouble (mainly rheumatic fever). Bronchitis and angina were the only diagnoses that unemployed not-ill men were significantly more likely to recall than continuously employed men. In contrast to the other non-employed men, retired not-ill men were actually less likely to recall a diagnosis of arthritis or asthma. Discontinuously employed men did not appear to differ from continuously employed men in their recall of doctor diagnoses. Adjusting for town and social class did not markedly alter these results.
Note: No individual analyses were done on the recall of a diagnosis of stroke (N=34) or Thyroid disease (N=27) due to the small numbers of cases; however, they are included.

| Diagnosis               | Retired | Unemployed | Discontinued | Non-Continuous | Continuously Employed | Cases
|-------------------------|---------|------------|--------------|------------------|-----------------------|------
| Diabetes                | 12      | 4          | 1            | 12               | 12                    | 77   |
| Cancer                  | 1.5     | 1.5        | 1.2          | 1.7              | 1.5                   | 93   |
| Asthma                  | 2        | 2          | 3            | 2                | 2                     | 159  |
| Ulcer                   | 1.6     | 2.0        | 1.7          | 1.5              | 1.6                   | 216  |
| Myocardial Tachycardia   | 2.4     | 2.2        | 2.2          | 3.4              | 2.2                   | 374  |
| Other Heart Disease     | 9.9     | 6.9        | 6.9          | 6.9              | 6.9                   | 538  |
| Cardiac Arrest          | 1.1     | 1.1        | 1.1          | 1.1              | 1.1                   | 101  |
| Peripheral Arteries      | 1.0     | 1.0        | 1.0          | 1.0              | 1.0                   | 101  |
| High Blood Pressure     | 2.0     | 2.0        | 2.0          | 2.0              | 2.0                   | 204  |

* Significantly different from percentage of continuously employed men (P <0.05).
5.3.2 Regular medication

Overall, 24.5% of men said that they were on regular medical treatment from their doctor (Table 5.3). Non-employed men were significantly more likely than continuously employed men to be on regular medication (30.4% compared to 22.2%). Over 50% of unemployed ill and retired ill men reported taking medication. Figure 5.1 shows that, after adjustment for age, town and social class, all non-employed men, except retired not-ill men, were significantly more likely to report taking medication than continuously employed men.

The most common medications taken were tranquillizers (6.3%), pain killers (5.1%) and antihypertensive drugs (4.0%) (Table 5.3). Due to small numbers of men taking anticoagulants, lipid lowering drugs, oral antidiabetics and insulin injections, these were not analysed further. Non-employed men were significantly more likely to be taking pain killers or tranquillizers than continuously employed men. This was mainly due to the high rates amongst unemployed ill and retired ill men. Only unemployed ill and retired ill men had significantly raised odds of taking pain killers, after town and social class were adjusted for.

5.4 PHYSIOLOGICAL MEASURES

5.4.1 Lung Function

Lung function was measured as forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV1). The men were seated, and after an initial blow to accustom the man to the apparatus, two consecutive readings were taken 15 seconds apart, using a 'Vitalograph' (model J49-B2). The readings were automatically recorded on a digital meter. A man was classified as having a poor lung function if his forced expiratory volume in 1 second was less than 65% of his forced vital capacity (Kryzanowski M, Wysocki M 1986).
**Significantly different from percentage of continuously employed men (p<0.05)**

**Note:** Antiarrhythmics, lipid lowering drugs, oral antidiabetics and injection of insulin were ignored due to small numbers.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Antihypertensives</th>
<th>Painkillers</th>
<th>Tranquilizers</th>
<th>Any medication 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>4.4</td>
<td>6.2</td>
<td>12.4</td>
<td>11.4</td>
</tr>
<tr>
<td>Unemployed</td>
<td>4.8</td>
<td>7.6</td>
<td>13.8</td>
<td>11.4</td>
</tr>
<tr>
<td>Employed</td>
<td>5.0</td>
<td>7.0</td>
<td>15.3</td>
<td>11.4</td>
</tr>
<tr>
<td>Discoid</td>
<td>4.7</td>
<td>6.1</td>
<td>14.3</td>
<td>11.4</td>
</tr>
<tr>
<td>Non-Continuously</td>
<td>1.7</td>
<td>3.0</td>
<td>6.9</td>
<td>5.3</td>
</tr>
<tr>
<td>Continuously</td>
<td>4.0</td>
<td>5.1</td>
<td>8.0</td>
<td>5.3</td>
</tr>
</tbody>
</table>

**Employment Status at Postal Questionnaire**

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Non-Medicated</th>
<th>Medicated</th>
<th>No. of men</th>
<th>No. of cases with missing data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>24.2</td>
<td>22.2</td>
<td>1482</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>51.4</td>
<td>27.4</td>
<td>303</td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>26.4</td>
<td>30.4</td>
<td>245</td>
<td></td>
</tr>
</tbody>
</table>

**Table 5.3** Percentage of men on regular medication at Initial Screening by Employment Status at the Postal Questionnaire (adjusted for age).
Overall, 9.8% of men had poor lung function (Table 5.4). Non-employed men were significantly more likely to have poor lung function than continuously employed men (11.6% compared to 9.0%). In particular, 15.1% of retired ill men had poor lung function. Adjusting for town and social class did not markedly alter these results (Figure 5.1).

5.4.2 Ischaemic Heart Disease (ECG)

An orthogonal three-lead electrocardiogram (ECG) was recorded. A man was classified as having ischaemic heart disease (IHD) if there was evidence of definite or possible myocardial infarction or definite myocardial ischaemia; possible myocardial ischaemia was excluded (Shaper AG, et al 1984).

Overall, 6.5% of men had IHD (Table 5.4). The percentage of men with evidence of IHD was similar in continuously employed and non-employed men, being 6.2% and 7.0% respectively. Adjusting for town and social class did not alter the picture (Figure 5.1).

5.4.3 Measured High Blood Pressure

The London School of Hygiene sphygmomanometer was used to measure the blood pressure twice in succession, with the man seated and the arm supported on a cushion. The blood pressures used in this thesis are the average of the two readings with an adjustment for observer bias (Bruce NG, et al 1988). A man was said to have measured high blood pressure if his systolic blood pressure was equal to or greater than 160 mm Hg or his diastolic blood pressure was equal to or greater than 95 mm Hg.

Overall, 25.9% of men had measured high blood pressure (Table 5.4), with the prevalence being significantly higher amongst non-employed men than amongst continuously employed men (28.8% and 24.7% respectively). The prevalence of measured high blood pressure was higher amongst all non-employed groups of men than amongst continuously employed men, significantly so for unemployed ill and
<table>
<thead>
<tr>
<th></th>
<th>Employed</th>
<th>Employed</th>
<th>Employed</th>
<th>Non-Continuing</th>
<th>Non-Continuing</th>
<th>Discontinued</th>
<th>Unemployed</th>
<th>Unemployed</th>
<th>Retired</th>
<th>Retired</th>
<th>Retired</th>
<th>Retired</th>
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<th>Retired</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>117.9</td>
<td>118.7</td>
<td>118.9</td>
<td>7.0</td>
<td>7.8</td>
<td>8.9</td>
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<td>9.6</td>
<td>9.6</td>
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<td>9.6</td>
<td>9.6</td>
<td>9.6</td>
<td>9.6</td>
</tr>
<tr>
<td>Obese</td>
<td>47.5</td>
<td>47.5</td>
<td>47.5</td>
<td>1.9</td>
<td>1.9</td>
<td>1.9</td>
<td>1.9</td>
<td>1.9</td>
<td>1.9</td>
<td>1.9</td>
<td>1.9</td>
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<td>1.9</td>
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</tr>
<tr>
<td>Blood pressure</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
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<td>6.0</td>
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<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Hypertension (HBP)</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
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<td>6.0</td>
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<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Poor Lung function</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
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<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questionnaire (adjusted for age)</th>
<th>Percentage of men with physical measures of ill health at initial screening by employment status at the postal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.4
retired ill men. Adjusting for town and social class did not markedly alter the results.

5.4.4 Weight

Each man was weighed in trousers and socks to the nearest 0.1kg on an MPS110 field survey scale (beam balance), and height was measured without shoes to the nearest millimetre with a Harpenden Stadiometer with digital meter. Body Mass Index (BMI) was calculated as weight/height\(^2\) and used as an index of relative weight. Bray's classification of relative weight (Bray GA, 1978) was used to define men to be underweight if their BMI was less than 20 kg/m\(^2\) and to be obese if their BMI was greater than or equal to 30 kg/m\(^2\).

Overall, 7.9% of men were obese and 3.0% of men were underweight (Table 5.4), with the percentages amongst continuously employed and non-employed men being 7.8% versus 8.1% (obese men) and 2.6% versus 3.9% (underweight men). Amongst non-employed men, unemployed ill and retired ill men were significantly more likely than continuously employed men to be underweight. Adjusting for town and social class did not markedly alter the results. Retired not-ill men were significantly less likely to be obese than continuously employed men. However, this difference was no longer significant when town and social class were adjusted for. (See chapter 8 for more details on body weight and changes in body weight on becoming non-employed).

5.5 EFFECT OF ANTICIPATION OF NON-EMPLOYMENT

Studies have suggested that the time before unemployment actually occurs, but when it is anticipated (for example, the announcement of the future closure of a factory) has an adverse effect on employees' mental health and health-related behaviour (Kasl SV, et al 1972; Jenkins R, et al 1982; Beale N, Nethercott S 1985). It is possible that some men, although they were employed at Initial Screening, may have
been experiencing this 'anticipatory effect' of future unemployment. Employment status is only accurately known at the time of Initial Screening and the Postal Questionnaire. For men who experienced more than one change in employment status, there is no knowledge of the precise dates of these changes. By excluding all of these men and examining the exact duration of the single spell of unemployment of the remaining non-employed men it was possible to identify those men who had definitely experienced no unemployment for at least two years after Initial Screening. It seems reasonable to assume that these men would not have known two years in advance that they were going to become non-employed. Similarly for retired men, the length of retirement was calculated using the man's date of birth and his age at retirement (recorded to the nearest number of years only). All men who had definitely not retired for at least two years after Initial Screening were identified. Again it is probably reasonable to assume that any effects of anticipating retirement would not be apparent two years prior to the event.

The relative odds of different measures of ill health in these men who did not experience any non-employment for at least two years after Initial Screening were calculated. These were compared to the relative odds obtained when all men were included irrespective of when their loss of employment occurred. Due to the smaller sample size, only age is adjusted for. The analyses on this subset of men not only lack statistical power due to the smaller numbers, but they also exclude all discontinuously employed men.

The relative odds of the different health measures are very similar when analysing only men who definitely did not experience any non-employment for two years after screening, compared to all 'stably' employed men (Table 5.5). The same pattern occurs for the different non-employment groups (data not shown). Whilst the table shows that a possible anticipation of non-employment is an unlikely explanation of the raised prevalence of ill health amongst non-employed men, the data were not sufficient to comment on whether anticipation of non-employment
does have an effect on health. In order to do this the exact date of the loss of employment would have to be known.

Table 5.5  Relative odds (95% CI) of measures of ill health compared to a continuously employed man in (a) all non-employed men and (b) non-employed men who did not experience non-employment for at least two years after Initial Screening (adjusted for age).

<table>
<thead>
<tr>
<th>Relative odds of: (Number men)</th>
<th>Employment status at Postal Questionnaire</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Continuously employed (4412)</td>
<td>All non-employed men (1645)</td>
</tr>
<tr>
<td>Symptom of ill health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MI and/or angina (1.00)</td>
<td>1.31*(1.10-1.57)</td>
<td>1.29*(1.02-1.61)</td>
</tr>
<tr>
<td>Wheeze and/or phlegm and/or breathlessness (1.00)</td>
<td>1.54*(1.34-1.76)</td>
<td>1.62*(1.36-1.93)</td>
</tr>
<tr>
<td>Recall of doctor diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two or more diagnosis (1.00)</td>
<td>1.32*(1.16-1.52)</td>
<td>1.32*(1.11-1.57)</td>
</tr>
<tr>
<td>Diagnosis of angina (1.00)</td>
<td>2.03*(1.40-2.96)</td>
<td>2.26*(1.44-3.55)</td>
</tr>
<tr>
<td>Diagnosis of bronchitis (1.00)</td>
<td>1.48*(1.27-1.73)</td>
<td>1.54*(1.26-1.88)</td>
</tr>
<tr>
<td>Medication taken regularly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any medication (1.00)</td>
<td>1.53*(1.34-1.76)</td>
<td>1.52*(1.27-1.81)</td>
</tr>
<tr>
<td>Pain killers (1.00)</td>
<td>1.83*(1.42-2.36)</td>
<td>1.85*(1.35-2.55)</td>
</tr>
<tr>
<td>Physiological measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor lung function (1.00)</td>
<td>1.34*(1.10-1.62)</td>
<td>1.28*(1.01-1.63)</td>
</tr>
<tr>
<td>ECG (IHD) (1.00)</td>
<td>1.13 (0.89-1.43)</td>
<td>1.18 (0.89-1.58)</td>
</tr>
<tr>
<td>Measured high blood pressure</td>
<td>1.24*(1.08-1.42)</td>
<td>1.28*(1.08-1.52)</td>
</tr>
<tr>
<td>Underweight (1.00)</td>
<td>1.51*(1.09-2.11)</td>
<td>1.61*(1.06-2.46)</td>
</tr>
</tbody>
</table>

* : Significantly different from continuously employed men P<0.05
5.6 HEALTH STATUS PRIOR TO NON-EMPLOYMENT

The first part of this chapter has shown that men who subsequently experienced non-employment after Initial Screening were more likely to exhibit evidence of ill health prior to screening. Unemployed ill and retired ill men reported more cardio-respiratory symptoms, were more likely to recall a doctor diagnosis, to be on medication, be underweight and have poor lung function or measured high blood pressure than continuously employed men. Unemployed not-ill men had less evidence of ill health. They were more likely than continuously employed men to report chronic phlegm production or breathlessness, to recall a doctor diagnosis or be on regular medication. The only evidence of discontinuously employed men being less healthier than continuously employed men, was that they were more likely to be on regular medication. Retired not-ill men differed from other non-employed men; they were more healthy than continuously employed men and were less likely to have a doctor diagnosis of arthritis or asthma.

5.7 HEALTH MEASURES ASSOCIATED WITH BECOMING NON-EMPLOYED

In order to examine the question of whether certain types of ill health were more likely to be associated with subsequent non-employment than others a series of logistic models were fitted. Whether the man remained continuously employed or not after Initial Screening was the outcome variable; age (4 categories), town of residence, social class, type of employment (self employed with employees versus the rest), time in longest held job (0-10 years versus >10 years) marital status (married versus not married) and the number of children (<3 versus 3 or more) were covariates (see chapter 4) and single of measures of ill health were the independent variables of interest (Table 5.6).
Table 5.6  Relative odds of experiencing non-employment after Initial Screening by health status at Initial Screening (adjusted for age, town, social class, self employed, time in longest held job, marital status and the number of children).

### Relative odds of experiencing non-employment (95% C.I.)

<table>
<thead>
<tr>
<th>Health measure</th>
<th>Separate logistic regressions</th>
<th>Stepwise logistic reg significant measures simultaneously#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms of ill health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest pain on exertion (angina)</td>
<td>1.53 * (1.20-1.59)</td>
<td></td>
</tr>
<tr>
<td>Severe chest pain (MI)</td>
<td>1.29 * (1.03-1.62)</td>
<td></td>
</tr>
<tr>
<td>Angina and MI</td>
<td>1.80 * (1.18-2.75)</td>
<td></td>
</tr>
<tr>
<td>Angina and/or MI</td>
<td>1.36 * (1.13-1.63)</td>
<td></td>
</tr>
<tr>
<td>Breathlessness</td>
<td>1.86 * (1.46-2.38)</td>
<td>1.45 * (1.12-1.87)</td>
</tr>
<tr>
<td>Chronic phlegm production</td>
<td>1.49 * (1.26-1.77)</td>
<td>1.40 (1.18-1.67)</td>
</tr>
<tr>
<td>Wheeze</td>
<td>1.32 * (1.12-1.55)</td>
<td></td>
</tr>
<tr>
<td>Breathlessness/phlegm/wheeze</td>
<td>1.45 * (1.23-1.63)</td>
<td></td>
</tr>
<tr>
<td>Calf pain</td>
<td>1.43 (1.16-1.75)</td>
<td></td>
</tr>
<tr>
<td>Recall of doctor diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One or more diagnoses</td>
<td>1.36 * (1.19-1.54)</td>
<td></td>
</tr>
<tr>
<td>Two or more diagnoses</td>
<td>1.38 * (1.20-1.58)</td>
<td></td>
</tr>
<tr>
<td>Angina</td>
<td>2.23 * (1.53-3.25)</td>
<td>1.71 * (1.16-2.53)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.73 * (1.04-2.89)</td>
<td></td>
</tr>
<tr>
<td>Heart attack or coronary thrombosis or myocardial infarction</td>
<td>1.58 * (1.09-2.20)</td>
<td></td>
</tr>
<tr>
<td>Bronchitis</td>
<td>1.35 * (1.15-1.59)</td>
<td></td>
</tr>
<tr>
<td>High blood pressure</td>
<td>1.24 (1.03-1.50)</td>
<td></td>
</tr>
<tr>
<td>Other heart trouble</td>
<td>1.20 (0.93-1.54)</td>
<td></td>
</tr>
<tr>
<td>Peptic ulcer</td>
<td>1.18 (0.97-1.43)</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>1.12 (0.80-1.57)</td>
<td></td>
</tr>
<tr>
<td>Gout</td>
<td>1.06 (0.71-1.59)</td>
<td></td>
</tr>
<tr>
<td>Arthritis</td>
<td>0.99 (0.80-1.22)</td>
<td></td>
</tr>
<tr>
<td>Gall bladder disease</td>
<td>0.80 (0.48-1.34)</td>
<td></td>
</tr>
<tr>
<td>Medication taken regularly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any medication</td>
<td>1.58 * (1.38-1.82)</td>
<td>1.42 * (1.23-1.64)</td>
</tr>
<tr>
<td>Pain killers</td>
<td>1.83 * (1.41-2.36)</td>
<td></td>
</tr>
<tr>
<td>Tranquillizers</td>
<td>1.60 * (1.26-2.04)</td>
<td></td>
</tr>
<tr>
<td>Antihypertensive drugs</td>
<td>1.38 (1.04-1.85)</td>
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<tr>
<td>Physiological measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>1.43 * (1.02-2.02)</td>
<td></td>
</tr>
<tr>
<td>Poor lung function</td>
<td>1.31 * (1.08-1.59)</td>
<td></td>
</tr>
<tr>
<td>High blood pressure</td>
<td>1.20 * (1.05-1.38)</td>
<td>1.20 * (1.04-1.38)</td>
</tr>
<tr>
<td>ECG (IHD)</td>
<td>1.18 (0.93-1.49)</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>0.99 (0.80-1.24)</td>
<td></td>
</tr>
</tbody>
</table>

# : Excluding symptom of calf pain as there was no data for this from three town and large numbers of missing values would result.

*: Significantly different from 1.00 : P < 0.05
5.7.1 Symptoms of ill health
Each individual symptom was associated with an increased odds of experiencing some non-employment after Initial Screening. The relative odds were highest for those men reporting breathlessness (OR=1.86; 95% CI: 1.46-2.38). Reporting both symptoms of chest pain on exercise (angina) and severe chest pain (possible MI) was associated with higher relative odds of non-employment than reporting only one of these symptoms.

5.7.2 Recall of doctor diagnosis
Recalling one or more diagnoses was associated with an increased odds of experiencing non-employment after screening (OR=1.36; 95% CI: 1.19-1.54). The odds were not further increased by recalling more than 1 diagnosis (OR=1.38; 95% CI: 1.20-1.58). Recalling a diagnosis of angina was associated with the highest relative odds (OR=2.23; 95% CI: 1.53-3.25). Also recalling a diagnosis of diabetes (OR=1.73), bronchitis (OR=1.35) or myocardial infarction (OR=1.55) were associated with increased odds of non-employment.

5.7.3 Medication taken regularly
Taking any medication, tranquillizers, pain killers or anti-hypertensive medication were associated with increased odds of non-employment. Taking pain killers was associated with the highest relative odds (OR=1.83; 95% CI:1.41-2.36).

5.7.4 Physiological measures
Poor lung function (OR=1.31), measured high blood pressure (OR=1.20) or being underweight (OR=1.43) were associated with increased odds of experiencing non-employment. Interestingly ECG evidence of Ischaemic Heart Disease was not associated with an increased odds of non-employment (OR=1.18; 95% CI:0.93-1.49).

5.7.5 Comparison of health measures
A stepwise logistic regression was carried out, entering all the measures of ill health simultaneously to determine the relative importance of the different measurements.
A final model containing only those measures that were significantly and independently associated with employment status was obtained (last column; Table 5.6). Recalling a doctor diagnosis of angina, reporting symptoms of chronic phlegm production or breathlessness, having measured high blood pressure and being on any regular medication were all independently associated with an increased risk of becoming non-employed. Recalling a doctor diagnosis of angina had the highest relative odds (OR=1.71; 95% CI:1.16-2.53). Note that the symptom of calf pain was excluded from this overall analysis due to the large number of missing values (747).

5.7.6 Health measures and types of non-employment

In order to examine the question of whether certain types of ill health were more likely to be associated with different types of non-employment a series of nominal polytomous regression models were fitted. The type of non-employment experienced after Initial Screening as opposed to remaining continuously employed was the outcome variable; the same covariates as in sections 5.7.1-5.7.4 were included and the single of measures of ill health shown to be most associated with non-employment were the independent variables of interest (Table 5.7).

All the relative odds in Table 5.7 are greater than 1.0, probably reflecting the fact that the measures of ill health examined were selected on the basis that they were associated with the highest odds of non-employment. As expected, the presence of any of the measures of ill health increased the odds of becoming unemployed ill or retired ill more than experiencing any other type of non-employment. Of interest, is the fact that, the presence of chronic phlegm production, breathlessness, recall of a doctor diagnosis of angina or being on regular medical treatment were all associated with significantly increased odds of becoming unemployed amongst men who stated their unemployment was not due to illness. The odds of becoming retired not-ill were not significantly raised for any of the measures of ill health.
<table>
<thead>
<tr>
<th>Symptom of III Health</th>
<th>Rel. Odds (95% CI)</th>
<th>118 (0.93-1.49)</th>
<th>1.38 (1.01-1.87)</th>
<th>1.15 (0.90-1.46)</th>
<th>1.79 (1.23-2.59)</th>
<th>1.07 (0.85-1.35)</th>
<th>P &lt; 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blood pressure measured high</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physiological Measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any medication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medication Taken Regularly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diagnosis of Asthma</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recall of Doctor Diagnosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bronchitisness of diagnosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>IV Health Measure</th>
<th>IV Health Measure RII</th>
<th>IV Health Measure III</th>
<th>IV Health Measure IV</th>
<th>IV Health Measure V</th>
<th>IV Health Measure VI</th>
<th>IV Health Measure VII</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>

*Significantly different than comparison group (P < 0.05)
5.7.7 Ill health and social class

It might be expected that ill health was associated with a greater increase in the odds of becoming non-employed for men in manual occupations than for men in non-manual occupations. This was investigated by fitting similar logistic regression models as in section 5.7.1-5.7.4, with dummy variables for manual work or not and an interaction term for the measure of ill health in manual workers instead of the dummy variables for social class. Men who were members of the armed forces were excluded from this analysis. Surprisingly, there was no evidence to indicate that ill health was a greater risk factor for non-employment in manual occupations than for non-manual occupations.

Table 5.8 Relative odds of experiencing non-employment after Initial Screening by health status and social class at Initial Screening (adjusted for age, town, time in longest held job, marital status and the number of children).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptoms of ill health</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breathlessness</td>
<td>2.00* (1.27-3.15)</td>
<td>1.82* (1.36-2.44)</td>
<td>1.10 (0.64-1.89)</td>
</tr>
<tr>
<td>Chronic phlegm production</td>
<td>1.56 (1.15-2.12)</td>
<td>1.48 (1.20-1.81)</td>
<td>1.06 (0.73-1.53)</td>
</tr>
<tr>
<td><strong>Recall of doctor diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosis of angina</td>
<td>2.53* (1.42-4.49)</td>
<td>2.09* (1.26-3.46)</td>
<td>1.21 (0.56-2.60)</td>
</tr>
<tr>
<td><strong>Medication taken regularly</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any medication</td>
<td>1.58* (1.27-1.98)</td>
<td>1.56* (1.30-1.87)</td>
<td>1.01 (0.76-1.35)</td>
</tr>
<tr>
<td><strong>Physiological measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured high blood pressure</td>
<td>1.40* (1.11-1.75)</td>
<td>1.15 (0.96-1.37)</td>
<td>1.21 (0.91-1.61)</td>
</tr>
</tbody>
</table>

\* : Significantly different than continuously employed man (P<0.05).
5.8 HEALTH STATUS PRIOR TO NON-EMPLOYMENT: OTHER STUDIES

Few studies have taken any measurements of health status prior to non-employment occurring. A study based on only 30 men and their controls found that psychological and physical function did not differ between men who subsequently became unemployed and an equal number matched for age and sex who remained employed (Linn MW, et al 1985). This study clearly lacked power to detect any differences. In the United Kingdom National Training Survey of 17708 men in the labour force between 1965-75, previous sickness spells did not directly affect the probability of future unemployment spells (Narendranathan W, et al 1985). However, as already discussed in chapter 2, only men who remained in the labour force for the full ten years (a healthy group) were included in the analyses. A study of 677 Danish bricklayers found that admission to a hospital increased the odds of unemployment (Lajer M 1982). This result cannot be generalised to other more permanent and less physical types of employment.

People who retire early are a heterogeneous group. Manual workers who retire early are more likely to state ill health as the major reason (Lackzo F, et al 1988; Parnes HS, Nestel G 1981). In 1961, 391 male employees (mainly manual workers) in a Swedish pulp and paper company were examined and followed up for 22 years (Astrand NE, Isacsson SO 1988). Reported back pain and abnormalities of the back as judged by a doctor were both found to be predictive of early retirement. In a study of non-manual workers (in this case male managers) prior to retirement, the health status of the men who retired did not differ significantly from those who remained employed (Vallery-Masson J, et al 1981).

5.9 DISCUSSION

The BRHS data demonstrate that unemployed men were less healthy than employed men prior to their unemployment occurring, even amongst those men who did not
give illness as a reason for their unemployment. This increased prevalence of ill health cannot be explained by the effect of any 'anticipation' of unemployment. There was a clear difference between those who retired not due to illness and other non-employed men; retired not-ill men were healthier than continuously employed men.

Previous analyses of this cohort have found that men reporting symptoms of breathlessness had a greater than two-fold risk of suffering a major ischaemic heart disease (IHD) event compared to men not doing so (Cook DG, Shaper AG 1988); men reporting symptoms of angina had a greater than three-fold risk of having a heart attack (fatal or non-fatal) (Cook DG, et al 1989) and underweight men had the highest mortality from non-cardiovascular causes, in particular lung cancer and respiratory disease (Wannamethee G, Shaper AG 1990). High blood pressure, recall of a diagnosis of ischaemic heart disease or diabetes and electrocardiographic evidence of ischaemic heart disease are all associated with an increased risk of ischaemic heart disease (Shaper AG, et al 1986) and high blood pressure is a risk factor for strokes (Shaper AG, et al 1991). On the basis of their health status and levels of smoking and drinking (see Chapter 8) prior to the non-employment occurring, these unemployed men would be expected to have a higher mortality rate, particularly from cardiovascular diseases and lung cancer. This is indeed what is observed in census-based longitudinal studies which analyse mortality rates in a cohort of men unemployed during a particular time period, over a follow-up of at least five years (see Table 2.2).

Recalling a doctor diagnosis of angina, reporting symptoms of chronic phlegm production or breathlessness, having measured high blood pressure and being on any regular medication all increased the odds of becoming non-employed even after adjusting for age, town, social class and other socio-economic variable found to be associated with increased odds of non-employment. This is consistent with several cross-sectional studies that have observed that unemployed men take more medication than employed men (General Household Surveys, Martikainen PT 1990);
have higher blood pressure (D'Arcy C 1986; Iversen L, Sabroe S 1987); report more
doctor diagnosed chest pain (D'Arcy C 1986; Iversen L, Sabroe C 1987) and report
more symptoms of bronchitis/ breathlessness or wheeze (Grayson JP 1989; Iversen
L, Sabroe S 1987).

Several studies have observed that health status is a strong predictor of how long
the period of unemployment lasts (Colledge M, Bartholomew R 1980; Moylan S, et
al 1982; Grayson JP, 1985). In an analysis of the health of a sample of people who
were all unemployed at one particular point in time, the sample will be weighted
towards those that are unemployed for longer, perhaps due to illness. The definition
of unemployment in this thesis is any unemployment occurring in 5 years.
Therefore the BRHS sample of unemployed men might be expected to be more
healthy than unemployed men in other studies, where unemployment is based on
a short period of time (for example, a week).

There was no evidence to suggest that ill health was associated with higher odds
of non-employment in manual than in non-manual workers. However, this is a
population of middle-aged men. Ill health may be a greater risk factor for non-
employment amongst manual compared to non-manual workers, when comparing
younger men doing more strenuous manual work. What this does indicate is that
illness increases the odds of becoming non-employed equally in both manual and
non-manual middle aged men. This suggests that the greater tendency of manual
workers to state that their non-employment is due to illness (S Arber, 1987), can
be explained by the higher prevalence of ill health amongst manual workers.

5.10 CONCLUSIONS : HEALTH STATUS PRIOR TO NON-EMPLOYMENT

Men who later became non-employed due to ill health showed evidence of ill
health at screening across all the different measures. They were more likely to
report having the different symptoms of ill health, to record having a doctors
diagnosis of different conditions, to be taking various medication, to have high blood pressure and be underweight. They also appeared to be more likely to have evidence of ischaemic heart disease (from an ECG) and to have poor lung function.

**Unemployed not-ill** and **discontinuously employed** men appeared to have some evidence of ill health on some of the measures; they were significantly more likely to recall at least one doctor diagnosis, to be on medication, to be breathless or to have chronic phlegm production than continuously employed men.

In contrast **retired not-ill** men did not appear to have any evidence of ill-health. On some measures they appeared more healthy than continuously employed men; they were less likely to recall a diagnosis of asthma or arthritis, to be on anti-hypertensive medication or to be obese.

In the logistic regression models used to predict non-employment, reporting symptoms of chronic phlegm production or breathlessness, recalling a doctor diagnosis of angina, being on regular medication or having measured high blood pressure were all independently associated with an increased risk of becoming non-employed. This occurred also amongst men who stated their unemployment was not due to illness, even after adjusting for a range of socio-economic variables. The increased risk of non-employment associated with ill health was similar in manual and non-manual workers.
CHAPTER 6

GENERAL PRACTICE CONSULTATION RATES

SUMMARY

The general practice consultation rate data consist of the number of times men in the BRHS visited their general practitioner in each year for eight consecutive calendar years (Year 1 - Year 8). The BRHS data differ from other published consultation rate data, with fewer non-consulters and fewer very high consulters. These differences may be due to different definitions of a consultation rather than due to the sample selection. However, this is not the issue here, as the data are going to be used to compare the employment groups within the study and the definition is consistent within the study.

Due to the distribution of consultation rates in any Year being highly skewed, the following method of analysing consultation rates in this thesis was derived in Appendix H:

For each Year men are classified into consultation rate groups according to their number of consultations in that Year:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Consultations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-consulters</td>
<td>0 consultations</td>
</tr>
<tr>
<td>Occasional consulters</td>
<td>1 consultation</td>
</tr>
<tr>
<td>Low consulters</td>
<td>2 or 3 consultations</td>
</tr>
<tr>
<td>Medium consulters</td>
<td>4 to 7 consultations</td>
</tr>
<tr>
<td>High consulters</td>
<td>More than 7 consultations</td>
</tr>
</tbody>
</table>

The probability of being in a particular category is modelled in the rest of the thesis using partial proportional ordered polytomous regression models.
6.1 INTRODUCTION

The general practice consultation rate data consist of the number of times men in the BRHS consulted their general practitioner in each year for eight consecutive calendar years (Year 1 - Year 8). A consultation was defined as any recording in the patients medical notes with a date. Figure 6.1 shows the distribution of the consultation rates in each Year for 7010 men with complete data. The distribution is similar in each Year, with the number of men not consulting in any Year falling over Years 1-8 from 49% to 28%. In each Year there are a few men who consulted more than 30 times.

Figure 6.1 The number of consultations per annum for 7010 men in the 8 Years of the study.
In this chapter, the representativeness of the study population of middle-aged men in Great Britain is evaluated. The data are then compared to data from other published sources. Standard parametric methods of analysis are not applicable in the analysis of the consultation rate data due to the skewness of the distribution of annual consultation rates (Figure 6.1). Appendix H reviews published methods of analysing consultation rate data and derives a method of analysing consultation rates. The final part of this chapter outlines this method.

6.2 REPRESENTATIVENESS OF THE GP CONSULTATION RATE DATA

6.2.1 Representativeness of the BRHS sample
The aim of The British Regional Heart Study (BRHS) was to investigate the large geographical variations in cardiovascular disease in Great Britain. Therefore the aim of the sampling was to get a representative sample of the full range of cardiovascular mortality in Britain, which means that in some respects the sample is not representative of the British population. The sources of bias and their possible effects on the consultation rate data are summarised in Table 6.1. The towns selected excluded both rural and metropolitan areas. Men in urban areas are more likely to consult their GPs (Balarajan R, et al 1987; National Morbidity Studies, 1971;1981). In the BRHS, towns with noticeable population movement were also excluded. People in a new town are said to be more likely to consult their doctor (Bain DJ, Philip AE 1975; Goodman M, Crombie DL 1982 ), however, this may be due to inaccuracies in the population denominators (Cobb JS, et al 1983).

In order to achieve a high response rate, good follow-up and administrative convenience, subjects were selected from one general practice in each town. (Shrewsbury is the exception). The practices had to have two or more general practitioners and practice populations over 7500. Consultation rates have been found to decrease with increasing average list size (Wilkin D, Metcalfe DH 1984; Crombie DL 1984). Consultation rates were also found to be highest for practices where
### Table 6.1 Sources of bias and the possible effects on the British Regional Heart Study general practice consultation rate data

<table>
<thead>
<tr>
<th>Factors causing undersampling of low consulters</th>
<th>Factors causing bias but the effect is uncertain</th>
<th>Factors causing undersampling of high consulters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excluding Rural Areas</td>
<td>Including Volunteer Practices with 2 or more GPs and list sizes of over 7500 only.</td>
<td>Excluding Metropolitan Conurbations.</td>
</tr>
<tr>
<td>Sampling from General Practice Registers.</td>
<td>Totally missing consultation rate data.</td>
<td>Excluding Towns with high population movement.</td>
</tr>
<tr>
<td></td>
<td>Non-responders in the BRHS study.</td>
<td>Excluding Men who could not participate in the BRHS survey due to severe mental or physical disability.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excluding men who died before the end of the 8 year follow-up period.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Partially missing consultation rate data.</td>
</tr>
</tbody>
</table>

there was only one doctor, lowest for practices with two doctors and the rates for practices with more doctors lay in the middle (Crombie DL 1984).

Once a practice had agreed to participate about 450 men aged 40-59 were randomly selected. The doctors were then asked to exclude any men whom they considered could not participate because of severe mental or physical disability. The number of these exclusions was about six to ten per practice. These men are likely to have been frequent consulters, but due to the very small numbers, the bias should not be marked.

The remaining men were invited to participate in the study and on average the response rate was 78%. The non-responders included those who refused or who failed to reply to the invitation and one reminder, and those who did not receive an invitation because a current address was unobtainable.
In the first three years of follow-up, the total mortality rate for non-responders was significantly higher than that of the participants, but thereafter it was similar (Walker M, et al 1987). This suggests that initial differences in health were 'wearing off' over time, and that any effects of healthy selection at Initial Screening will have largely worn off in the later years of the study.

6.2.2 Sampling from General Practice registers
One problem in calculating consultation rates from GP registers, is that the denominator is the number of patients on each doctor's list. This does not always reflect the true number of patients at risk; it tends to be an over-estimate due to people moving and not notifying the GP until they register with a new GP. Also there are men in the population who have not registered with a General Practitioner at all. For the BRHS data, men who have moved from the practice and not informed the GP will be included in the 22% initial non-responders. Therefore this would cause the average consultation rate to be slightly higher for the BRHS than for the National Morbidity Studies (GP based studies), as the denominator is likely to be more accurate.

6.2.3 Deaths before the end of the 8 year follow-up period
The GP notes were not available for any of the 545 men who died before the end of the eight year follow-up period. These men are likely to have consulted the GP more often than those men still surviving. The number of consultations per annum for the eight Years is available for 153 men who died in the two years after the eight year period (Table 6.2). These 153 men had much higher consultation rates than the cohort as a whole. The effect of excluding these men is small (Table 6.2(c)), reducing the average consultation rate by 0.04 consultations per annum, increasing the percentage of non-consulters by 0.2% and decreasing the number of men consulting more than 7 times by 0.3%. This is an overestimate of the magnitude of the effect of not having data for those men who died before the end of Year 8, since the effect will decrease with increasing time between Year of consultation and death.
Table 6.2 Distribution of number of consultations per annum in Years 7 and 8 for men with complete consultation rate data (a) All men; (b) Men who died Years 9 and 10; (c) Men alive in Years 9 and 10; and Men with incomplete data.

<table>
<thead>
<tr>
<th>No Consultations per annum in Years 7 &amp; 8</th>
<th>Men with Complete data</th>
<th>Men with incomplete data</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) All Men</td>
<td>(b) Men dead in Years 9-10</td>
<td>(c) Men alive in Years 9-10</td>
</tr>
<tr>
<td>Total (No. of Men)</td>
<td>100 (n=7010)</td>
<td>100 (n=6857)</td>
</tr>
<tr>
<td>0</td>
<td>29.7</td>
<td>19.3</td>
</tr>
<tr>
<td>1</td>
<td>17.7</td>
<td>13.7</td>
</tr>
<tr>
<td>2-3</td>
<td>22.6</td>
<td>18.3</td>
</tr>
<tr>
<td>4-7</td>
<td>19.8</td>
<td>23.9</td>
</tr>
<tr>
<td>8+</td>
<td>10.1</td>
<td>24.8</td>
</tr>
<tr>
<td>Average No Consultations</td>
<td>2.90</td>
<td>4.82</td>
</tr>
</tbody>
</table>

6.2.4 Partially completed data

It was decided to exclude from analysis 69 men for whom complete data for all 8 Years were not available. Of these men, 92% had moved from their original study practice and generally data were incomplete for the earlier Years (67 men had complete data in Year 8). By comparing their consultation rates in Years 7 and 8 with the rates in those Years for the men with complete data, an idea of any possible bias can be obtained (Table 6.2). The men with incomplete data appear to consult slightly more, but as there are only 69 such men, the bias caused by excluding them will have only a small effect. Though of course, these men may have differed more in earlier Years.

6.2.5 Totally missing data on alive men

Some men had no consultation rates recorded for any of the eight Years, due to the following reasons:
1. The man emigrated permanently (There are a few men who emigrated for a few years and then returned on whom we have incomplete data) : 51 men.
2. The forms were incorrectly completed (Generally the number of consultations per year was not filled in at all) : 59 men.
3. It was not possible to trace the man : 6 men.

Based on data at Initial Screening, these men do not seem to be different from the men with complete data, except for the fact that they were more likely to have moved from the original study practice (Over 70% had moved compared with only 12% of the men with complete data). The most likely reason for the lack of data is that their new General Practitioner did not complete the form.

6.3 COMPARISON OF THE DATA WITH OTHER PUBLISHED DATA

The majority of information about people's consulting behaviour in Great Britain comes from two different sources: the Royal College of General Practitioners Morbidity statistics from general practice, referred to as the National Morbidity Studies (NMS) and the annual General Household Surveys (GHS).

The National Morbidity Studies are based on volunteer practices in England and Wales, who record all FACE TO FACE contacts with patients, and classify them according to morbidity, for one year. The Second National Morbidity study (NMSII) was based on 60 volunteer practices, involving 115 GPs, for the year from 1 July 1970. The Third National Morbidity study (NMSIII) was based on 48 volunteer practices, involving 143 GPs, for the year from 1 July 1980. For NMSIII, morbidity recorded for 80 per cent of patients in a sub-sample of 25 of the practices was linked with information obtained from their 1981 census records. These 25 practices were not representative of all general practices in England and Wales. A sample of NMSII was also linked in a similar manner to the 1971 census.
The General Household Surveys are annual population-based surveys in Great Britain, with about 25 000 to 30 000 respondents each year being asked if they had consulted a GP in the last 14 days (telephone consultations are included) and if so how many times. The average number of consultations per annum is calculated by multiplying the total number of consultations in the last 14 days for all respondents by 26 and dividing by the number of respondents.

6.3.1 Average consultation rates

The majority of data on GP consultation rates are presented in the form of the average number of consultations per annum, often only to the nearest integer. The average number of consultations per annum for the BRHS men is lower than that for men aged 45-64 in the General Household Survey (the average of 1978-1987) and the National Morbidity Study (1981/2) (Table 6.3). The BRHS men were aged 40-60 at the start, but by the end of the 8 years they were 48-68, so the groups have a similar age structure. For comparative purposes the average for Years 7 and 8 is also given. This is to reduce the possible 'healthy participant effect', which is assumed to have worn off by then (Walker M, et al 1987). The increase in the average consultation rate is also partly due to the aging of the cohort.

Table 6.3  Average Number of GP consultations per annum in the BRHS, the General Household Surveys (GHS) (1978-87) and the third National Morbidity Study (NMSIII) (1981/2)

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Average Years 1 to 8 (men aged 40-68)</th>
<th>Average Years 7 and 8 (men aged 47-68)</th>
<th>GHS * (men aged 45-64)</th>
<th>NMSIII (men aged 45-64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRHS</td>
<td>2.50</td>
<td>2.90</td>
<td>4</td>
<td>3.05</td>
</tr>
</tbody>
</table>

* The GHS gives the average no. of consultations per year to the nearest integer. This is 4 for the years 1978-1987
6.3.2 Frequency of consultations per annum

The mean is not a good summary statistic, due to the distribution of consultation rates being extremely skew (see Figure 6.1 and Cook DG, et al 1990). It is therefore difficult to quantify the differences in the BRHS data from the other data sources in Table 6.3. The distribution of the number of consultations in Year 8 of the BRHS study (when the men were aged 48-67) is compared to the distribution of the annual number of consultations of men aged 45-64 in the NMS III (Figure 6.2). Whilst the shape of the distributions are similar, the BRHS data has fewer men never visiting the GP, more men visiting the GP 1 - 10 times per year and less visiting more than 10 times per year. This might be due to biases in either set of data or to the different definitions of a consultation.

Figure 6.2 Comparison of frequency of consultations in the BRHS Data (Year 8, men aged 48-68) and the Third National Morbidity Study (NMSIII) (1981-82, men aged 45-64)
6.3.3 Average consultation rates by marital status
A further method of validating the BRHS consultation rate data is to determine if factors affecting the consultation rates in other data sets have the same effect in the BRHS data. The NMSIII linked with the 1981 Census showed that married, widowed or divorced men are more likely to consult their general practitioner than single men. The same trend is observed in the BRHS data. Direct comparisons of the association between marital status and consultation rates in the two data sets are difficult due to the data in the NMSIII being quoted in the form of 'standardised patient consultation ratios'.

6.3.4 Average consultation rates by social class
The General Household Survey found a trend of increasing consultation rate from social class I to social class V, which is also observed in the BRHS data, although it is more pronounced in the GHS data (Table 6.4). For comparative purposes the percentages in Years 7 and 8 only are also given to reduce the possible 'healthy participant effect', which is assumed to have worn off by then. The same trend of increasing consultation rate from social class I to social class V is observed in the NMSIII data linked to the 1981 Census.

6.3.5 Conclusions on the comparison of the BRHS data with other sources
It is difficult to compare consultation rates in the BRHS with those in the General Household Surveys and the National Morbidity Studies, due to all three sources using different definitions of what a 'consultation' is. The average number of consultations per annum is not an appropriate way of summarising the data and so it is difficult to compare the BRHS data to other sources of data quoting just the average number of consultations per annum. The tendency of single men to consult less observed in the NMSIII is present in the BRHS data. Also the trend of increasing consultation rate with decreasing socio-economic group observed in the General Household Surveys and the National Morbidity Studies is present in the BRHS data. This implies that the BRHS data is internally consistent, and therefore any association between employment status and consultation rates would be expected
to be reflected accurately in the data.

Table 6.4 

<table>
<thead>
<tr>
<th>Social Class</th>
<th>BRHS Data</th>
<th>GHS Data*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Years 1-8</td>
<td>Years 7 &amp; 8</td>
</tr>
<tr>
<td>All Men</td>
<td>2.5</td>
<td>2.9</td>
</tr>
<tr>
<td>I</td>
<td>2.0</td>
<td>2.2</td>
</tr>
<tr>
<td>II</td>
<td>2.2</td>
<td>2.5</td>
</tr>
<tr>
<td>III-NM</td>
<td>2.4</td>
<td>2.8</td>
</tr>
<tr>
<td>III-M</td>
<td>2.7</td>
<td>3.1</td>
</tr>
<tr>
<td>IV</td>
<td>2.7</td>
<td>2.9</td>
</tr>
<tr>
<td>V</td>
<td>2.9</td>
<td>3.4</td>
</tr>
</tbody>
</table>

* : The GHS Data is the average of the mean number of consultations per year by social class from 1978-1987.

6.4 ANALYSING GENERAL PRACTICE CONSULTATION RATES

The non-normality of the distribution of consultation rates (see Figures 6.1 and 6.2) has resulted in a variety of methods of analysing consultation rates, highly dependent on the objectives of the study and the way in which the data was collected. In Appendix H previous methods of analysis are reviewed and found wanting. The following method of analysing consultation rates in this thesis is derived in Appendix H:
For each Year men are classified into consultation rate groups according to their number of consultations in that Year:

- Non-consulters: 0 consultations
- Occasional consulters: 1 consultation
- Low consulters: 2 or 3 consultations
- Medium consulters: 4 to 7 consultations
- High consulters: More than 7 consultations

These categories have been derived by examining statistical properties of the data rather than arbitrarily categorising the data. The categorisation has the advantage that it will allow non-consulters in particular to be examined as well as preserving some information on high consulters.

In all cross-sectional analyses the association between different factors and consultation rates will be determined by fitting partial proportional ordered polytomous regression models, checking the proportionality assumption for the highest consulters.

6.5 CONCLUSIONS

The BRHS data differ from other published consultation rate data, with fewer non-consulters and fewer very high consulters. These differences may be due to different definitions of a consultation rather than due to the sample selection. However, this is not the issue here, as the data is going to be used to compare the employment groups within the study. Examination of the association of other factors with consultation rates has shown the data to be internally consistent.
CHAPTER 7

LOSS OF EMPLOYMENT AND CHANGES IN GENERAL PRACTICE
CONSULTATION RATES

SUMMARY

Prior to any non-employment occurring, men who subsequently experienced non-employment were likely to consult their general practitioners more frequently than men who remained continuously employed. These results are consistent with the greater prevalence of ill health amongst non-employed men prior to their non-employment occurring (Chapter 5). Men who retired for reasons other than illness were the exceptions to this; they appeared healthier than continuously employed men and did not have high consultation rates prior to their retirement.

Men who later became non-employed due to ill health showed a marked increase in consultation rates on becoming non-employed. Men who retired for reasons other than illness increased their consultation rates to a lesser extent on retiring. Men who stated their unemployment was not due to ill-health did not reduce their consultation rates as much as continuously employed men consulting at the same initial level did.
7.1 INTRODUCTION

The aim of this chapter is to determine if non-employed men consulted their General Practitioners more frequently than employed men, and if so whether this occurred on becoming non-employed, or whether such differences were present prior to the non-employment period. Due to non-employed men being older than continuously employed men, all the percentages quoted in this chapter are adjusted for age.

7.2 DATA ON GP CONSULTATION RATES

Data were available on 5767 of the 6057 'stably' employed men; 186 men had died between the Postal Questionnaire and the end of the 8th year of follow-up, 15 men had emigrated during this time period, 4 men could not be traced and there were missing or incomplete data on the remaining 85 men.

7.3 CROSS-SECTIONAL ANALYSIS OF GP CONSULTATION RATES AND EMPLOYMENT STATUS

Consultation rates in the first year of the consultation rate data (Year 1) are assumed to correspond to a time prior to non-employment occurring and to be unaffected by a man's subsequent employment experiences. Consultation rates in the fifth year of the consultation rate data (Year 5) are assumed to be most affected by a man's employment status at the time of the Postal Questionnaire. To detect
the effects of periods of non-employment between Initial Screening and the Postal Questionnaire the maximum consultation rate over Years 2 to 5 is analysed. Also consultation rates in each of the eight years are presented to demonstrate the overall consistency in the levels of consultations amongst the employment groups. There are several problems with the assumptions implicit in this approach which will be discussed in the following sections.

7.3.1 Assumption that Year 1 of the consultation rate data corresponds to a time when all men were ‘stably’ employed.

Due to the linking of data from different sources, there may be some men who were not ‘stably’ employed throughout Year 1 of the consultation rate data. This is due to the consultation rate data having been collected on a calendar year basis, whereas Initial Screening occurred throughout the year. Employment status is only accurately known at Initial Screening and at the time of the Postal Questionnaire, with no knowledge of the precise dates of change in employment status between the two.

Table 3.9 in Chapter 3 (The British Regional Heart Study Methodology) showed that for the majority of men Initial Screening took place during the first half of Year 1 of the consultation rate data. For unemployed men at the Postal Questionnaire who had not experienced any previous episodes of unemployment between Initial Screening and the Postal Questionnaire, the date of the start of the unemployment could be determined from their answer to the length of their current spell of unemployment at the Postal Questionnaire. However, if they had experienced several spells of unemployment and re-employment, there was no way of determining if any such spells occurred after Initial Screening, but still during Year 1 of the consultation rate data. By excluding all men who stated that they had experienced more than one spell of unemployment between Initial Screening and the Postal Questionnaire and by examining the exact duration of the single spell of unemployment of the remaining unemployed men it was possible to identify those men who had definitely experienced no unemployment in Year 1. Similarly for
retired men, the length of retirement was calculated using the man's date of birth and his age at retirement (recorded to the nearest number of years only). Therefore all men who stated that they had been retired for more than four years might have been retired during some period covered by Year 1 of the consultation rate data, despite being employed at the time of Initial Screening. These men were identified. Table 7.1 shows the numbers of men definitely employed throughout Year 1. All discontinuously employed men are excluded due to the uncertainty of the timing of their unemployment. To gain an indication of the possible effects of including men who were not strictly 'stably' employed throughout Year 1, all analyses in this chapter are redone on the subset of 'definitely employed men' in Year 1. These analyses lack statistical power and exclude all discontinuously employed men.

Table 7.1 Number of 'stably' employed men at Initial Screening, who definitely did not experience any non-employment in Years 1, 1-2 and 1-3 of the consultation rate data (row %)

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>Total No. of Men (%)</th>
<th>No of Men Definitely Employed in Years:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>All Men</td>
<td>5767 (100)</td>
<td>5166 (89.6)</td>
</tr>
<tr>
<td>Continuously Employed</td>
<td>4260 (100)</td>
<td>4260 (100)</td>
</tr>
<tr>
<td>All Non-Continuously Employed</td>
<td>1507 (100)</td>
<td>906 (60.1)</td>
</tr>
<tr>
<td>Discontinuously Employed</td>
<td>429 (100)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Unemployed Not-ill</td>
<td>111 (100)</td>
<td>79 (71.2)</td>
</tr>
<tr>
<td>Unemployed Not-ill</td>
<td>349 (100)</td>
<td>271 (77.7)</td>
</tr>
<tr>
<td>Retired Not-ill</td>
<td>180 (100)</td>
<td>161 (89.4)</td>
</tr>
<tr>
<td>Retired Not-ill</td>
<td>438 (100)</td>
<td>395 (90.2)</td>
</tr>
</tbody>
</table>
7.3.2 Assumption that the consultation rates in Year 1 of the consultation rate data are unaffected by a man's subsequent employment experiences.

Studies have shown that the time before unemployment actually occurs, but when it is anticipated (for example the announcement of the future closure of a factory) is the time when GP consultation rates are likely to increase (Beale N, Nethercott S 1985; Jacobsen K 1975). Some men, although they were employed throughout Year 1 of the consultation rate data, may have been experiencing this anticipatory effect. There was no information on when a man became aware that he was going to become unemployed or about the stability of his employment. However, using the same procedure as in 7.3.1, it was possible to identify two further subsets of men; those men who were definitely employed throughout Years 1 and 2 of the consultation rate data, ie their non-employment did not occur until at least the end of the second year of the consultation rate data, and those men whose non-employment did not occur until at least the end of the third year of the consultation rate data (Table 7.1).

It seems reasonable to assume that these men would not have known in Year 1 (i.e. two or three years in advance) that they were going to become non-employed. Similarly for retired men, although they might have planned their early retirement, it is probably reasonable to assume that the anticipatory effects will not start occurring more than 2 years prior to the event. To gain an estimate of any possible anticipation effect these subsets of data are analysed.

7.3.3 Assumption that consultation rates in Year 5 of the consultation rate data are the most affected by a man's employment status at the time of the Postal Questionnaire.

No information was available on the employment status of a man after the Postal Questionnaire was completed. Table 3.9 in Chapter 3 (The British Regional Heart Study Methodology) showed that for the majority of men the sixth year of the consultation rate data (Year 6) covered a longer period after the Postal Questionnaire than before the Postal Questionnaire. Therefore for the majority of
men their employment status during the majority of Year 6 was unknown. In particular some continuously employed men, used as the control group in the analyses, might have become non-employed during this year. In the six months prior to the Postal Questionnaire, of 4540 continuously employed men 380 (6%) became non-employed for the first time. Also 5% of the cohort will reach 65 in each year after the Postal Questionnaire, of whom about 30% were continuously employed in the year prior to the Postal Questionnaire. Therefore as a rough guide it might be expected that over each subsequent year a further 14% (2 X 6% + 0.3 X 5%) of continuously employed men would stop being continuously employed.

For unemployed men at the Postal Questionnaire, a lower bound on the amount of unemployment experienced in Year 5 and Year 6 was obtained by using the length of current spell of unemployment and the month that they were screened in. There was more known unemployment occurring in Year 5 than Year 6 (Table 7.2). By assuming that all unemployed men were in the middle of their current period of unemployment, an estimate of the 'likely' amount of unemployment in Year 6 was obtained. Note that the amount of known unemployment in Year 5 is an underestimate of the amount of unemployment occurring in Year 5 as it ignores any previous spells of unemployment which may have occurred during this time.

Table 7.2 Average number of months of unemployment occurring in Year 5 and Year 6 of the consultation rate data for men 'stably' employed at Initial Screening.

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>In Year 5</th>
<th>In Year 6</th>
<th>Estimated Unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Known</td>
<td>Known</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unemployment</td>
<td>Unemployment</td>
<td></td>
</tr>
<tr>
<td>Unemployed III (n=111)</td>
<td>8.1</td>
<td>5.1</td>
<td>10.2</td>
</tr>
<tr>
<td>Unemployed Not-III (n=349)</td>
<td>7.1</td>
<td>4.9</td>
<td>9.3</td>
</tr>
</tbody>
</table>

* : Assuming men were half way through their period of unemployment at the Postal Questionnaire.
For men who recently retired at the Postal Questionnaire, the time spent retired occurring in Year 5 of the consultation rate data might be very small, but there is no way of estimating this. The amount of time retired is greater in Year 6 (assuming that once retired a man remains retired).

Therefore although the amount of non-employment was greater in Year 6 than in Year 5, due to the comparison group of continuously employed men also becoming non-employed in Year 6, Year 5 was assumed to be the year which would be most sensitive to detect any effects of changes in employment status. This decision is justified when examining the changes in relative odds of consulting of non-employed men compared to continuously employed men over all eight Years (Figure 7.1; section 7.8 discussed later).

7.3.4 Assumption that the maximum consultation rates over Years 2 to 5 is the measure most sensitive to a man's employment status between Initial Screening and the Postal Questionnaire.

For continuously employed men their exact employment status was known for the whole time period from Initial Screening to the Postal Questionnaire. However, for men who said they had experienced periods of unemployment in this intervening time the only data available was how many periods of unemployment (1, 2 or more) and the length of the longest period. It was not judged worthwhile to try to derive a measure of the amount of unemployment during these intervening years. The maximum consultation rate in Years 2 to 5 is analysed as this was thought likely to be more sensitive to temporary changes in consultation rates, particularly for discontinuously employed men.

7.4 CONSULTATION RATE GROUPS

For each Year, men were classified into the following groups based on their number of consultations in that Year (Chapter 6) :
Non-consulters : 0 consultations
Occasional consulters : 1 consultation
Low consulters : 2 or 3 consultations
Medium consulters : 4 to 7 consultations
High consulters : More than 7 consultations.

7.5 CONSULTATION RATES IN YEAR 1 PRIOR TO NON-EMPLOYMENT OCCURRING

In Year 1 41.4% of men did not consult their General Practitioner and 4.9% consulted more than 7 times (Table 7.3). Continuously employed men were more likely to be non-consulters than non-employed men (43.0% compared to 37.0%) and were less likely to be high consulters (4.0% versus 7.4%). Amongst non-employed men, non-employed ill men were the least likely to be non-consulters and the most likely to be high consulters. Retired not-ill men were the most likely to be non-consulters and discontinuously employed men were the least likely to be high consulters.

The relative odds of non-employed men consulting above a certain level compared to continuously employed men were investigated by fitting a proportional ordered polytomous regression model to the consultation rate group in Year 1, with five dummy variables for employment group and age as a continuous variable (see Chapter 6). The assumption of proportionality for high consulters was investigated and found to be reasonable for the employment groups but not for age. Therefore this assumption was relaxed for age. The relative odds of consulting above a certain level for a non-employed man compared to a continuously employed man can be thought of as the relative odds of a non-employed man being a higher consulter (ie consulting more frequently) than a continuously employed man, and will be referred to as such throughout this chapter.
Table 7.3 Consultation rates in Year 1 by employment status at the Postal Questionnaire (row % adjusted for age)

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>Total No. of Men</th>
<th>Type of Consulter in Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>All Men</td>
<td>5767 (100)</td>
<td>41.4</td>
</tr>
<tr>
<td>Continuously Employed</td>
<td>4260 (100)</td>
<td>43.0</td>
</tr>
<tr>
<td>All Non-Contin Employed</td>
<td>1507 (100)</td>
<td>37.0</td>
</tr>
<tr>
<td>Discontinuously Employed</td>
<td>429 (100)</td>
<td>38.3</td>
</tr>
<tr>
<td>Unemployed III</td>
<td>111 (100)</td>
<td>25.3</td>
</tr>
<tr>
<td>Unemployed Not-ill</td>
<td>349 (100)</td>
<td>36.7</td>
</tr>
<tr>
<td>Retired III</td>
<td>180 (100)</td>
<td>27.8</td>
</tr>
<tr>
<td>Retired Not-ill</td>
<td>438 (100)</td>
<td>43.1</td>
</tr>
</tbody>
</table>

Overall non-employed men were significantly more likely to be higher consulters than continuously employed men (OR=1.33; 95% CI: 1.19-1.49)(Table 7.4). The relative odds were much higher for non-employed ill men (2.68 for unemployed ill and 2.37 for retired ill), but were still significantly raised for unemployed not-ill men. Discontinuously employed and retired not-ill men did not have significantly raised odds.

Chapter 4 demonstrated how social class and town distributions were significantly different in the different employment groups. These factors are also related to GP consultation rates (General Household Surveys, Socio-economic analysis of National Morbidity Statistics II and III) and therefore need to be adjusted for. This was
done by fitting a further ordered polytomous regression model to the consultation rate, with town and social class as additional dummy variables (age was already in the model). The assumption of proportionality for high consulters was tested and found to be reasonable for social class, but not for town. Therefore this assumption was relaxed for town of residence for high consulters. Adjusting for Town and Social Class reduced the relative odds for unemployed not-ill and discontinuously employed men, but increased them amongst unemployed ill and retired ill men. (Table 7.4). The overall pattern of consultations is unaltered.

Excluding all men who might possibly have been non-employed at some time in Year 1 reduced the odds ratios for the non-employed ill groups, but did not alter the other two non-employed groups (Table 7.4). This indicates that the observed raised odds of non-employed men consulting more heavily than continuously employed men in Year 1, are not due to some non-employment occurring during Year 1.

The same effects on the relative odds of consulting are observed when all men who might possible have been non-employed in Years 1 and 2 and then in Years 1,2 and 3 are excluded. Therefore men who definitely did not experience any non-employment for the next three years still had higher consultation rates in Year 1 than continuously employed men. It would seem that possible anticipation effects of non-employment do not explain the odds of non-employed men consulting more than continuously employed men in Year 1.

In summary, prior to non-employment occurring, non-employed men were more likely to consult their GPs than continuously employed men. These raised odds cannot be explained by anticipation of non-employment, age, social class or town of residence. Amongst men who later became non-employed, unemployed ill and retired ill men had the highest relative odds of consulting. Retired not-ill men and discontinuously employed men did not have significantly raised odds of consulting.
<table>
<thead>
<tr>
<th>Year</th>
<th>Continuous Employed Men</th>
<th>Retired</th>
<th>Unemployed</th>
<th>Unemployed Retired</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-0</td>
<td>1.01 (0.79-1.29)</td>
<td>0.98 (0.78-1.23)</td>
<td>0.10 (0.85-1.38)</td>
<td>1.00 (0.82-1.22)</td>
</tr>
<tr>
<td>1-1</td>
<td>2.32 (1.50-3.45)</td>
<td>1.19 (0.42-2.75)</td>
<td>0.25 (0.92-3.39)</td>
<td>2.47 (1.80-3.31)</td>
</tr>
<tr>
<td>1-2</td>
<td>1.34 (1.01-1.73)</td>
<td>1.41 (1.11-1.77)</td>
<td>2.38 (1.73-1.70)</td>
<td>1.43 (1.27-1.49)</td>
</tr>
<tr>
<td>1-3</td>
<td>1.72 (1.04-2.82)</td>
<td>1.87 (1.22-2.95)</td>
<td>1.97 (1.49-3.20)</td>
<td>2.75 (1.91-3.75)</td>
</tr>
<tr>
<td>1-4</td>
<td>1.70 (0.90-1.35)</td>
<td>1.51 (1.01-1.35)</td>
<td>2.00 (1.31-1.82)</td>
<td>1.00 (0.90-1.35)</td>
</tr>
</tbody>
</table>

In Years 1 and 2, (c) Only those men employed in Years 1, 2, and 3.

Advised for age, town and social class, (d) All men, (e) Only those men employed in Year 1.

Relative Odds (95% CI) of being a higher consultant than a continuously employed man in Year 1:

Table 7.4
7.6 CONSULTATION RATES IN YEAR 5, AFTER SOME PERIODS OF NON-EMPLOYMENT HAD OCCURRED

By Year 5 the percentage of non-consulters had dropped from 41.4% to 35.9% (Table 7.5). This fall occurred within all employment groups and is partly due to aging. In Table 7.3 age standardisation is to the age structure of the cohort at the time of Initial Screening, whereas in Table 7.5 age standardisation is to the age structure of the cohort at the time of the Postal Questionnaire (ie every man was five years older). The difference in Tables 7.3 and 7.5 is thus in part due to the aging of the cohort which has not been removed by the standardisation procedure.

Continuously employed men were still more likely than non-employed men to be non-consulters (37.9% of continuously employed men were compared to only 29.9% of non-employed men). Only 11.8% of unemployed ill and 11.3% of retired ill men were non-consulters. The percentages of discontinuously employed men and continuously employed men who were non-consulters were similar. Overall the percentage of high consulters increased to 7.4% (from 4.9%), with 10.9% of non-employed men being high consulters compared to 6.0% of continuously employed men. Non-employed ill groups had the highest percentages of high consulters: 36.0% of unemployed ill and 23.5% of retired ill men were high consulters. The percentages of high consulters amongst unemployed not-ill, retired not-ill and discontinuously employed men were slightly higher than amongst continuously employed men, but much lower than amongst non-employed ill men.

Non-employed men were significantly more likely to be higher consulters than continuously employed men after adjusting for age, town and social class (OR=1.56; 95% CI: 1.39-1.75) (Table 7.5). The relative odds had risen even higher for non-employed ill men (7.19 for unemployed ill and 5.85 for retired ill in Year 5 compared to 2.75 and 2.55 respectively in Year 1). The relative odds were significantly raised for both unemployed not-ill men and retired not-ill men (retired not-ill men did not have raised odds at all in Year 1). Discontinuously employed men still did not have raised odds.
<table>
<thead>
<tr>
<th>Type of Consultant in Year</th>
<th>Retired</th>
<th>Continued Employment</th>
<th>Mean</th>
<th>Continued Employment</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questionnaire at Social Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Men</td>
<td>1.75 (1.49-1.75)</td>
<td>1.5</td>
<td>1.9</td>
<td>2.3</td>
<td>2.4</td>
</tr>
<tr>
<td>1.50</td>
<td>6.0</td>
<td>15.6</td>
<td>21.8</td>
<td>18.5</td>
<td>17.9</td>
</tr>
<tr>
<td>1.57</td>
<td>0.0</td>
<td>1.3</td>
<td>1.3</td>
<td>2.0</td>
<td>1.2</td>
</tr>
<tr>
<td>1.75</td>
<td>1.0</td>
<td>1.3</td>
<td>1.0</td>
<td>2.0</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Significantly different from continuously employed men (p < 0.05).
7.7 MAXIMUM CONSULTATION RATES IN YEARS 2 TO 5

In order to detect temporary changes in consultation rates due to separate periods of unemployment, the maximum consultation rates in any one year for Year 2 to Year 5 (inclusive) were examined (Table 7.6). The only difference from comparing the rates in Year 5 (Table 7.5) is that discontinuously employed men now appear to be slightly higher consulters than continuously employed men, with 18.0% being a high consulter in at least one of the Years 2-5 and 9.5% being non consuters for all four Years compared to 14.9% and 11.0% respectively of continuously employed men. Discontinuously employed men did have higher odds of consulting more (OR=1.13; 95% CI:0.95-1.35), but it was not statistically significant (Table 7.6). The odds were significantly raised for all other non-employed men.

Table 7.6  Highest type of consulter (age adjusted percentages) in Years 2-5 by employment status at the Postal Questionnaire and Relative odds (95% CI) of being a higher consulter than a continuously employed man over Years 2-5 (adjusted for age, town and social class).

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>Highest type of consulter</th>
<th>Relative odds of being a higher consulter than a continuously employed man</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Consulter</td>
<td>High Consulter</td>
</tr>
<tr>
<td>All Men</td>
<td>10.0</td>
<td>18.2</td>
</tr>
<tr>
<td>Continuously Employed</td>
<td>11.0</td>
<td>14.9</td>
</tr>
<tr>
<td>All Non-Contin Employed</td>
<td>7.0</td>
<td>26.9</td>
</tr>
<tr>
<td>Discontinuously Employed</td>
<td>9.5</td>
<td>18.0</td>
</tr>
<tr>
<td>Unemployed Ill</td>
<td>1.8</td>
<td>62.5</td>
</tr>
<tr>
<td>Unemployed Not-ill</td>
<td>6.9</td>
<td>21.9</td>
</tr>
<tr>
<td>Retired Ill</td>
<td>1.7</td>
<td>53.0</td>
</tr>
<tr>
<td>Retired Not-ill</td>
<td>7.9</td>
<td>20.6</td>
</tr>
</tbody>
</table>

*: Significantly different from continuously employed men (P < 0.05)
7.8 CHANGES IN CONSULTATION RATES

Ordered polytomous regression models adjusting for age, town and social class were fitted to the consultation rates in each Year separately. Figure 7.1 illustrates the relative odds of being higher consulters than continuously employed men for the different employment groups over the eight Years. The relative odds for all the non-employment groups fell from Year 6 to Year 8, probably due to continuously employed men becoming non-employed. This justifies (post hoc) the use of Year 5 as the most sensitive year to detect the effects of non-employment on consultation rates.

Non-employed ill men had higher odds of consulting in all the years from Year 1 onwards, and these relative odds increased dramatically over time. They clearly increased their consultation rates significantly more than continuously employed men. However, for unemployed not-ill, discontinuously employed and retired not-ill men the changes in consultation rates need to be examined in more detail. Unemployed not-ill men were likely to consult more than continuously employed men, but on experiencing unemployment the relative odds did not appear to rise any higher. For retired not-ill men the relative odds did seem to increase on retiring. For discontinuously employed men, there did seem to be an increase in consulting in the Years 2 to 4, but by Year 5 their odds were similar to those of continuously employed men.

Predicting the level of consultations in Year 5 by fitting an ordered polytomous regression model with age, town, social class and level of consultation in Year 1 as covariates and employment status as a set of dummy variables will provide estimates of the odds of non-employed men consulting more than continuously employed man adjusted for their consultation rate in Year 1. This is not equivalent to the odds of non-employed men increasing their consultation rate compared to continuously employed men. The only way this can be approached is to examine the actual changes in consultation rates.
Figure 7.1  Relative odds (95% CIs) of consulting a General Practitioner more than a continuously employed man (adjusted for age, town and social class).
The distribution of changes in consultation rates between each Year and Year 1 appears to be reasonably normally distributed. However, non-consulters in Year 1 can only increase their consultation rates and similarly low consulters can only decrease their consultation rates by a small amount. This means that standard parametric tests assuming normality of the data cannot be used. The difficulty with using non-parametric tests is adjusting for age and town of residence, which both affect the changes in consultation rates. Several different methods of looking at changes in categorical variables over time, after adjusting for various covariates were investigated (see Appendix J for full details). The different methods all gave similar conclusions, and so only the simplest method will be reported here.

7.8.1 Assigning matched controls for age and town

In order to adjust for covariates such as age and town the easiest solution is to match. Therefore age and town of residence were matched for in the following way. Social class was not matched for as changes in consultation rates were not associated with social class and also bias was introduced due to matches not being available for some men if social class was matched for as well.

Method of matching

For each non-employed man one continuously employed man was searched for who came from the same town and was less than 6 months older or younger. If a match could not be obtained, then a further match was searched for being less than 2 years older or younger. If a match still could not be found, a final match was searched for being less than 3 years younger or older.

Efficiency of matching

Matches could not be found for two retired ill men (both aged 59 from Merthyr Tydfil) and for 12 retired not-ill men (all aged 59; 7 of whom were from Scunthorpe, 2 from Newcastle-Under-Lyne and 1 from Burnley, Maidstone and Wigan). The matching for age was extremely close, with the largest difference in means occurring for retired not-ill men, who were on average about 3 months older
than their matched controls. It was therefore assumed that age and town were adequately controlled for.

Analysis of matching results

The difference in consultation rates from Year 1 to the Year of interest was calculated for the case and the control. These differences were then compared using the Wilcoxon signed ranks test on each Year separately (Table 7.7).

### Table 7.7 Changes in consultation rates from Year 1 of non-employed men compared to continuously employed men (a) matched for age and town and (b) matched for age, town and consultations in Year 1.

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>(a) Matched for age and town</th>
<th>(b) Matched for age, town and consultations in Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 5</td>
<td>Max Year(2-5)</td>
</tr>
<tr>
<td>All Non-Continuously Employed</td>
<td>0.34*(0.14)</td>
<td>1.17*(0.24)</td>
</tr>
<tr>
<td>Discontinuously Employed Ill</td>
<td>0.18 (0.20)</td>
<td>0.43 (0.29)</td>
</tr>
<tr>
<td>Unemployed Ill</td>
<td>2.55*(0.73)</td>
<td>4.11*(0.93)</td>
</tr>
<tr>
<td>Unemployed Not-ill</td>
<td>-0.64* (0.27)</td>
<td>-0.08 (0.40)</td>
</tr>
<tr>
<td>Retired Ill</td>
<td>2.00* (0.49)</td>
<td>3.76* (0.69)</td>
</tr>
<tr>
<td>Retired Not-ill</td>
<td>0.04 (0.26)</td>
<td>0.70* (0.35)</td>
</tr>
</tbody>
</table>

* : Significantly different from continuously employed men (P < 0.05; Wilcoxon Signed Ranks Test)

On average by Year 5, non-employed men had increased their consultation rates by 0.34 consultations per annum more than continuously employed men of the same age and from the same town. This increase was mainly due to unemployed ill and retired ill men increasing their consultations by over 2 consultations per annum.
more than continuously employed men. Unemployed not-ill men did not increase their consultation rates as much as continuously employed men. Discontinuously employed and retired not-ill men did not differ from continuously employed men.

The maximum of the consultation rates in Years 2, 3, 4 and 5 was calculated and then the difference between this maximum and the initial consultation rate was calculated for the cases and controls. These differences were also compared using the Wilcoxon signed ranks test (Table 7.7). Again non-employed ill men increased their consultation rates more than continuously employed men. Retired not-ill and discontinuously employed men also had significant increases, but unemployed not-ill men did not differ significantly from continuously employed men.

Excluding men experiencing non-employment or anticipation of non-employment in Year 1
The analysis of matched controls was repeated for only those men who were definitely employed for at least three years after Initial Screening. This excluded all discontinuously employed men. The results did not differ markedly from those reported above.

The above analysis does not control for consultation rates in Year 1. Overall men who were high consulters in Year 1 tended to reduce their level of consultations (regression to the mean) and obviously non-consulters could only increase theirs. Therefore the analysis was redone matching on age, town and consultation rate in Year 1.

7.8.2 Assigning matched controls for age, town and consultation rate in Year 1
For each non-employed man one continuously employed man was searched for who came from the same town, was the same type of consulter in Year 1 (none, low, average, medium or high) and was less than 6 months older or younger. If a match could not be obtained, then a further match was searched for being less than 2 years older or younger. If a match still could not be found, a final match was
searched for being less than 5 years younger or older.

**Efficiency of matching**

The matching was less efficient, with no matches being found for 44 men (3%). Matches could not be found for three discontinuously employed men (1%), eight unemployed ill men (7%), eight unemployed not-ill men (2%), nine retired ill men (1%) and sixteen retired not-ill men (4%). The matching for age was less close, with retired not-ill men, being on average about 1 year older than their matched controls. It was probably still reasonable to assume that age and town were adequately controlled for.

**Matching results**

On average by Year 5, non-employed men had increased their consultation rates by 0.68 consultations per annum more than continuously employed men who consulted the same amount in Year 1 and were of the same age and from the same town (Table 7.7). This increase was mainly due to unemployed ill and retired ill men increasing their consultations by over 2\½ consultations per annum more than continuously employed men. Unemployed not-ill and retired not-ill men increased their consultation rates slightly more than continuously employed men, but these excess increases were not significant in Year 5. Discontinuously employed men did not appear to differ from continuously employed men. The maximum increase in consultation rates over Years 2-5 was significantly higher for all non-employed groups, except for discontinuously employed men, than the increase for continuously employed men.

**7.8.3 Conclusions on changes in consultation rates**

Adjusting for consultation rates in Year 1 markedly altered the results of analysing changes in consultation rates. The main differences occurred amongst the unemployed not-ill men. Initially these men appeared more likely to decrease their consultation rates than continuously employed men. However, once their raised consultation rates in Year 1 were adjusted for they then appeared to have a greater
increase in consultation rates compared to continuously employed men. This would suggest that what is happening is that they tend to be higher consulters in Year 1 and do not tend to consult less in the following Years as would be expected by the regression to the mean effect, which occurs amongst continuously employed men. Therefore when they are compared to continuously employed men who are high consulters in Year 1 they appear to increase their consultation rates more than continuously employed men.

To conclude, non-employed ill men increased their consultation rates significantly more than continuously employed men. Retired not-ill men also significantly increased their consultation rates more than continuously employed men. Unemployed not-ill men did not appear to increase their consultation rates more than continuously employed men. However, they also did not decrease their consultation rates as much as continuously employed men did who consulted at the same level in Year 1. For discontinuously employed men the maximum consultation rate in Years 2 to 5 is the more applicable measure. Discontinuously employed men did have a greater increase in consultation rates than continuously employed men, but the increase was not statistically significant.

7.9 GP CONSULTATION RATES AND EMPLOYMENT: OTHER STUDIES

The only previous large scale study of general practitioner consultation rates in relation to unemployment in Britain was based on the General Household Surveys (1983 and 1984) (Yuen P, Balarajan R 1989). Men aged 18-64 who were actively seeking work were 1.8 times more likely to have consulted their general practitioner in the previous 14 days compared to employed men. Men who had been out of work for five years or more had a substantially higher odds ratio than other non-employed men (2.12 compared to about 1.4 (estimated from a graph)). The men in the GHS who were actively seeking work and had been unemployed for less than 5 years can be compared to the unemployed not-ill men in the BRHS. The
unemployed not-ill men in the BRHS by definition had been unemployed for less than 5 years and it might be assumed that a large proportion of the unemployed ill and all the retired men might not be actively seeking work. The unemployed not-ill men had odds of 1.35 of consulting more than the continuously employed men in year 5, which is consistent with the odds ratio of consulting in the past 14 days of about 1.4 from the GHS.

The raised consultation rates of unemployed workers are also reported in another large scale cross-sectional analysis of data from the Canada Health Survey (D'Arcy C, Siddique CM 1985). Neither of these studies were able to examine the changes in consultation rates.

A few small studies looking at the effects of factory closures on health, have analysed the effect of the closure on GP consultation rates (Beale N, Nethercott S 1985;1986a-e;1987;1988a-d; Klausen H, Iversen L 1981; Jacobsen K 1975). The only British study was based on 302 workers made redundant when a factory producing meat products in Calne, Wiltshire closed in 1982 (Beale N, Nethercott S 1985;1986a-e;1987;1988a-d). This study reported a significant rise in consultations amongst employees and their families due to the announced closure of the factory (Beale N, Nethercott S 1985). For 43 male employees aged 41-60 the consultation rate rose from an average 2.2 consultations per year before closure was announced to 3.3 consultations per year after the closure was announced (Beale N, Nethercott S 1986a). The comparable consultation rates of the control group fell from 2.5 to 2.2 consultations per year. Therefore the difference in change in consultation rates was 1.4 consultations per year. This compares to a difference in change in consultation rates of 0.34 per year in Year 5 of the BRHS data. These two studies are not strictly comparable and there are certain reservations about some aspects of the design and analysis of the Calne study (Morris JK, Cook DG 1990). In particular, the 302 employees analysed represent a residual work force compared to the original 886 in 1979 and might therefore represent a group with atypical health status. The disadvantage of the BRHS data is that matching is only for age
and town of residence, whereas in the Calne study the controls did similar jobs. Also the power of the BRHS study is reduced by the lack of knowledge about the exact time unemployment occurred and for how long it had been anticipated. A study based on the closure of a Danish factory also reported an increase in consultation rates, again occurring in the anticipatory phase before the closure occurred (Jacobsen K 1975). Klausen et al did not find an increase in consultation rates as the result of the closure of a shipyard (Klausen H, Iversen L 1981). However, the analysis was based on self-reported consultation rates, rather than from examining the GP notes, as was done in the other studies.

7.10 GP CONSULTATION RATES AND EMPLOYMENT: CONCLUSIONS

In agreement with other studies, non-employed men were likely to consult their general practitioners more. However, all the groups of non-employed men, apart from retired not-ill men, were likely to consult their GP's more frequently than continuously employed men in Year 1 of the consultation rate data. In an attempt to reduce the effects of possible unemployment occurring in Year 1 and any anticipation effects an analysis of the consultation rates of only those men who were continuously employed for at least three years after Initial Screening was carried out. These men had higher consultation rates than continuously employed men. This indicates that anticipation cannot be the sole explanation for the increased likelihood of higher consultation rates observed in the men prior to their non-employment occurring. These results agree with the greater prevalence of ill health amongst non-employed men prior to their non-employment occurring (Chapter 5). The only group of non-employed men who were healthier than continuously employed men were retired not-ill men. These men did not have higher consultation rates than the continuously employed men prior to retiring.

Men who stated their non-employment was due to illness, increased their consultation rates greatly on becoming non-employed. Retired not-ill men increased
their consultation rates to a lesser extent on retiring. Discontinuously employed men appeared to increase their consultation rates on becoming non-employed, but the increases were not statistically significant. There was no evidence of an increase in consultation rates for unemployed not-ill men. There was some evidence that the consultation rates for unemployed not-ill men did not fall as much as the rates for continuously employed men consulting at the same level in Year 1 did.
CHAPTER 8

LOSS OF EMPLOYMENT AND CHANGES IN DRINKING,
SMOKING AND WEIGHT

SUMMARY

At Initial Screening men who later experienced non-employment were significantly more likely to be heavy drinkers, to smoke cigarettes or to have smoked cigarettes in the past than men who remained continuously employed. The prevalence of obesity was unrelated to subsequent employment experience, but men who later experienced non-employment were significantly more likely to be underweight.

Examination of the changes in health-related behaviour in men who had experienced some non-employment, showed differences between those who attributed their non-employment to illness and those who did not. Unemployed ill and retired ill men were significantly more likely to have decreased and stopped smoking cigarettes, to have decreased their alcohol consumption and to have lost weight compared to men who remained continuously employed. Discontinuously employed, unemployed not-ill and retired not-ill men were also more likely to reduce their alcohol consumption, but there was no evidence that they were more likely to change their levels of cigarette smoking, than men who remained continuously employed. All groups of non-employed men were more likely to gain more than 15% in weight on experiencing non-employment. This was the only evidence of non-employed men adopting behaviour detrimental to their future health.

The less healthy lifestyle of non-employed men, particularly prior to their non-employment occurring, may provide a partial explanation for the association between unemployment and ill health.
Chapter 8 Loss of Employment and Changes in Drinking, Smoking and Weight

LOSS OF EMPLOYMENT AND CHANGES IN DRINKING,
SMOKING AND WEIGHT

8.1 INTRODUCTION

Data on alcohol consumption, cigarette smoking and body weight were collected both at Initial Screening and at the Postal Questionnaire. The aim of this chapter is to establish whether after adjusting for age, town and social class, non-employed men were more likely to have adverse health-related behaviour than employed men, and if this increased on becoming non-employed. Due to non-employed men being older than continuously employed men, all the percentages quoted in this chapter are adjusted for age.

8.2 ALCOHOL CONSUMPTION

Figures 8.1 and 8.2 show the questions on alcohol consumption that were asked at Initial Screening and in the Postal Questionnaire.

Figure 8.1 Alcohol consumption questions at Initial Screening

11.6 Would you describe your present alcohol intake as:
   None
   On special occasions only
   Once or twice a month
   Weekends
   Daily/most days

   How much do you usually take?
   2 drinks a day or less
   3-6 drinks a day
   More than 6 drinks a day
A drink was equivalent to half a pint of beer, a single whisky, gin or brandy, or a glass of wine or sherry. Data were not available on 2 men at Initial Screening and 76 men at the Postal Questionnaire.

From the questions on frequency and quantity, the men were grouped into eight drinking categories: Non-drinkers, Occasional drinkers, Weekends 1-2, Weekends 3-6, Weekend > 6, Daily 1-2, Daily 3-6 and Daily > 6. Previous work relating biochemistry and haematological variables to the eight alcohol groups has provided support to the following ordered classification of alcohol consumption (Shaper AG, et al 1985b).

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None Drinkers</td>
<td>Did not currently drink</td>
</tr>
<tr>
<td>Occasional Drinkers</td>
<td>Drank on special occasions only or once or twice per month</td>
</tr>
<tr>
<td>Light Drinkers</td>
<td>Drank 1-2 units daily/most days or 1-6 units weekends</td>
</tr>
<tr>
<td>Moderate Drinkers</td>
<td>Drank 3-6 units daily/most days or more than 6 units weekends</td>
</tr>
<tr>
<td>Heavy Drinkers</td>
<td>Drank more than 6 units daily</td>
</tr>
</tbody>
</table>
Previous studies have shown that non-drinkers include a considerable proportion of ex-drinkers who have a high prevalence of ill health (Wannamethee G, Shaper AG 1988a). Since the aim of this chapter is to examine the health implications of the levels of alcohol consumption, the analyses will concentrate on non-drinkers and heavy drinkers.

8.2.1 Alcohol consumption at Initial Screening prior to non-employment occurring

Table 8.1 presents drinking patterns at Initial Screening by employment group. The percentages of none, occasional, light, moderate and heavy drinkers are presented age standardised. The odds of being a non-drinker or a heavy drinker are presented relative to a continuously employed man, after standardising for age, town and social class, since these are known to influence drinking habits (Cummins RO, et al 1981). Overall, 9.8% of men were heavy drinkers at Initial Screening, with a significantly higher percentage of non-employed men being heavy drinkers (13.6%) than continuously employed men (8.6%). The prevalence of heavy drinkers was higher amongst all non-employed groups, apart from retired not-ill men, than amongst continuously employed men. Unemployed ill men had the highest prevalence of heavy drinkers (19.3%). Adjusting for town and social class does not markedly alter the results (Table 8.1). All non-employed men, except for retired not-ill men, had significantly higher odds of being heavy drinkers compared to continuously employed men.

A different pattern is observed for non-drinkers, where overall, the prevalence of non-drinkers was the same amongst non-employed and continuously employed men (5.4%). However, within non-employment groups, unemployed ill men contained a significantly higher percentage of non-drinkers (11.2%) than continuously employed men. The prevalence of non-drinkers amongst other non-employed groups did not significantly differ from the prevalence amongst continuously employed men. Adjusting for town and social class does not markedly alter the results, with unemployed ill men being almost twice as likely to be non-drinkers than a continuously employed man (OR=1.98).
Table A1: Significant differences from continuously employed men (p<0.05)

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>p = 0.113</th>
<th>p = 0.085</th>
<th>p = 0.033</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>0.97 (0.00, 1.07)</td>
<td>0.87 (0.00, 1.02)</td>
<td>0.39 (0.00, 1.02)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>1.66 (0.86, 3.22)</td>
<td>1.23 (0.82, 1.21)</td>
<td>0.32 (0.00, 1.06)</td>
</tr>
<tr>
<td>Employed</td>
<td>1.57 (0.86, 2.89)</td>
<td>0.96 (0.00, 1.25)</td>
<td>0.28 (0.00, 1.09)</td>
</tr>
<tr>
<td>Discouraged</td>
<td>1.93 (1.02, 3.76)</td>
<td>0.98 (0.00, 1.25)</td>
<td>0.33 (0.00, 1.13)</td>
</tr>
<tr>
<td>All Men</td>
<td>1.40 (0.90, 2.39)</td>
<td>0.79 (0.00, 1.24)</td>
<td>0.21 (0.00, 1.05)</td>
</tr>
</tbody>
</table>

Chi-Square on 4 DF at p value

Test of Homogeneity

Relative Odds of Drinking:

<table>
<thead>
<tr>
<th>Drinking Categories at Screening (%)</th>
<th>Heavy Drinker</th>
<th>Non-Drinker</th>
<th>None</th>
<th>Light</th>
<th>Moderate</th>
<th>Heavy</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men</td>
<td>0.74 (0.56, 1.00)</td>
<td>0.00 (0.00, 1.00)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discouraged</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Relative Odds of Drinking adjusted for age, town and social class.

(1) Relative odds (5% CI) of being a non-drinker or a heavy drinker compared to a continuously employed man (adjusted for age and sex). (2) Relative odds (5% CI) of being a non-drinker or a heavy drinker compared to a continuously employed man (adjusted for age, sex and social class).
8.2.2 Alcohol consumption at time of Postal Questionnaire, after some periods of non-employment had occurred.

The prevalence of heavy drinkers had fallen from 9.8% to 3.9% between Initial Screening and the Postal Questionnaire (Table 8.2). In Table 8.1 age standardisation is to the age structure of the cohort at the time of Initial Screening, whereas in Table 8.2 age standardisation is to the age structure of the cohort at the time of the Postal Questionnaire (ie every man was five years older). The differences between Tables 8.1 and 8.2 are thus in part due to the aging of the cohort which has not been removed by the standardisation procedure. Overall, the prevalence of heavy drinkers was similar amongst non-employed and continuously employed men (4.4% compared to 3.8%). The prevalence of heavy drinkers amongst unemployed ill and retired ill men had reduced dramatically (from 19.3% to 7.5% for unemployed ill and from 15.6% to 3.1% for retired ill). The relative odds of a non-employed man being a heavy drinker compared to a continuously employed man had fallen (from OR=1.46 at Initial Screening to OR=1.07 at the Postal Questionnaire) and were no longer statistically significant.

Overall, the prevalence of non-drinkers had risen from 5.4% to 9.1%, with the prevalence amongst unemployed ill and retired ill men having increased the most dramatically (11.2% to 25.7% and 6.7% to 16.4% respectively). The relative odds of a non-employed man being a non-drinker compared to a continuously employed man had risen (from OR=0.97 at Initial Screening to OR=1.33 at the Postal Questionnaire) and were now statistically significant. The test of heterogeneity indicates that there was significant variability between non-employed groups. Unemployed ill and retired ill men were the most likely to be non-drinkers.

In summary, in the five years after screening, a large number of men reduced their alcohol consumption, with the most marked decreases occurring amongst unemployed ill and retired ill men. Non-employed men did not appear to have started drinking more on experiencing non-employment. To investigate this more fully the individual changes in alcohol consumption are analysed.
Significantly different from continuously employed men \( (p < 0.05) \).

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Odds Ratio (95% CI)</th>
<th>Alcohol Consumption at Past Quinquennium (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>0.57 (0.57-1.37)</td>
<td>5.0 ( % )</td>
</tr>
<tr>
<td>Employed</td>
<td>0.40 (0.27-0.59)</td>
<td>3.9 ( % )</td>
</tr>
<tr>
<td>Non-Continuousity Employed</td>
<td>0.75 (0.56-1.01)</td>
<td>4.9 ( % )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Odds Ratio (95% CI)</th>
<th>Alcohol Consumption at Past Quinquennium (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>0.57 (0.57-1.37)</td>
<td>5.0 ( % )</td>
</tr>
<tr>
<td>Employed</td>
<td>0.40 (0.27-0.59)</td>
<td>3.9 ( % )</td>
</tr>
<tr>
<td>Non-Continuousity Employed</td>
<td>0.75 (0.56-1.01)</td>
<td>4.9 ( % )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Odds Ratio (95% CI)</th>
<th>Alcohol Consumption at Past Quinquennium (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>0.57 (0.57-1.37)</td>
<td>5.0 ( % )</td>
</tr>
<tr>
<td>Employed</td>
<td>0.40 (0.27-0.59)</td>
<td>3.9 ( % )</td>
</tr>
<tr>
<td>Non-Continuousity Employed</td>
<td>0.75 (0.56-1.01)</td>
<td>4.9 ( % )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Odds Ratio (95% CI)</th>
<th>Alcohol Consumption at Past Quinquennium (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>0.57 (0.57-1.37)</td>
<td>5.0 ( % )</td>
</tr>
<tr>
<td>Employed</td>
<td>0.40 (0.27-0.59)</td>
<td>3.9 ( % )</td>
</tr>
<tr>
<td>Non-Continuousity Employed</td>
<td>0.75 (0.56-1.01)</td>
<td>4.9 ( % )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Odds Ratio (95% CI)</th>
<th>Alcohol Consumption at Past Quinquennium (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
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<td>5.0 ( % )</td>
</tr>
<tr>
<td>Employed</td>
<td>0.40 (0.27-0.59)</td>
<td>3.9 ( % )</td>
</tr>
<tr>
<td>Non-Continuousity Employed</td>
<td>0.75 (0.56-1.01)</td>
<td>4.9 ( % )</td>
</tr>
</tbody>
</table>
8.2.3 Changes in Alcohol Consumption between Initial Screening and the Postal Questionnaire

Overall, 36.9% of men reported reducing their consumption compared to 10.7% of men who reported increasing their alcohol consumption. Only 5.4% of drinkers stopped drinking, whilst 28% of non-drinkers started drinking.

Reducing alcohol consumption

The percentages of drinkers at Initial Screening reducing their alcohol consumption were higher in all the non-employed groups compared with the percentage of continuously employed men (Table 8.3). Non-employed ill men were the most likely to reduce their alcohol consumption (55.4% of unemployed ill and 51.1% of retired ill men did, compared to 34.7% of continuously employed men). Unemployed not-ill men were also significantly more likely to reduce their alcohol consumption.

The probability of reducing alcohol consumption was affected by the initial level of consumption, heavy drinkers being more likely to reduce their consumption than light drinkers. Adjusting for initial level of drinking reduced the overall relative odds of non-employed men reducing their consumption compared to continuously employed men, from 1.37 to 1.25. Only unemployed ill and retired ill men were significantly more likely to reduce their levels of alcohol consumption than continuously employed men, once age, town, social class and alcohol consumption at Initial Screening had been adjusted for. The relative odds of reducing were higher in all the other non-employed groups, but not significantly so.

Overall, 75% of heavy drinkers at Initial Screening had reduced their alcohol consumption. The percentages of heavy drinkers reducing their consumption were similar amongst continuously employed and non-employed men (Table 8.3).
<table>
<thead>
<tr>
<th>Class of Occupation</th>
<th>p = 0.787</th>
<th>p = 0.001</th>
<th>p = 0.002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired (e)</td>
<td>1.0 (0.04-2.6)</td>
<td>0.73 (0.39-1.37)</td>
<td>1.14 (1.00-1.34)</td>
</tr>
<tr>
<td>Retired (f)</td>
<td>1.0 (0.07-6.9)</td>
<td>0.88 (0.62-1.27)</td>
<td>1.53 (1.33-1.77)</td>
</tr>
<tr>
<td>Retired (g)</td>
<td>0.9 (0.5-1.8)</td>
<td>0.72 (0.41-1.10)</td>
<td>1.35 (1.14-1.60)</td>
</tr>
<tr>
<td>Retired (h)</td>
<td>1.1 (0.4-3.1)</td>
<td>0.44 (0.25-0.78)</td>
<td>2.25 (1.53-3.32)</td>
</tr>
<tr>
<td>Retired (i)</td>
<td>1.0 (0.5-1.8)</td>
<td>0.73 (0.41-1.30)</td>
<td>1.37 (1.02-1.85)</td>
</tr>
<tr>
<td>Retired (j)</td>
<td>1.0 (0.5-1.8)</td>
<td>0.73 (0.41-1.30)</td>
<td>1.37 (1.02-1.85)</td>
</tr>
<tr>
<td>Continuous (k)</td>
<td>1.0 (0.07-1.6)</td>
<td>0.71 (0.41-1.25)</td>
<td>1.37 (1.02-1.85)</td>
</tr>
<tr>
<td>Continuous (l)</td>
<td>1.0 (0.07-1.6)</td>
<td>0.71 (0.41-1.25)</td>
<td>1.37 (1.02-1.85)</td>
</tr>
</tbody>
</table>

Table 1.3: Heavy Drinkers at Initial Screening.
Increasing alcohol consumption

Overall, 12.5% of continuously employed men who were none, occasional, light or moderate drinkers at Initial Screening reported increasing their alcohol consumption compared to only 10.0% of non-employed men. Non-employed men were significantly less likely to increase their alcohol consumption than continuously employed men, even after adjusting for age, town, social class and level of alcohol consumption at Initial Screening (OR=1.29; 95% CI:1.04-1.60). The odds of increasing alcohol consumption were not significant for any of the non-employed groups individually (data not shown). Note that the heavy drinkers at Initial Screening are not included in this analysis, because, due to the categorisation of the data, it is not possible to determine if heavy drinkers increased their alcohol consumption.

Starting drinking

Overall, 28% of non-drinkers at screening had started drinking by the time of the Postal Questionnaire. The percentages of men starting to drink were similar amongst continuously employed and non-employed men (27% and 29% respectively). Non-employed men were not significantly more likely than continuously employed men to start drinking after adjusting for age, town and social class (OR=1.1; 95% CI: 0.6-2.1).

8.2.4 Reasons for not drinking at the Postal Questionnaire

Only 9% of men who did not drink at the Postal Questionnaire, said that this was due to illness or their doctor’s advice (Table 8.4). Continuously employed men were least likely to be non-drinkers for health reasons and unemployed ill and retired ill men were most likely to give this reason. The same pattern occurs, when just those men who said they had stopped drinking between Initial Screening and the Postal Questionnaire is examined (not shown). In fact other analyses have found a strong link between ill health and the reduction of reported alcohol consumption in this cohort of men (Wannamethee G, Shaper AG 1988b).
Table 8.4  Number and percentage of men not drinking for health reasons at the Postal Questionnaire.

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>Total No. Non-drinkers</th>
<th>Health Reasons No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Men</td>
<td>533</td>
<td>48</td>
<td>9</td>
</tr>
<tr>
<td>Continuously Employed</td>
<td>334</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>Non-Continuously Employed</td>
<td>199</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Discontinuously Employed</td>
<td>35</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Unemployed</td>
<td>33</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Unemployed Not-ill</td>
<td>48</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Retired</td>
<td>42</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Retired Not-ill</td>
<td>41</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

8.2.5 Alcohol consumption and anticipation of non-employment

Some men, although they were employed at Initial Screening may have been anticipating imminent non-employment, which may have effected their alcohol consumption. Therefore the data were reanalysed on only those men who definitely experienced no non-employment for at least two years after screening. There was no evidence of any anticipation effect of non-employment on alcohol consumption, with the results remaining unchanged.
8.2.6 Alcohol consumption and employment status: other studies

Two studies have reported time series analyses of the incidence of liver cirrhosis or sale of alcohol and the levels of unemployment in different industrialised nations (Brenner MH 1975 (USA); Starrin B, et al 1990 (Sweden)). They claim that liver cirrhosis death rates and alcohol sales are at their highest during periods of economic recession and high unemployment. Such methods appear to be just statistically manipulating the data, due to the models only being applicable over specific time periods, the arbitrary choice of time lag between alcohol sales and liver cirrhosis death rates and the manipulation of the data to remove the long term time trends (Gravelle HSE, et al 1981; Kasl SV 1979).

Several studies have observed that the pattern of alcohol consumption is different in unemployed men compared to employed men (Crawford A, et al 1987; Lee AJ, et al 1990). The occurrence of binge drinking was observed in data on 4170 employed and 479 unemployed men from the Scottish Heart Health Study (Lee AJ, et al 1990). A smaller study found that 87 unemployed men were more likely to 'binge' drink and experience the adverse effects of alcohol than 941 men employed full time, who were more likely to drink regularly (Crawford A, et al 1987). The unemployed men consumed more alcohol overall. This occurrence of binge drinking accounting for a large amount of the alcohol consumed by unemployed men, may explain why several studies have not observed that unemployed men consume more alcohol than employed men; for example, Cook using data from the British Regional Heart Study (Cook DG, et al 1982) and D’Arcy using data from the Canada Health Survey (D’Arcy C 1986). The General Household Studies in 1982 and 1984 observed that unemployed men were more likely to be heavier drinkers, however, the 1988 GHS changed the classifications of alcohol consumption and found that unemployed men were not more likely to be consuming more than 22 units per week.

Addressing the question of whether unemployment causes any change in alcohol consumption results in different findings. A study of school leavers found that
boys who experienced some unemployment in the two years after school did significantly increase their alcohol consumption from 29.1 units per week to 74.3 units, compared to an increase for all boys of 12.5 units per week to 26.7 units per week (Hammerstrom A, et all 1988). Two studies based on shipyards that were closed down both found that alcohol consumption fell (Withington J, Wybrow P 1988; Iversen L, Klausen H 1986). Withington found that 53 out of 100 men made redundant reported spending less on alcohol. Financial considerations have been found to be a strong incentive to reduce alcohol consumption; the effect of an increase in VAT on 463 regular drinkers in Scotland, was that unemployed men were more likely to reduce their consumption than employed men (Kendell RE, et al 1983). A third study on the closure of a shipyard did not observe any change in alcohol consumption (Mattiasson I, et al 1990). The data on alcohol consumption was evaluated by a modified version of the Michigan alcohol screening test (MAST) rather than on estimated units consumed as in the other studies. Journalists faced with the threat of redundancy did not appear to alter their alcohol consumption (Jenkins R, et al 1982). However, the overall level of consumption was found to be high and the study had a low response rate. Men who reported more than 3 drinking symptoms (indicating alcohol abuse) were more likely to drink more when unemployed, than men who reported less than 3 symptoms (Smart RG 1979).

Therefore it appears that unemployed men are more likely to consume more alcohol and have a different pattern of drinking than employed men. The financial constraints of unemployment cause some men to decrease their alcohol consumption, whereas other men (probably heavy drinkers already) increase their consumption. Apart from the study on school leavers (Hammerstrom A, et al 1988) there does not appear to be any data on whether unemployed men drank more before they became unemployed, than men who remained employed.
8.2.7 Conclusions: alcohol consumption and employment status

The BRHS data enable us to demonstrate that men who experienced some non-employment after screening tended to be heavier drinkers at screening before the non-employment occurred, even after adjusting for age, town of residence and social class. By the time of the Postal Questionnaire the majority of men had reduced their alcohol consumption. In agreement with some of the previous studies, men who had experienced some non-employment were more likely than men who remained continuously employed, to have reduced their alcohol consumption and less likely to have increased their alcohol consumption. However, because of the categorisation of the data it is not possible to determine if heavy drinkers increased their alcohol consumption. This is a limitation of the data, as previous studies have indicated that it is these men who are most likely to increase their alcohol consumption. By the time of the Postal Questionnaire men who had experienced some non-employment were no longer heavier drinkers than continuously employed men after adjusting for age, town of residence and social class, though again this finding might be due to the categorisation of the data. They were significantly more likely to be non-drinkers. Unemployed ill and retired ill men were the most likely to have reduced their alcohol consumption, indicating that the presence of illness was causing some men to reduce their alcohol consumption. The effect of the presence of illness is not reported in other studies. The BRHS had no data on the financial situations of the men who experienced non-employment, which has been found to be a strong incentive to reduce alcohol consumption.

8.3 CIGARETTE SMOKING

Figures 8.3 and 8.4 show the questions on smoking cigarettes, pipes and cigars that were asked at Initial Screening and in the Postal Questionnaire. Data were not available on 12 men at Initial Screening and 30 men at the Postal Questionnaire.
The men were classified into the following categories according to their reported smoking habits:
Never Smoker : Did not currently smoke cigarettes and had never smoked cigarettes in the past.

Ex-Smoker : Did not currently smoke cigarettes, but had smoked cigarettes in the past.

Light Smoker : Currently smoked 1-19 cigarettes a day.

Medium Smoker : Currently smoked 20 cigarettes a day.

Heavy Smoker : Currently smoked more than 20 cigarettes a day.

Smoking cigarettes has more serious health consequences than smoking cigars or a pipe. Therefore whether a man was currently smoking cigarettes or had smoked cigarettes in the past will be analysed; his level of pipe/cigar smoking will be ignored. Ignoring pipe/cigar smoking does not markedly alter the results, as at screening only 3% of men smoked pipes or cigars and had never smoked cigarettes and 8% smoked pipes/cigars, having smoked cigarettes in the past.

Past patterns of smoking are important due to the long-term health effects. The level of cigarette smoking is also relevant when considering health implications. Therefore the analysis will concentrate on men who had never smoked cigarettes, men who were current cigarette smokers and men who were heavy cigarette smokers.

8.3.1 Smoking at Initial Screening prior to non-employment occurring

Table 8.5 presents smoking patterns at Initial Screening by employment group. The percentages of never, current and heavy smokers are presented age standardised, while the relative odds of being in each of these categories are presented relative to continuously employed men after standardising for age, town and social class since the latter are known to influence smoking habits.
Significantly different from continuously employed men (p<0.05).

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Not-ill</th>
<th>Unemployed</th>
<th>Disemployed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Retired</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Retired</td>
<td>1.00</td>
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</tr>
<tr>
<td>Retired</td>
<td>1.00</td>
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<tr>
<td>Retired</td>
<td>1.00</td>
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<tr>
<td>Retired</td>
<td>1.00</td>
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<tr>
<td>Retired</td>
<td>1.00</td>
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<tr>
<td>Retired</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Retired</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Table 8.5**

Cigarette smoking at initial screening by employment status at Postal Questionnaire (4). Percentages of never smokers, current smokers, and heavy smokers.
At Initial Screening 25.3% of men had never smoked cigarettes, 38.6% of men were current cigarette smokers, with 13.7% of men being heavy smokers. Overall, men who subsequently experienced non-employment were more likely than men who subsequently remained continuously employed, to have ever smoked cigarettes, to be current smokers (OR=1.31) and to be heavy smokers (OR=1.23). The tests of heterogeneity indicate that there was significant variability amongst the non-employed groups. Unemployed ill men were most likely to have ever smoked, most likely to be current smokers and most likely to be heavy smokers. At the other extreme retired not-ill men were less likely to have ever smoked or to smoke heavily than even continuously employed men, though the differences were not statistically significant.

8.3.2 Smoking at time of Postal Questionnaire, after some periods of non-employment had occurred.

Between Initial Screening and the Postal Questionnaire the prevalence of cigarette smoking fell from 38.6% to 30.2%, while heavy smoking declined even more dramatically from 13.7% to 7.9% (Tables 8.5 and 8.6). These decreases occurred within all employment groups and are partly due to the cohort aging as well as to secular trends in smoking habits. The percentage of never smokers decreased very slightly (25.3% to 25.2%) due to 9 ‘never smokers’ at Initial Screening starting to smoke.

As at Initial Screening, non-employed men were more likely than continuously employed men to be current smokers (34.9% versus 28.7%). However, the relative odds of non-employed men being current smokers had fallen from 1.31 at Initial Screening to 1.20 at the Postal Questionnaire. The relative odds of non-employed men being heavy smokers had fallen from 1.23 to 0.92. These changes seemed to be mainly due to the marked changes amongst unemployed ill and retired ill men. The relative odds of an unemployed ill man being a smoker fell from 2.27 to 1.50, and the odds of him being a heavy smoker fell from 2.10 to 0.69. In contrast to
<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Smokers N</th>
<th>Non-Smokers N</th>
<th>Odds Ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous &amp; Employed</td>
<td>114</td>
<td>105</td>
<td>2.9</td>
<td>0.01</td>
</tr>
<tr>
<td>Continuous &amp; Unemployed</td>
<td>187</td>
<td>174</td>
<td>2.9</td>
<td>0.01</td>
</tr>
<tr>
<td>Retired</td>
<td>474</td>
<td>467</td>
<td>2.6</td>
<td>0.01</td>
</tr>
<tr>
<td>Non-Employed</td>
<td>936</td>
<td>820</td>
<td>2.7</td>
<td>0.01</td>
</tr>
<tr>
<td>Dropped</td>
<td>699</td>
<td>587</td>
<td>2.6</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Significantly different from continuously employed men (P < 0.05).
the marked changes in the non-employed ill groups, the relative odds for non-employed not-ill men being current smokers or heavy smokers decreased only slightly. Unemployed not-ill and discontinuously employed men still had higher relative odds of being heavy smokers, but they were no longer significantly greater than 1. Retired ill men appeared less likely to be heavy smokers than continuously employed men (OR=0.79 95% CI:0.56-1.11).

In order to examine the changes between Initial Screening and the Postal Questionnaire in more detail the individual changes in cigarette smoking are analysed.

8.3.3 Changes in smoking between Initial Screening and the Postal Questionnaire

Stopping smoking

By the time of the Postal Questionnaire 26.8% of smokers at screening had stopped smoking, with similar percentages of continuously employed men and non-employed men having stopped smoking (26.3% and 27.6%) (Table 8.7). The test of heterogeneity indicates that there was significant variability amongst the non-employed groups. Unemployed ill and retired ill men were the most likely to have stopped smoking. At the other extreme discontinuously employed and unemployed not-ill men appeared less likely to have stopped smoking than even continuously employed men, but the differences were not statistically significant. The probability of stopping smoking was associated with the initial level of smoking, with 33.5% of light smokers stopping compared to only 20.6% of heavy smokers. After adjusting also for level of smoking at Initial Screening, unemployed ill and retired ill men were significantly more likely to have stopped smoking than continuously employed men (OR=1.64 and OR=1.76 respectively).
Reducing smoking

By the time of the Postal Questionnaire 45.7% of smokers at screening had reduced or stopped smoking, with significantly more non-employed men reducing smoking than continuously employed men (48.6% versus 43.2%). As the emphasis in this chapter is on heavy smokers just the percentages of heavy smokers reducing their levels of smoking will be examined in detail.

Only 44.6% of heavy smokers at screening remained heavy smokers; 52% of continuously employed men reduced their smoking compared to 61% of non-employed men (Table 8.7). Non-employed men were significantly more likely to reducing their smoking than continuously employed men (OR=1.43). The test of heterogeneity indicates that there was significant variability between the non-employed groups. Unemployed ill and retired ill men were the most likely to reduce their levels of smoking (unemployed ill OR=2.74, retired ill OR=5.85).

Starting smoking

Very few men started smoking after Initial Screening (0.6% of never smokers and 4.8% of ex cigarette smokers were smoking at the time of the Postal Questionnaire). The percentages of men who started smoking were similar for all non-employed groups and continuously employed men (data not shown).

Increasing smoking

By the time of the Postal Questionnaire 14.3% of light and moderate smokers at Initial Screening had increased their level of smoking, with similar percentages of non-employed men and continuously employed men increasing their levels of smoking (13.5% of continuously employed men and 15.3% of non-employed men). The odds of increasing cigarette smoking were not significant for any of the non-employed groups individually (data not shown). Note that heavy smokers at Initial Screening are not included in this analysis, because, due to the categorisation of the data it is not possible to determine if they increased their levels of smoking.
| Adj A, SC | Adj A, T, SC | Adj A, T, SC, SMK | Chi-Square on 4 df | Test of Homogeneity
<table>
<thead>
<tr>
<th></th>
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</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.22 (0.84 - 1.78)</td>
<td>1.17 (0.71 - 2.29)</td>
<td>1.76 (0.94 - 2.58)</td>
<td>1.97 (1.00 - 2.17)</td>
<td>1.63 (0.96 - 1.24)</td>
</tr>
<tr>
<td>0.98 (0.49 - 1.94)</td>
<td>0.85 (0.44 - 1.65)</td>
<td>0.97 (0.50 - 1.85)</td>
<td>0.83 (0.43 - 1.66)</td>
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</tr>
<tr>
<td>32.4</td>
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<td>32.9</td>
<td>25.9</td>
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<tr>
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<td>179</td>
<td>181</td>
<td>187</td>
<td>215</td>
</tr>
<tr>
<td>III</td>
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<td>III</td>
</tr>
<tr>
<td>Unemployed</td>
<td>Unemployed</td>
<td>Unemployed</td>
<td>Unemployed</td>
<td>Unemployed</td>
</tr>
<tr>
<td>1.43 (1.05 - 1.97)</td>
<td>1.03 (0.88 - 1.34)</td>
<td>1.07 (0.86 - 1.36)</td>
<td>1.09 (0.88 - 1.37)</td>
<td>1.00 (0.88 - 1.24)</td>
</tr>
<tr>
<td>0.10</td>
<td>0.03</td>
<td>0.04</td>
<td>0.09</td>
<td>0.00</td>
</tr>
<tr>
<td>1800</td>
<td>296</td>
<td>324</td>
<td>263</td>
<td>100</td>
</tr>
<tr>
<td>Contemplated</td>
<td>Contemplated</td>
<td>Contemplated</td>
<td>Contemplated</td>
<td>Contemplated</td>
</tr>
<tr>
<td>1.00</td>
<td>0.42</td>
<td>0.76</td>
<td>0.25</td>
<td>0.00</td>
</tr>
<tr>
<td>1000</td>
<td>469</td>
<td>946</td>
<td>168</td>
<td>00</td>
</tr>
<tr>
<td>All Non-Continuously</td>
<td>All Non-Continuously</td>
<td>All Non-Continuously</td>
<td>All Non-Continuously</td>
<td>All Non-Continuously</td>
</tr>
<tr>
<td>1.40 (1.01 - 1.97)</td>
<td>1.03 (0.88 - 1.30)</td>
<td>1.07 (0.86 - 1.34)</td>
<td>1.09 (0.88 - 1.37)</td>
<td>1.00 (0.88 - 1.24)</td>
</tr>
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<td>0.03</td>
<td>0.04</td>
<td>0.09</td>
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<td>1000</td>
<td>469</td>
<td>946</td>
<td>168</td>
<td>00</td>
</tr>
<tr>
<td>All Non-Continuously</td>
<td>All Non-Continuously</td>
<td>All Non-Continuously</td>
<td>All Non-Continuously</td>
<td>All Non-Continuously</td>
</tr>
<tr>
<td>1.40 (1.01 - 1.97)</td>
<td>1.03 (0.88 - 1.30)</td>
<td>1.07 (0.86 - 1.34)</td>
<td>1.09 (0.88 - 1.37)</td>
<td>1.00 (0.88 - 1.24)</td>
</tr>
<tr>
<td>0.10</td>
<td>0.03</td>
<td>0.04</td>
<td>0.09</td>
<td>0.00</td>
</tr>
<tr>
<td>1800</td>
<td>296</td>
<td>324</td>
<td>263</td>
<td>100</td>
</tr>
<tr>
<td>Contemplated</td>
<td>Contemplated</td>
<td>Contemplated</td>
<td>Contemplated</td>
<td>Contemplated</td>
</tr>
<tr>
<td>1.00</td>
<td>0.42</td>
<td>0.76</td>
<td>0.25</td>
<td>0.00</td>
</tr>
<tr>
<td>1000</td>
<td>469</td>
<td>946</td>
<td>168</td>
<td>00</td>
</tr>
</tbody>
</table>
8.3.6 Cigarette smoking and anticipation of non-employment

Some men, although they were employed at Initial Screening may have been anticipating imminent non-employment, which may have effected their cigarette smoking. The data were reanalysed on only those men who definitely experienced no non-employment for at least two years after Initial Screening. The results were largely unaltered (data not presented). The higher levels of cigarette smoking prior to non-employment and the changes in smoking were not due to any possible anticipation effects of non-employment.

8.3.7 Cigarette smoking and employment: other studies

Several studies have found that a higher proportion of unemployed people smoke cigarettes than employed people and are more likely to have smoked in the past. In the General Household Surveys the proportion of smokers amongst unemployed men (economically active) is consistently over 20% higher than the proportion amongst employed men (General Household Surveys 1980-1988). Social class differences does not explain the higher prevalence of current and ever smokers amongst unemployed people compared to employed people (Lee AJ, et al 1991). This is consistent with data from the OPCS Longitudinal study, in which men identified as unemployed in the 1971 census had higher mortality rates of lung cancer (an indicator of prevalence of cigarette smoking) than other men of the same age, even after accounting for factors such as social class, housing tenure, region of residence, and marital state (Moser KA, et al 1984). Data from the September 1985 Current Population Survey (A survey of a large representative sample of US households) found that not only were unemployed people more likely to have ever smoked (after adjusting for age, education and marital status), but also that starting smoking occurred in adolescence, prior to the unemployment (Waldron I, Lye D 1989). This implies that certain personal characteristics or early experiences influenced both smoking adoption and adult unemployment, rather than unemployment causing higher levels of smoking. This lack of effect of unemployment on smoking habits also occurred in a study of workers made redundant when a factory closed down in Michigan (Kasl SV, et al 1972) and in
school leavers, some of who experienced unemployment in the two years after leaving school (Hammerstrom A, et al 1988). In an extremely small study on 9 people, financial reasons led to a reduction in the number of cigarettes smoked in some cases, while the reason given for an increase in smoking by other respondents was anxiety and a lack of any alternative activity (Kirby HD, Luker KA 1986). The financial incentive to reduce smoking was also observed in a study of 100 shipyard workers made redundant in Middlesborough in 1988, 35% of whom reported spending less money on cigarettes (Withington J, Wybrow P 1988).

In summary it appears that unemployed people do tend to smoke more than employed people, mainly due to having been more likely to have started smoking, and that on becoming unemployed there is a tendency to stop smoking due to financial constraints.

8.3.7 Conclusions: cigarette smoking and employment status

In agreement with other studies, men who later experienced some non-employment, compared to men who remained continuously employed, were more likely to have smoked at some point in time, to be current smokers and also to smoke heavily before the non-employment occurred, even after adjusting for age, town and social class of residence. By the time of the Postal Questionnaire, men who had experienced some non-employment since screening were still more likely to be current smokers than men who had remained continuously employed, however, the relative odds of this had decreased. Non-employed men were no longer more likely to be heavy smokers. The data demonstrate that illness was a major factor in causing non-employed men to stop smoking. Men who attributed their non-employment to illness had significantly higher rates of stopping smoking and decreasing smoking than both continuously employed men and men who did not attribute their non-employment to illness. There was no evidence that men who experienced some non-employment not due to illness were likely to change their smoking habits more than men who remained continuously employed.
8.4 WEIGHT

At Initial Screening each man was weighed in trousers and socks to the nearest 0.1 kg on an MPS110 field survey scale (beam balance) and height was measured without shoes to the nearest millimetre, using a Harpenden Stadiometer with digital meter. In the Postal Questionnaire five years later men were asked to state their weight in pounds or kilograms. Since body weight at the Postal Questionnaire is based on reported weight it is inevitable that there will have been some misreporting (Stewart AW, et al 1987). However, as it is the relative weights of men who remained employed compared to those who experienced some non-employment after screening rather than the actual weights that is of interest, any misreporting will not be a problem unless it is related to non-employment. Data were not available on 1 man at Initial Screening and 127 men at the Postal Questionnaire. Weight is related to height and therefore Body Mass Index (BMI) was calculated as weight/height$^2$ and used as an index of relative weight. Bray’s classification of relative weight (Bray GA, 1978) was used to define men to be underweight if their BMI was less than 20 kg/m$^2$ and to be obese if their BMI was greater than or equal to 30 kg/m$^2$.

8.4.1 BMI measured at Initial Screening, prior to non-employment occurring

The mean BMI at screening was 25.49 kg/m$^2$ (standard deviation = 3.1 kg/m$^2$). The age standardised mean BMI differed by less than 0.1 kg/m$^2$ between employment groups (Table 8.8). Social class and town of residence were significantly associated with the mean BMI in this cohort of men (Weatherall R, Shaper AG 1988). Adjusting for these factors resulted in their being no significant differences in mean BMIs in the different employment groups.

However, when the proportions of men who were either underweight or obese were examined, there were significant differences between the employment groups (Table 8.8). A significantly higher percentage of non-employed men were underweight (3.9%) than continuously employed men (2.6%). Within non-employment groups, the
Significantly different from continuously employed men (P < 0.05).

<table>
<thead>
<tr>
<th>p = 0.023</th>
<th>p = 0.026</th>
<th>p = 0.030</th>
<th>p = 0.032</th>
<th>p = 0.034</th>
<th>p = 0.036</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.96 (0.47-1.91)</td>
<td>0.99 (0.33-2.79)</td>
<td>0.92 (0.39-2.17)</td>
<td>0.90 (0.34-2.45)</td>
<td>0.88 (0.33-2.45)</td>
<td>0.82 (0.31-2.45)</td>
</tr>
<tr>
<td>2.2 (1.02-4.4)</td>
<td>3.2 (1.08-9.8)</td>
<td>4.2 (1.24-13.8)</td>
<td>5.2 (1.46-17.9)</td>
<td>6.0 (1.78-20.1)</td>
<td>7.0 (1.99-24.2)</td>
</tr>
</tbody>
</table>

Adj A: adjusted for Age; Adj A, T, SC: adjusted for Age, Town and Social Class; Adj A, T, SC, SMK: adjusted for Age, Town, Social Class and Cigarette smoking at Initial Screening.

Table 8.8: BMI at Initial Screening: (d) Mean BMI (adjusted for age); (q) Percentages underweight and obese (adjusted for age and the relative odds of being underweight or obese compared to a continuously employed man, 95% CI) (c) adjusted for age, town and social class and (d) adjusted for age, town, social class and cigarette smoking at initial screening.
prevalence of underweight men was significantly greater amongst unemployed ill men and retired ill men than amongst continuously employed men. Adjusting for town and social class does not markedly alter the results. Non-employed men were significantly more likely to be underweight (OR=1.43) than continuously employed men, with unemployed ill and retired ill men having the highest relative odds of being underweight.

There is a strong association between cigarette smoking and BMI, with current smokers having a reduced BMI (Wannamethee G, Shaper AG 1989). Adjusting for whether a man was a non-smoker, an ex-smoker or a current smoker reduced the relative odds of being underweight to non-significant levels.

The prevalence of obesity was similar amongst non-employed and continuously employed men (8.1% and 7.8% respectively) (Table 8.8). However, within non-employment groups, the prevalence of obesity was significantly lower amongst retired not-ill men compared to continuously employed men (5.2% of retired not-ill men were obese). Adjusting for town, social class and cigarette smoking did not markedly alter the results.

8.4.2 BMI reported at Postal Questionnaire, after some periods of non-employment had occurred

The mean BMI at the questionnaire had increased by 0.26 kg/m$^2$ to 25.75 kg/m$^2$ (standard deviation = 3.2 kg/m$^2$) (Table 8.9), with the mean BMI increasing in all employment groups, probably due to aging. The mean BMI was similar amongst all employment groups. The percentage of underweight men had fallen from 3.0% to 2.1%, with decreases occurring in all non-employment groups. The percentage of obese men had increased from 7.9% to 8.7%, with the percentages amongst continuously employed men increasing from 7.8% to 8.3%, compared to a greater increase of 8.1% to 9.9% amongst non-employed men. The odds of non-employed men being underweight or obese were similar to the odds for continuously employed men after adjusting for social class, town and smoking.
Percentage is significantly different from the percentage of continuously employed men (P < 0.05).

Adj A : adjusted for Age; Adj A,T,SC : adjusted for Age, Town and Social Class
Adj A,T,SC,SMK : adjusted for Age, Town, Social Class and Cigarette smoking

<table>
<thead>
<tr>
<th></th>
<th>p = 0.232</th>
<th>p = 0.0323</th>
<th>p = 0.0181</th>
<th>p = 0.014</th>
<th>p = 0.005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Disease</td>
<td>0.90 (0.60-1.35)</td>
<td>0.79 (0.57-1.09)</td>
<td>0.77 (0.59-1.04)</td>
<td>1.39 (0.94-2.07)</td>
<td>1.77 (0.97-3.22)</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.92 (0.86-3.98)</td>
<td>1.79 (0.84-3.77)</td>
<td>1.27 (0.57-2.81)</td>
<td>0.80 (0.49-1.35)</td>
<td>0.53 (0.28-1.03)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.08 (0.53-2.17)</td>
<td>0.97 (0.50-1.85)</td>
<td>1.27 (0.57-2.81)</td>
<td>0.79 (0.49-1.35)</td>
<td>0.53 (0.28-1.03)</td>
</tr>
<tr>
<td>Heart Attack</td>
<td>0.80 (0.35-1.85)</td>
<td>0.53 (0.28-1.03)</td>
<td>0.97 (0.50-1.85)</td>
<td>1.27 (0.57-2.81)</td>
<td>0.79 (0.49-1.35)</td>
</tr>
<tr>
<td>Cigarette smoking</td>
<td>0.77 (0.33-1.80)</td>
<td>0.53 (0.28-1.03)</td>
<td>0.97 (0.50-1.85)</td>
<td>1.27 (0.57-2.81)</td>
<td>0.79 (0.49-1.35)</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>1.11 (0.74-1.67)</td>
<td>1.11 (0.74-1.67)</td>
<td>1.11 (0.74-1.67)</td>
<td>1.11 (0.74-1.67)</td>
<td>1.11 (0.74-1.67)</td>
</tr>
<tr>
<td>Obesity</td>
<td>1.00 (1.00)</td>
<td>1.00 (1.00)</td>
<td>1.00 (1.00)</td>
<td>1.00 (1.00)</td>
<td>1.00 (1.00)</td>
</tr>
</tbody>
</table>

All Mean 2.1 8.7

Table 8.9

This table shows the results of a study comparing the prevalence of various health conditions in different occupational statuses. The data is adjusted for age, town, social class, and smoking status.
8.4.3 Changes in weight between Initial Screening and the Postal Questionnaire

Between Initial Screening and the Postal Questionnaire, the mean BMI increased by 0.3 kg/m² (standard deviation = 1.6 kg/m²). This mean change in weight did not differ by employment groups. Men were classified into six groups based on weight change:

- **Large Loss** - men with a weight loss > 10% of weight at screening
- **Small Loss** - men with a weight loss between 4% - 10% of weight at screening
- **Stable** - men with a weight loss or gain of less than 4% of weight at screening
- **Small Gain** - men with a weight gain between 4% - 10% of weight at screening
- **Medium Gain** - men with a weight gain > 10% and up to 15% of weight at screening
- **Large Gain** - men with a weight gain > 15% of weight at screening

Overall, 57.3% of men maintained a stable weight (Table 8.10), with a higher percentage of continuously employed men doing so than non-employed men (59.3% compared to 51.6%). Unemployed ill men contained the lowest percentage of men remaining at a stable weight (only 38.5%). The percentage of men who lost more than 10% in weight was 2.0% of continuously employed men compared to 2.9% of non-employed men. Within non-employed groups it was much greater amongst the ill groups; 7.2% of unemployed ill and 5.2% of retired ill men. A different pattern is seen at the other extreme. All non-employed groups had greater percentages of men gaining more than 15% in body weight.
Odds of men having this weight change rather than remaining a stable weight is significantly different than the odds for continuously employed men (p<0.05).

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Weight Gain</th>
<th>Weight Loss</th>
<th>Relative Odds of Weight Gain vs. Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>0.15 (0.79-2.85)</td>
<td>2.28 (0.71-6.49)</td>
<td>0.71 (0.31-1.66)</td>
</tr>
<tr>
<td>Retired</td>
<td>3.8 (1.75-7.69)</td>
<td>4.59 (1.82-9.96)</td>
<td>4.59 (1.82-9.96)</td>
</tr>
<tr>
<td>Retired</td>
<td>1.45 (0.71-2.99)</td>
<td>2.12 (1.07-3.92)</td>
<td>2.12 (1.07-3.92)</td>
</tr>
<tr>
<td>Retired</td>
<td>5.61 (2.52-12.51)</td>
<td>6.19 (2.62-14.92)</td>
<td>6.19 (2.62-14.92)</td>
</tr>
<tr>
<td>Retired</td>
<td>1.14 (0.40-3.41)</td>
<td>1.48 (0.69-3.17)</td>
<td>1.48 (0.69-3.17)</td>
</tr>
<tr>
<td>Non-Continuously Employed</td>
<td>2.05 (1.03-4.24)</td>
<td>1.76 (1.76-2.32)</td>
<td>1.76 (1.76-2.32)</td>
</tr>
<tr>
<td>Non-Continuously Employed</td>
<td>1.36 (1.03-1.76)</td>
<td>1.61 (1.08-2.39)</td>
<td>1.61 (1.08-2.39)</td>
</tr>
<tr>
<td>Employed</td>
<td>1.10 (0.52-2.31)</td>
<td>1.48 (0.69-3.17)</td>
<td>1.48 (0.69-3.17)</td>
</tr>
</tbody>
</table>

Table 8.10: Percentages (adjusted for age and social class) for men and (e) excluding men who stopped smoking. Weight change is defined as opposed to remaining the same weight compared to a continuously employed man (95% CL).
Both weight loss and substantial weight gain are significantly associated with increased mortality in the BRHS cohort (Table 8.11; Wannamethee G, Shaper AG 1990). Weight loss was associated with a significantly higher rate of mortality from cancer whilst substantial weight gain was associated with an increased risk of cardiovascular mortality. Due to these health implications the odds of being in one of these weight change categories rather than maintaining a stable weight are of interest and the effects of employment status on these odds were investigated using nominal polytomous regression models (Appendix F: Nominal Polytomous Regression Models). Only the relative odds of losing more than 10% in weight or gaining more than 15% in weight rather than remaining at a stable weight will be reported (Table 8.10). The relative odds are adjusted for age and social class only, as town of residence was not associated with weight change.

Table 8.11  Weight change and relative risk of death (95% confidence intervals) adjusted for initial age, cigarette smoking, BMI, systolic blood pressure and blood cholesterol (Wannamethee G, Shaper AG 1990).

<table>
<thead>
<tr>
<th>% Change in body weight (kg)</th>
<th>Total Deaths</th>
<th>CVD Deaths</th>
<th>Cancer Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss &gt; 10%</td>
<td>2.0 (1.1-3.6)</td>
<td>0.88 (0.3-2.4)</td>
<td>2.9 (1.3-6.6)</td>
</tr>
<tr>
<td>Loss 4-10%</td>
<td>1.6 (1.2-2.3)</td>
<td>1.1 (0.7-1.8)</td>
<td>2.6 (1.6-4.1)</td>
</tr>
<tr>
<td>Stable</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Gain 4-10%</td>
<td>1.1 (0.4-1.5)</td>
<td>1.0 (0.6-1.4)</td>
<td>1.4 (0.9-2.2)</td>
</tr>
<tr>
<td>Gain 10-15%</td>
<td>1.1 (0.6-1.9)</td>
<td>1.4 (0.7-2.7)</td>
<td>0.8 (0.3-2.1)</td>
</tr>
<tr>
<td>Gain &gt; 15%</td>
<td>2.7 (1.5-4.9)</td>
<td>2.9 (1.4-6.0)</td>
<td>1.2 (0.4-4.0)</td>
</tr>
</tbody>
</table>

Non-employed men were significantly more likely to lose more than 10% in weight rather than maintain a stable weight compared to continuously employed men.
(OR=1.61). However, within non-employment groups it was unemployed ill men and retired ill men who were significantly more likely to lose weight, with odds ratios of 5.57 and 3.45 respectively. The relative odds for retired not-ill men was actually less than 1 (OR=0.71, not significant). The pattern is different when examining the odds of gaining more than 15% in weight rather than remaining at a stable weight. Non-employed men were significantly more likely to gain more than 15% in weight than continuously employed men (OR=2.71). This pattern of weight gain was seen in all non-employed groups, even retired not-ill men.

There is a strong association between cigarette smoking and changes in body weight, with there being an increase in body weight on stopping smoking (Wannamethee G, Shaper AG 1989). It is therefore relevant to consider if the weight gain in non-employed men can be attributed to changes in smoking habits between Initial Screening and the Postal Questionnaire. Therefore the changes in weight between Initial Screening and the Postal Questionnaire in only those men who did not stop smoking cigarettes between Initial Screening and the Postal Questionnaire were examined using the same nominal polytomous regression models (Table 8.10). After excluding men who stopped smoking, overall non-employed men were still more likely to either lose weight or gain weight rather than maintain a stable weight than continuously employed men. The odds for losing weight were very similar to the odds for the whole study population. However, the relative odds of gaining more than 15% in weight were slightly reduced in all non-employed groups. Therefore some, but not all of the extreme weight gain in non-employed men, was attributable to them stopping smoking.

8.4.4 Weight, employment status and social class

Table 8.12 shows that there is evidence that the effects of non-employment on weight gain differed in the different social classes. Non-employed men from social classes I and II were significantly less likely to gain more than 4% in weight than men from classes IV and V. The cut-off of 4% was used to maintain power for testing the interaction.
Table 8.12  **Relative odds of gaining more than 4% in weight (95% CI) compared to a continuously employed man in the same social class (adjusted for age).**

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>Relative Odds of &gt; 4% increase in weight</th>
<th>Social Class</th>
<th>P (interaction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuously Employed</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>All Non-Contin Employed</td>
<td>0.97 (0.74-1.26)</td>
<td>1.21* (1.01-1.45)</td>
<td>1.56* (1.10-2.21)</td>
</tr>
</tbody>
</table>

*: Odds of men having this weight change rather than remaining a stable weight is significantly different than the odds for continuously employed men (P<0.05).

8.4.5 **Weight and anticipation of non-employment**

Some men, although they were employed at Initial Screening may have been anticipating imminent non-employment, which may have affected their weight. The data were reanalysed on only those men who definitely experienced no non-employment for at least two years after screening. None of the results were markedly affected. The increased tendency to gain weight on becoming non-employed was not due to any possible anticipation effects of non-employment.

8.4.6 **Weight and employment status: other studies**

Very few studies have reported on the effect of unemployment on weight. A study of 715 male shipyard workers who were made redundant found that they were heavier than 261 age matched controls, but that the average weight change was the same in both groups (Mattisson I, et al 1990). A study of 100 ‘blue collar’ workers at 2 factories that were closed down found that unemployed men tended to increase weight slightly (on average 2.2 lbs) on regaining employment (Kasl SV, et al 1972). However, both these studies analysed average weight and average weight change. As we have shown this fails to pick up raised prevalence rates of being underweight or obese and to distinguish between gaining or losing weight.
8.4.7 Conclusions: weight and employment status

There was no difference in mean BMI or mean changes in BMI of men who remained continuously employed compared to men who experienced some non-employment. However, men who subsequently experienced some non-employment were significantly more likely to be underweight than men who remained continuously employed. This was mainly due to the raised odds for unemployed ill and retired ill men. In the BRHS cohort a high proportion of the men who were underweight at Initial Screening had impaired health at Initial Screening (Wannamethee et al, 1989). Men who subsequently experienced some non-employment were also significantly more likely than men who remained continuously employed to lose weight, again mainly due to the raised odds for unemployed ill and retired ill men. This weight loss is another indication of the presence of underlying disease. The only group of non-employed men who did not have raised odds of weight loss were retired not-ill men, which is a further indication of their good health status.

Overall, men who subsequently experienced some non-employment were more likely to be obese than men who remained continuously employed, but this was not significant. However, they were more likely to gain over 15% in weight than men who remained continuously employed, even after allowing for the effect of stopping smoking. This increased risk of weight gain was seen in all non-employed groups and is likely therefore to be associated with the non-employment. In the BRHS cohort, this considerable weight gain was associated with increased risk of cardiovascular mortality over a short period of follow-up (four years) (Wannamethee et al, 1989). There was some evidence that non-employed men from social classes IV and V were more likely to gain weight than non-employed men from social classes I and II.

Analysing the mean BMI and mean changes in BMI fails to detect these patterns.
8.5 CONCLUSIONS: DRINKING, SMOKING, WEIGHT AND EMPLOYMENT STATUS

On experiencing non-employment men were at higher risk of gaining more than 15% in weight, particularly men from social classes IV and V. This was the only evidence of non-employed men adopting behaviour detrimental to their future health. Higher levels of alcohol consumption and cigarette smoking were observed in non-employed men. However, these were due to their higher levels prior to the non-employment occurring. Men who stated their non-employment was due to illness were more likely to reduce their cigarette smoking and levels of alcohol consumption. These men were more likely to lose weight and be underweight, indicating pre-existing disease.

The less healthy lifestyle of non-employed men, particularly prior to their non-employment occurring may provide a partial explanation for the association between unemployment and ill health. The long term effects of the higher levels of smoking and alcohol consumption prior to non-employment should be taken into account when comparing mortality and morbidity in groups of employed and unemployed people.
CHAPTER 9

NON-EMPLOYMENT AND SUBSEQUENT MORTALITY

SUMMARY

Over the five and a half years following the Postal Questionnaire there were 197 deaths (12%) amongst 1645 men who had experienced some non-employment between Initial Screening and the Postal Questionnaire, compared to 174 deaths (4%) amongst 4412 men who had remained continuously employed. The relative odds of death amongst non-employed men compared to continuously employed men were 2.08 (95% CI: 1.64-2.64), after adjustment for age, town and social class. The odds were significantly raised even in men who stated their non-employment was not due to ill health. Further adjustment for self-assessed health and health-related behaviour reduced these odds (for all non-employed men OR=1.63; 95% CI: 1.27-2.10).

Men who retired for reasons other than illness differed from the other groups of non-employed men; they were more likely to be non-manual workers, to come from the South and were less likely to be smokers and heavy drinkers. They were also likely to be healthier than continuously employed men prior to their retirement. However, these men also had increased odds of death (OR=1.49; 95% CI: 1.02-2.17). It seems unlikely that some other factor reflecting general life circumstances is causing the increased odds of mortality amongst non-employed men, as retired not-ill men do not appear to have many life circumstances, apart from non-employment, in common with the other groups of non-employed men. This suggests that loss of employment is associated with an increased risk of mortality. This association cannot readily be explained by either pre-existing health status or by health-related behaviour.
NON-EMPLOYMENT AND SUBSEQUENT MORTALITY

9.1 INTRODUCTION

The analysis presented in this chapter is a preliminary analysis of the association between employment status at the Postal Questionnaire and subsequent mortality. Due to the computerisation of the National Health Service Central Registry mortality certificates have been delayed. The final month for which complete data is available is December 1989. NHSCR are 'capturing' the BRHS data at present (April 1992) and it is expected that within the next few months data on mortality from January 1990 to January 1992 inclusive will become available. This will increase the power to detect any effects on mortality. The analyses presented here will therefore focus on all cause mortality.

The first aim of this chapter is to determine if mortality from all causes differed between non-employed men and continuously employed men during an average of five and a half years of follow-up after the Postal Questionnaire. The second aim is to determine if such differences in all cause mortality remained once a large number of other variables are adjusted for. These include age, socio-economic variables (town and social class), self-reported health status at the Postal Questionnaire and health-related behaviour both at Initial Screening (prior to the non-employment) and at the Postal Questionnaire. Multiple logistic regression is used in the analysis. All adjustments use Wilcosky's marginal prediction method (appendix G).
9.2 MORTALITY

All deaths that occurred prior to January 1990 were included, giving an average follow-up period of five and a half years after the Postal Questionnaire (range 4 to 6½ years). Overall, 379 men had died, giving an annual death rate of 11.1 per 1000 men (Table 9.1). Of these, 142 were attributable to malignant neoplasms (43 lung cancer), 194 to circulatory diseases (156 Ischaemic Heart Disease), 19 to respiratory diseases and 5 to accidents, poisonings and violence.

The death rate per 1000 men from all causes was much higher amongst non-employed men (21.8) compared to continuously employed men (7.2), particularly amongst unemployed ill men (40.9) and retired ill men (38.8). The same pattern is observed for deaths attributable to malignant neoplasms, lung cancer, circulatory diseases, ischaemic heart disease and respiratory diseases.

9.3 NON-EMPLOYMENT AND MORTALITY ADJUSTED FOR OTHER FACTORS

9.3.1 Non-employment and mortality adjusted for age

The age adjusted relative odds of death from all causes was over twice as high for non-employed men compared to continuously employed men (Table 9.2; RO=2.10; 95% CI : 1.66-2.65). The age adjusted relative odds were significantly raised for all the non-employment groups, with the odds being extremely high amongst unemployed ill and retired ill men (5.83 and 3.25 respectively).

9.3.2 Non-employment and mortality adjusted for age, town and social class

Adjusting for town of residence and social class reduced the relative odds of death for non-employed men to 2.08 (95% CI: 1.64-2.64). The relative odds were reduced within each group of unemployed men, but increased for retired men.
<table>
<thead>
<tr>
<th>Disease</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart Disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neural Disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Causes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9.1

Number of mortality/1000/years (of deaths in 6057 men during five and a half years of follow up according to employment status)
Significantly different from continuously employed men (p > 0.05).

<table>
<thead>
<tr>
<th></th>
<th>p = 0.05</th>
<th>p = 0.15</th>
<th>p = 0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.49(1.02-2.17)</td>
<td>1.60(1.11-2.31)</td>
<td>1.57(1.09-2.28)</td>
<td></td>
</tr>
<tr>
<td>1.98(1.28-3.08)</td>
<td>1.61(1.23-2.94)</td>
<td>3.91(2.26-5.98)</td>
<td></td>
</tr>
<tr>
<td>1.35(0.88-2.07)</td>
<td>1.41(0.92-2.14)</td>
<td>1.57(1.02-2.23)</td>
<td></td>
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<tr>
<td>2.93(1.77-4.85)</td>
<td>2.69(1.56-4.98)</td>
<td>3.91(2.26-5.98)</td>
<td></td>
</tr>
<tr>
<td>1.50(0.98-2.31)</td>
<td>1.60(1.05-2.24)</td>
<td>1.67(1.01-2.25)</td>
<td></td>
</tr>
<tr>
<td>1.78(1.18-2.69)</td>
<td>1.41(1.20-2.69)</td>
<td>1.85(1.00-2.80)</td>
<td></td>
</tr>
</tbody>
</table>

Chi-square on 4 df of Relative ODDS : 

Test Homogeneity: 3.35

Revised

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Unemployed

Unemployed

Employed

Discriminatory

Employed

All Non-Cohort

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9.3.3 Non-employment and mortality adjusted for age, town, social class and self-assessed health during non-employment

Self-assessed health status at the Postal Questionnaire

The men were asked in the Postal Questionnaire:

"How would you describe your health at present?
Excellent/Good/Fair/Poor".

Data were not available on 43 men.

This self-assessment of health status is the best global measure reflecting both physical and psychological health status available in the BRHS at the Postal Questionnaire. It has been shown to be strongly associated with future mortality, with mortality being twice as high in men reporting fair or poor health than in men reporting excellent or good health (Wannamethee G, Shaper AG 1991). Overall, 22.8% of men rated their health as excellent and only 2.0% rated their health as poor (Table 9.3). There was a clear difference between continuously employed and non-employed men, with over 5.0% of non-employed men rating their health as poor compared to only 0.8% of continuously employed men. Amongst non-employed men, men who stated that their non-employment was due to illness were much more likely to rate their health as poor (19.5% of unemployed ill and 16.8% of retired ill men did). Men who stated that their non-employment was not due to illness appeared to be slightly more likely to rate their health as poor compared to continuously employed men, but the differences were small. The same pattern is observed when looking at the percentages of men who rated their health as excellent, with continuously employed men being more likely to rate their health as excellent than non-employed men. Fitting an ordered polytomous regression model, with health assessment as the ordered dependant variable, showed that all non-employed men, apart from discontinuously employed men, were significantly more likely to rate their health as worse than continuously employed men (last column of Table 9.3).
Significantly different from continuously employed men (p < 0.05).

<table>
<thead>
<tr>
<th>Group</th>
<th>Empl Status</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>1.22 (1.01-1.47)</td>
<td>1.3</td>
<td>1.6</td>
<td>6.0</td>
<td>21.1</td>
</tr>
<tr>
<td>Unemployed</td>
<td>2.087 (12.55-22.01)</td>
<td>19.8</td>
<td>20.8</td>
<td>3.0</td>
<td>270 (100)</td>
</tr>
<tr>
<td>Employed</td>
<td>2.38 (1.93-2.94)</td>
<td>2.4</td>
<td>2.0</td>
<td>3.7</td>
<td>61.7</td>
</tr>
<tr>
<td>Discontinued Dismissed</td>
<td>1.20 (0.99-1.46)</td>
<td>1.4</td>
<td>1.6</td>
<td>9.9</td>
<td>8.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Empl Status</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Continuously Employed</td>
<td>2.45 (2.18-2.74)</td>
<td>5.0</td>
<td>5.9</td>
<td>5.5</td>
<td>15.5</td>
</tr>
<tr>
<td>Employed</td>
<td>1.00</td>
<td>0.8</td>
<td>1.3</td>
<td>9.4</td>
<td>5.4</td>
</tr>
</tbody>
</table>

| All men                       | 9.40        | 2.0    | 17.6   | 4.7    | 8.3    | 6014 (100) |

Table 4.3

Self-assessed health status at the Postal Questionnaire by employment category and the Postal Questionnaire's percentages.
9.3.4 Non-employment and mortality adjusted for age, town, social class and self-assessed health during non-employment

Adjusting for self-assessed health as well as age, town and social class considerably lowered the relative odds of death for non-employed men compared to employed men from 2.08 down to 1.71 (Table 9.2). The greatest reduction occurred amongst non-employed ill men; the relative odds for unemployed ill men fell from 5.69 to 2.93 and for retired ill men from 3.39 to 1.91. The relative odds for unemployed not-ill men was 1.41 (95% CI: 0.92-2.14), which was no longer significantly higher than that for continuously employed men. The confidence intervals are wide, indicating the lack of power of this study when examining mortality rates. The test of heterogeneity indicates that after adjustment for self-assessed health at the Postal Questionnaire the differences in mortality between the non-employment groups are no longer statistically significant.

9.3.5 Non-employment and mortality adjusted for age, town, social class, self-assessed health during non-employment and health-related behaviour prior to and during non-employment

Chapter 8 showed that non-employed men were more likely to be current cigarette smokers and heavy drinkers at Initial Screening. The only evidence of non-employed men adopting behaviour detrimental to their future health on experiencing non-employment, was their tendency to gain more than 15% in weight between Initial Screening and the Postal Questionnaire. The number of years a man had been smoking for at Initial Screening plus whether a man was a current cigarette smoker or a heavy cigarette smoker or a heavy drinker at Initial Screening and the Postal Questionnaire and whether a man gained more than 15% in weight or lost more than 10% in weight between Initial Screening and the Postal Questionnaire were entered into the regression model predicting all cause mortality (age, town, social class and self-assessed health were already in the model). The relative odds of death for non-employed men compared to continuously employed men were reduced from 1.71 to 1.63 (95% CI: 1.27-2.10). The relative odds were reduced within each group of non-employed men, but increased slightly for retired ill men.
9.3.6 Non-employment and mortality adjustments

All the background factors adjusted for are imprecise measurements taken at only one or two points in time. The imprecision of these measurements may obscure the fact that one or several of them or a further unidentified factor may cause the increased odds of death associated with the non-employment groups (Phillips AN, Davey Smith G 1991). In order for this to occur, non-employment would have to be highly correlated with and be an accurate reflection of this unknown factor. As the BRHS cohort is a reasonably representative sample of middle-aged men in Great Britain it is highly unlikely that the non-employment is correlated with a specific factor (such as a particular occupation for instance). Any more general factor that unemployment accurately reflects (such as poverty) would probably be considered a feature of non-employment and in that sense it could be argued that some of the increased odds of death is attributable to non-employment. The increased odds of death amongst retired not-ill men is further evidence in favour of the increased odds of death being attributable to non-employment. The retired not-ill men have been shown to be more likely to be from Social Classes I and II, to be more healthy and to be less likely to be heavy smokers and drinkers. It seems unlikely that some other factor reflecting general life circumstances is causing the increased odds, as these men do not appear to have many life circumstances, apart from non-employment, in common with the other groups of non-employed men.

Unemployed ill men and retired ill men have been shown to differ markedly from unemployed not-ill and retired not-ill men in their health status and health-related behaviour. Adjusting for self-assessed health at the Postal Questionnaire statistically removes any difference in mortality rates amongst the non-employed groups. The fact that it does not statistically remove the difference in mortality rates between employed and non-employed men is further evidence in favour of the increased odds of death being attributable to non-employment.
The relative odds of death were higher for discontinuously employed men than for unemployed not-ill men. This may reflect the fact that the less healthy unemployed men have selected themselves into the unemployed ill category, whereas some discontinuously employed men did state their unemployment between Initial Screening and the Postal Questionnaire was due to illness, but this group was not divided into ill and not-ill men.

There are clear differences between employed and non-employed men in this study. Having more precise measurements of these features would probably reduce the increased odds of death from all causes of non-employed men.

9.4 NON-EMPLOYMENT AND MORTALITY: OTHER STUDIES

The only reported studies that have been large enough to examine the issue of mortality and non-employment are the census-based longitudinal studies reviewed in detail in Chapter 2 (section 2.3.3). The reported age standardised mortality ratios for all causes of unemployed men in the five years after unemployment range from 1.29 in the OPCS longitudinal study (Moser KA, et al 1990) to 2.41 in the Finnish longitudinal study (Martikainen PT 1990). The BRHS relative odds of 2.10 for all non-employed men, 1.78 for discontinuously employed men and 1.64 for unemployed not-ill men are of a similar magnitude. The mortality ratios vary between the studies for several reasons. Firstly, the experience of unemployment is likely to differ in the different countries and at different times. However, early results of analysing the death rates in the first three years after the 1981 Census by the OPCS gives similar findings to the 1971 Census (Moser KA, et al 1987a). Secondly, the studies define unemployment differently, with most studies requiring unemployed men to be seeking work. The non-employed men in the BRHS includes men who were not seeking work as they were too ill (the majority of the unemployed ill and retired ill men). Thirdly, the studies use different reference populations, in some studies the reference population is all men, in others it is
all employed men. Finally, the age range of the men differs in the studies, with the men in the BRHS being older than the men in other studies. Several studies report that the relative mortality of unemployed men is higher amongst younger men. The relative mortality in the BRHS was probably lower than if a wider age range of men had been included in the study.

In the OPCS LS, standardising for social class, reduces the SMR for all causes of unemployed men from 129 to 121 (95% CI : 103-140) (a 6% reduction). In the BRHS study adjusting for social class reduced the relative odds for all non-employed men from 2.12 to 2.08 (a 2% reduction), for discontinuously employed men from 1.74 to 1.67 (a 4% reduction) and for unemployed not-ill men from 1.61 to 1.54 (a 4% reduction).

The only study that was able to standardise for any health measures was the Finnish LS. They had data on the use of reimbursable medicines and the number of sick allowance days. Adjusting for these measures and also social class, education and marital status reduced the relative mortality for all causes of unemployed men from 2.41 down to 1.93 (95% CI : 1.82-2.05) (a 20% reduction). In the BRHS, standardising for social class, town, self-assessed health and health-related behaviour, reduced the relative odds from 2.10 down to 1.63 (a 22% reduction) for all non-employed men and from 1.78 down to 1.50 (a 16% reduction) for discontinuously employed men and 1.64 to 1.35 (an 18% reduction) for unemployed not-ill men.

The largest reported study on early retirement and subsequent mortality (3971 men) reported no significant differences in mortality over nine years of follow-up of men who retired early (aged 62-64) compared to men who retired at age 65 (Haynes SG, et al 1978). In contrast, retired not-ill men in the BRHS had higher relative odds of death from all causes in the five and a half years of follow-up compared to men who remained employed (OR=1.49; 95% CI: 1.02-2.17, adjusted for all background variables). These differences may reflect the differences in life circumstances of men retiring in the late 1960's in America and the early 1980's.
9.5 CONCLUSIONS: NON-EMPLOYMENT AND MORTALITY

In agreement with other studies, non-employed men had an increased odds of death from all causes in the five years following their non-employment even after adjusting for age, socio-economic factors, self-assessed health status and health-related behaviour. Despite being able to adjust for far more background variables than other studies have been able to do, we have still failed to explain the raised mortality amongst all non-employed men. In particular retired not-ill men seem to have few background factors in common with the other groups of non-employed men, which implies that the raised mortality is unlikely to be totally explained by other background factors associated with both mortality and non-employment.

Due to the imprecise nature and measurement of the other factors, it would not be expected to be able to totally remove the association of increased mortality and non-employment. However, an overall relative odds of 1.63 for all non-employed men and 1.49 for retired not-ill men does strongly suggest that some of this increased risk is attributable to the direct and indirect consequences of non-employment. At times of high unemployment, the percentages of men retiring early increases (Piachaud D 1986). The raised mortality amongst retired not-ill men emphasises the need to consider the impact of high levels of unemployment on all members of society, not just those who are classified as ‘unemployed’.

9.6 FURTHER WORK ON NON-EMPLOYMENT AND MORTALITY

This preliminary analysis of non-employment and mortality indicates that there is an association of non-employment and increased odds of mortality. The data available in the BRHS provide an opportunity to investigate some aspects of
association or causation in greater detail than other published data has allowed.

Further topics to be investigated are:

1. Whether the relative odds of death varied by cause of death. The relative odds of death from certain causes might be expected to be more affected by non-employment than others. For example, it is plausible that loss of employment would affect the risk of ischaemic heart disease, but implausible that death from malignant neoplasms would be affected in the short term.

2. Whether the relative odds of death varied over length of follow-up.

3. Whether the relative odds of death were greater for men aged 45-54 at the Postal Questionnaire than for men aged 55-64 then.

4. Whether the relative odds of death were higher amongst manual workers compared to non-manual workers and whether this differed by region of residence.

5. Whether non-employed men who were ‘healthy’ at the Postal Questionnaire had a raised odds of death compared to continuously employed men who were ‘healthy’. The judgement on health status could be based on recall of doctor diagnoses and the presence of chest pain in addition to the self-assessment of health.
CHAPTER 10

MEN NOT 'STABLY' EMPLOYED AT INITIAL SCREENING

SUMMARY

At Initial Screening, 'non-stably' employed men were older, more likely to come from the North and to be manual workers than 'stably' employed men. They were more likely to be non-employed at the postal questionnaire and to give illness as the reason for the non-employment.

The recent experience of unemployment in 'non-stably' employed men at Initial Screening may explain some of the differences in health status and health related behaviour observed between 'stably' and 'non-stably' employed men at Initial Screening. 'Non-stably' employed men had evidence of more ill health at Initial Screening, consulted their General Practitioners more and had a less healthy lifestyle, when considering cigarette smoking, alcohol consumption and obesity.

Apart from the same increased tendency to gain weight, changes in health related behaviour on experiencing periods of non-employment were different in 'non-stably' employed men compared to 'stably' employed men. 'Non-stably' employed men did not show the same increases in consultation rates as 'stably' employed men. They also did not exhibit the same tendency to reduce their alcohol consumption or cigarette smoking.

Within employment groups at the Postal Questionnaire 'non-stably' employed and 'stably' employed men had similar risk of death in the five and a half years after the Postal Questionnaire. Including these men in the analysis would not alter the increased risk of death observed in non-employed men compared to continuously employed men reported in Chapter 9.
MEN NOT ‘STABLY’ EMPLOYED AT INITIAL SCREENING

10.1 INTRODUCTION

Thus far this thesis has concentrated on 6057 men who were ‘stably’ employed at Initial Screening and for whom follow-up data are available. Three groups of men have been excluded:

a) ‘Non-stably’ employed men: Men for whom there is complete employment data and (i) were not employed at Initial Screening or (ii) stated at the Postal Questionnaire that they had experienced some non-employment in the five years prior to Initial Screening (n=1055).

b) Men who did not complete a Postal Questionnaire due to death, emigration or non-response (n=489).

c) Men who were working part time at the time of the Postal Questionnaire (n=134).

The purpose of this chapter is to examine how men excluded from the main analyses in this thesis differed from ‘stably’ employed men, and to see if any observed differences in ‘non-stably’ employed men were consistent with possible effects of previous periods of unemployment. Amongst ‘non-stably’ employed men, their past experience of unemployment may have already produced differences in general practice consultation rates, health status and health-related behaviour at Initial Screening. Also ‘non-stably’ employed men may react differently to further non-employment compared to ‘stably’ employed men experiencing their first period of non-employment for at least five years.

Men who were working part time at the time of the Postal Questionnaire were excluded from the main analyses in this thesis, due to the uncertainty as to whether their part-time working was because, they were unable to find full time
work, or whether, it was chosen as preferable to working full time. These men will be examined in further detail in this chapter.

### 10.2 ‘NON-STABLY’ EMPLOYED MEN AT INITIAL SCREENING

In previous chapters ‘stably’ employed men were classified into employment categories based on their employment experience after Initial Screening. The same criteria can be used to classify ‘non-stably’ employed men. For example, men who experienced some non-employment in the five years prior to Initial Screening, but who were employed at Initial Screening and the Postal Questionnaire and who had experienced no unemployment in the intervening five years, were classified as continuously employed men. Men who were unemployed at Initial Screening or who experienced some unemployment between Initial Screening and the Postal Questionnaire and who were employed full time at the postal questionnaire were classified as discontinuously employed. All other men were classified according to their employment experience after Initial Screening.

### 10.3 COMPARISON OF MEN WHO WERE ‘STABLY’ EMPLOYED AT INITIAL SCREENING WITH THOSE WHO WERE NOT.

#### 10.3.1 Employment experience

At Initial Screening 62% of the ‘non-stably’ employed men were employed. Men who had died prior to the Postal Questionnaire and non-responders had high levels of employment at Initial Screening (84% and 86% respectively).

‘Non-stably’ employed men at Initial Screening were more likely to experience further periods of non-employment. They were less likely to be employed full-time at the time of the Postal Questionnaire compared to ‘stably’ employed men (46.0% versus 78.5% respectively; Table 10.1) and they were more likely to have
experienced some non-employment in the 5 years after Initial Screening (only 26.4% were continuously employed compared to 71.3% of 'stably' employed men). The reasons for non-employment were also different. Amongst 'stably' employed men at Initial Screening only 26% (129/505) said illness was the reason for unemployment, whereas for 'non-stably' employed men 57% (184/324) gave illness as the reason. The same pattern is seen amongst retired men.

Table 10.1 Employment status at Postal Questionnaire of 'stably' employed and 'non-stably' employed men at Initial Screening (Number and col %)

<table>
<thead>
<tr>
<th>Employment Status at Postal Questionnaire</th>
<th>'Stably' Employed at Initial Screening</th>
<th>'Non-Stably' Employed at Initial Screening</th>
<th>Missing Data / Non-R</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. (Col %)</td>
<td>No. (Col %)</td>
<td>No.</td>
</tr>
<tr>
<td>All Men</td>
<td>6191 (100)</td>
<td>1055 (100)</td>
<td>297</td>
</tr>
<tr>
<td>Employed Full Time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuously</td>
<td>4859 (78.5)</td>
<td>485 (46.0)</td>
<td></td>
</tr>
<tr>
<td>Discontinuously</td>
<td>4412 (71.3)</td>
<td>278 (26.4)</td>
<td></td>
</tr>
<tr>
<td>Discontinuously</td>
<td>447 (7.2)</td>
<td>207 (19.6)</td>
<td></td>
</tr>
<tr>
<td>Employed Part Time</td>
<td>134 (2.2)</td>
<td>37 (3.5)</td>
<td></td>
</tr>
<tr>
<td>Employed Part Time</td>
<td>134 (2.2)</td>
<td>37 (3.5)</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>1055</td>
<td>1055</td>
<td>297</td>
</tr>
<tr>
<td>Ill</td>
<td>505 (8.2)</td>
<td>324 (30.7)</td>
<td></td>
</tr>
<tr>
<td>Not-III</td>
<td>129 (2.1)</td>
<td>184 (17.4)</td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>693 (11.2)</td>
<td>209 (19.8)</td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>693 (11.2)</td>
<td>209 (19.8)</td>
<td></td>
</tr>
</tbody>
</table>

10.3.2 Socio-demographic characteristics at Initial Screening

Overall, 'non-stably' employed men at Initial Screening were less likely to come from the 'South' (24.5% versus 31.0%) and were more likely to be over age 55 (32.0% versus 24.0%) and to be manual workers (73.0% versus 56.1%, age adjusted) than 'stably' employed men at Initial Screening (Table 10.2a). (The 'South' is defined as all those towns south of a line drawn from the Wash to the Bristol Channel, Figure 3.2). These differences between 'stably' and 'non-stably' employed men remained when comparing within employment groups at the Postal Questionnaire.
Overall, ‘non-stably’ employed men were less likely to be self-employed with employees than ‘stably’ employed men were (9.1% versus to 11.3% respectively; Table 10.2b). High percentages of men working part time were self-employed with employees both for ‘stably’ and ‘non-stably’ employed men (26.0% and 16.2% respectively).

Time in the longest held occupation can be taken as a crude measure of previous job stability. Overall, ‘non-stably’ employed men had had less job stability than ‘stably’ employed men (7.1% had been in their longest held job for less than 10 years compared to 2.9% of ‘stably’ employed men; Table 10.2b age adjusted). Amongst ‘non-stably’ employed men, unemployed ill and unemployed not-ill men had had the least job stability. Men employed part time also had raised levels of job instability.

‘Non-stably’ employed men were also less likely to be married and more likely to have more than 2 children than ‘stably’ employed men were (85.5% were married and 21.6% had more than 2 children compared to 91.6% and 15.6% for ‘stably’ employed men; data not shown).

10.3.3 Conclusions

Restricting the main analyses in this thesis to those men who were ‘stably’ employed at Initial Screening meant excluding 15% of the British Regional Heart Study men. These men were on average older, more likely to come from the North, to be manual workers and to have been in their longest held job for less than 10 years than men who were ‘stably’ employed at Initial Screening. ‘Non-stably’ employed men (men who were not ‘stably’ employed at Initial Screening, but for whom there was complete employment data) were also more likely to be non-employed at the Postal Questionnaire, and to give illness as the reason for that non-employment. The differences observed between ‘stably’ and ‘non-stably’ employed men still persisted, even after controlling for their subsequent employment experience. Men employed part time differed from both employed and non-
Table 10.2 (a) Socio-demographic characteristics of study employed compared to non-study employed men and men with missing data.

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Manual</th>
<th>Non-Manual</th>
<th>Over 55 years of age</th>
<th>From the South</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed Full Time</td>
<td>6.7</td>
<td>8.3</td>
<td>7.5</td>
<td>11.0</td>
</tr>
<tr>
<td>Employed Part Time</td>
<td>4.5</td>
<td>3.1</td>
<td>6.2</td>
<td>2.8</td>
</tr>
<tr>
<td>Unemployed</td>
<td>5.6</td>
<td>5.8</td>
<td>3.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Retired</td>
<td>6.9</td>
<td>6.0</td>
<td>1.3</td>
<td>1.0</td>
</tr>
<tr>
<td>Not in III</td>
<td>0.0</td>
<td>6.6</td>
<td>11.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>

* Excluding men from the Armed Forces and adjusted for age.
### Table 10.2(b) Socio-Demographic Characteristics of Stably Employed Compared to Non-Stably Employed Men and Men with Less than 10 Years in Longest Held Occupation

<table>
<thead>
<tr>
<th></th>
<th>All Men</th>
<th>1.3</th>
<th>9.1</th>
<th>10.9</th>
<th>18.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stably Employed with Employees</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Stably Employed Missing Data</td>
<td>(e)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Employed</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emp. Dead</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emp. Study</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Employed</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed Full Time</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed Part Time</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reired</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Adjusted for age.
employed men, for example they were more likely to come from the ‘South’ and be self-employed with employees, than both employed and non-employed men.

10.4 HEALTH STATUS AT INITIAL SCREENING

Table 10.3 presents the percentages of men reporting various measures of ill health adjusted for age, town and social class. The significance tests compare the ‘stably’ employed with ‘non-stably’ employed men within employment groups at the Postal Questionnaire.

10.4.1 Self-reported symptoms of ill health

At Initial Screening ‘non-stably’ employed men were more likely than ‘stably’ employed men to report experiencing respiratory and cardiovascular symptoms, even after adjusting for age, social class and town (Table 10.3). Amongst ‘non-stably’ employed men 21.9% reported symptoms of severe chest pain (possible MI) or chest pain on exertion (angina); 36.7% reported symptoms of breathlessness/chronic phlegm production or wheeze; and 15.3% reported calf pain on exercise compared to 12.0%, 25.3% and 10.4% respectively for ‘stably’ employed men. The same pattern tends to be observed when comparisons are made within subsequent employment groups. In particular, with respect to reporting symptoms of chest pain, unemployed not-ill and retired not-ill men who were ‘non-stably’ employed were significantly more likely to report these symptoms than unemployed not-ill and retired not-ill men who were ‘stably’ employed. As expected, the percentages of men reporting these symptoms amongst men who died prior to the Postal Questionnaire was high.

10.4.2 Medical history

‘Non-stably’ employed men were more likely than ‘stably’ employed men, to recall more than one diagnosis or be on regular medication, even after adjusting for age, town and social class (38.9% versus 25.3% had more than one diagnosis and 41.9% versus 24.7% were on regular medication). This also occurs within all
Table 10.3

Prevalence of different health measures at initial screening. Figures are percentages of men (adjusted for age, town and social class). (SE = non-stably employed at screening. NS = non-stably employed at screening).

<table>
<thead>
<tr>
<th>Class</th>
<th>Medical History</th>
<th>Self-reported Symptoms</th>
<th>Psychological Measures</th>
<th>Screening Questionnaire</th>
<th>Medical History</th>
<th>Self-reported Symptoms</th>
<th>Psychological Measures</th>
<th>Screening Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE</td>
<td>31.2</td>
<td>12.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
</tr>
<tr>
<td>NS</td>
<td>38.9</td>
<td>14.9</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
</tr>
<tr>
<td>SE</td>
<td>9.0</td>
<td>13.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
</tr>
<tr>
<td>NS</td>
<td>41.9</td>
<td>14.9</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
</tr>
<tr>
<td>SE</td>
<td>38.9</td>
<td>14.9</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
</tr>
<tr>
<td>NS</td>
<td>41.9</td>
<td>14.9</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
</tr>
<tr>
<td>SE</td>
<td>38.9</td>
<td>14.9</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
</tr>
<tr>
<td>NS</td>
<td>41.9</td>
<td>14.9</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
<td>24.3</td>
<td>32.7</td>
<td>12.0</td>
</tr>
</tbody>
</table>
non-employment groups. Over 75% of unemployed ill and retired ill men who were ‘non-stably’ employed were on regular medication. As expected, high percentages of men who died prior to the Postal Questionnaire had more than one diagnosis or were on regular medication. Similar patterns are observed when individual diagnoses are examined (not shown here).

10.4.3 Physiological measures

‘Non-stably’ employed men were more likely to have evidence of ischaemic heart disease (measured by an electrocardiogram); to have poor lung function and to be underweight at Initial Screening than ‘stably’ employed men, even after adjusting for age, town and social class (Table 10.3). The same pattern occurred within employment groups at the Postal Questionnaire. In particular amongst retired ill men, 17.0% of ‘non-stably’ men had evidence of IHD compared to 8.8% of ‘stably’ employed men. The prevalence of measured high blood pressure showed no consistent pattern overall. Men who subsequently died prior to the postal questionnaire had the highest prevalence of evidence of IHD and poor lung function.

10.4.4 Conclusions

Overall, ‘non-stably’ employed men showed consistent evidence of ill health being present at Initial Screening. This greater prevalence was present even when ‘stably’ and ‘non-stably’ employed men were compared within employment groups at the Postal Questionnaire. In particular retired not-ill men who were ‘non-stably’ employed at Initial Screening appeared to have worse health than continuously employed men. This contrasts with retired not-ill men who were ‘stably’ employed at Initial Screening who appeared more healthy than continuously employed men. The pattern of prevalence of ill health amongst men working part time was similar to that of retired not-ill men, with ‘stably’ employed men being more healthy than continuously employed men and ‘non-stably’ employed men being less healthy. As expected men who died prior to the Postal Questionnaire had strong evidence of ill health at Initial Screening.
10.5 GENERAL PRACTICE CONSULTATION RATES

10.5.1 Data on GP consultation rates
Of the 1055 ‘non-stably’ employed men; 54 men had died between the Postal Questionnaire and the end of the 8th year of follow up and 3 men had emigrated during this time period. There were missing or incomplete data on 20 men. Therefore complete data was available on 978 ‘non-stably’ employed men (response rate = 98%).

10.5.2 Consultation rates over Years 1 to 8
As in chapter 7, the relative odds of consulting more than a continuously employed man (‘stably’ employed at Initial Screening) were calculated by fitting an ordered polytomous regression model to the grouped annual consultation rates. The relative odds were adjusted for age, town and social class. It would have been better to compare ‘non-stably’ employed men with ‘stably’ employed men within employment groups at the Postal Questionnaire. Unfortunately by the time this was realised, the ability to fit these models no longer existed as the University of London Computer Centre had closed down and SAS Version 5.0 was not readily available elsewhere. Figure 10.1 illustrates these relative odds over Years 1 to 8. The horizontal line at 1 represents continuously employed men (‘stably’ employed at Initial Screening). Solid lines are ‘stably’ employed men and dashed lines (and bars for the 95% CIs) are ‘non-stably’ employed men. The graphs for men working part time are not plotted as the small numbers result in very wide confidence intervals.

The pattern of consultation rates for ‘stably’ employed men differs from that for ‘non-stably’ employed men. In Year 1, ‘non-stably’ employed men had higher relative odds of consulting than ‘stably’ employed men (also given in Table 10.4). For retired ill and unemployed ill men by Year 5, the relative odds of consulting had risen for ‘stably’ employed men, but had remained constant or fallen for ‘non-stably’ employed men. A similar pattern is seen for retired not-ill men, with the relative odds for ‘stably’ employed men increasing, whilst the relative odds for
Figure 10.1 Relative odds (95% CI) of consulting a General Practitioner more than a continuously employed man (stably employed at Initial Screening) adjusted for age, town and social class.

---

CONTINUOUSLY EMPLOYED MEN
NOT STABLY EMPLOYED AT SCREENING

DISCONTINUOUSLY EMPLOYED

UNEMPLOYED ILL

UNEMPLOYED NOT-ILL

RETIRE ILL

RETIRE NOT-ILL

---
Significantly different from continuously employed men who were stably employed at Initial Screening (P<0.05).

| (98) | 60.8% (0.5) | 77 | 46 | 0.1% (0.1) | 77 | 46 |
| (98) | 60.8% (0.5) | 77 | 46 | 0.1% (0.1) | 77 | 46 |
| (98) | 60.8% (0.5) | 77 | 46 | 0.1% (0.1) | 77 | 46 |
| (98) | 60.8% (0.5) | 77 | 46 | 0.1% (0.1) | 77 | 46 |
| (98) | 60.8% (0.5) | 77 | 46 | 0.1% (0.1) | 77 | 46 |

Table 10.4: Relative Odds (95% CI) of being a higher contributor than a continuously employed man who was stably employed at screening.
'non-stably' employed men appear to fall in Years 4 and 5. For continuously employed men, who were not 'stably' employed at Initial Screening (ie they had had some non-employment in the five years prior to Initial Screening), the relative odds remain consistently higher than the odds for continuously employed men who were 'stably' employed at Initial Screening, despite the fact that this group of men experienced no unemployment during the Years 1 to 5.

To examine the changes in consultation rates, each non-employed man was matched with a man who was 'stably' employed at Initial Screening and remained continuously employed, by the same procedure described in Chapter 7. It was not possible to match 23 men (1%) when age and town were matched for and 93 men (4%) when age, town and consultation rates in Year 1 were matched for. Table 10.4 (columns d and e) gives the mean difference in changes in consultation rates between Year 1 and the maximum of Years 2 to 5. Matching for consultation rates in Year 1 tended to increase the difference in the mean change in consultation rates for all the non-employed groups. The significance of the mean changes are determined using the Wilcoxon signed ranks test.

On experiencing further non-employment, 'non-stably' employed men did not increase their consultation rates as much as 'stably' employed men (This was not tested formally). In particular, 'stably' employed men who later became unemployed ill or retired ill dramatically increased their consultation rates more than men who remained continuously employed (average difference in rates = 5.45 for unemployed ill men and 5.89 for retired ill men). 'Non-stably' employed men who later became unemployed ill or retired ill had smaller increases (average difference in rates = 2.78 for both unemployed and retired ill men). Men working part time were the exception to this pattern, with 'non-stably' employed men increasing their consultation rates more than 'stably' employed men, however, the number of men involved is small. For continuously employed men, who were not 'stably' employed at Initial Screening (ie they had had some non-employment in the five years prior to Initial Screening), there was no significant increase in consultation rates compared
to continuously employed controls matched for age and town. When consultations in Year 1 was also matched for there was a significant increase in consultations compared to the controls. This indicates that the higher consultation rates of these men in Year 1 did not fall due to regression to the mean, which did occur amongst continuously employed men.

10.5.3 Conclusions
‘Non-stably’ employed men at Initial Screening had higher consultation rates at Initial Screening than ‘stably’ employed men even after controlling for subsequent employment experience. However, on experiencing non-employment the consultation rates of the ‘stably’ employed men rose more than those for ‘non-stably’ employed men. The explanation for this difference may be that for ‘stably’ employed men the experience of non-employment and also possibly illness were novel events. The novelty of such events may be causing the increase in consultation rates.

10.6 DRINKING, SMOKING AND WEIGHT

10.6.1 Alcohol consumption
At Initial Screening, ‘non-stably’ employed men were more likely to be either non-drinkers or heavy drinkers than ‘stably’ employed men (8.2% versus 5.5% were non-drinkers and 13.2% versus 10.0% were heavy drinkers) (Table 10.5). Five years later, ‘non-stably’ employed men appeared to be more likely to reduce their drinking than ‘stably’ employed men (43.9% versus 37.2%). However, when this was examined within employment groups at the Postal Questionnaire, there was no consistent pattern.
### Table 10.5 Alcohol consumption at Initial Screening and changes in alcohol consumption. Figures are percentages adjusted for age, town and social class (SE='stably' employed at screening, NSE= 'non-stably' employed at screening).

<table>
<thead>
<tr>
<th>Employment Status at Initial Screening</th>
<th>Initial Screening</th>
<th>Changes in Alcohol Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Non-Heavy Drinkers</td>
</tr>
<tr>
<td>All Men</td>
<td>6189</td>
<td>5.5&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>1053</td>
<td>8.2&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Continuously Employed</td>
<td>4411</td>
<td>5.6&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>277</td>
<td>5.5&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Discontinuously Employed</td>
<td>447</td>
<td>4.5&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>207</td>
<td>6.3&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Employed</td>
<td>134</td>
<td>4.5&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Part Time</td>
<td>37</td>
<td>15.5&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Unemployed</td>
<td>129</td>
<td>10.5&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>III</td>
<td>183</td>
<td>7.9&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Unemployed</td>
<td>375</td>
<td>5.3&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Not-III</td>
<td>140</td>
<td>9.3&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Retired</td>
<td>211</td>
<td>7.0&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>III</td>
<td>118</td>
<td>12.5&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Retired</td>
<td>482</td>
<td>4.5&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Not-III</td>
<td>91</td>
<td>10.4&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Dead</td>
<td>296</td>
<td>6.5</td>
</tr>
<tr>
<td>Non-Response</td>
<td>191</td>
<td>6.5</td>
</tr>
</tbody>
</table>

<sup>*</sup> : significantly different from the percentage for 'stably' employed men in the same employment group at the Postal Questionnaire. (P < 0.05).

<sup>a</sup> : Data missing on 6 men.

#### 10.6.2 Cigarette Smoking

At Initial Screening, ‘non-stably’ employed men were more likely to be current smokers and to be heavy smokers than stably-employed men (Table 10.6). Five years later ‘stably’ employed men were significantly more likely to have stopped smoking than ‘non-stably’ employed men (26.8% versus 22.4%). The same pattern occurred within non-employment groups.
Table 10.6  Smoking habits at Initial Screening and changes in smoking habits. Figures are percentages adjusted for age, town and social class (SE='stably' employed at screening, NSE='non-stably' employed at screening).

<table>
<thead>
<tr>
<th>Employment Status at Initial Screening</th>
<th>Changes in Smoking Smokers stopping smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postal Questionnaire</td>
<td>N(a)</td>
</tr>
<tr>
<td>All Men</td>
<td>SE</td>
</tr>
<tr>
<td></td>
<td>NSE</td>
</tr>
<tr>
<td>Continuously Employed</td>
<td>SE</td>
</tr>
<tr>
<td></td>
<td>NSE</td>
</tr>
<tr>
<td>Discontinuously Employed</td>
<td>SE</td>
</tr>
<tr>
<td></td>
<td>NSE</td>
</tr>
<tr>
<td>Employed Part Time</td>
<td>SE</td>
</tr>
<tr>
<td></td>
<td>NSE</td>
</tr>
<tr>
<td>Unemployed III</td>
<td>SE</td>
</tr>
<tr>
<td></td>
<td>NSE</td>
</tr>
<tr>
<td>Unemployed Not-Ill</td>
<td>SE</td>
</tr>
<tr>
<td></td>
<td>NSE</td>
</tr>
<tr>
<td>Retired III</td>
<td>SE</td>
</tr>
<tr>
<td></td>
<td>NSE</td>
</tr>
<tr>
<td>Retired Not-Ill</td>
<td>SE</td>
</tr>
<tr>
<td></td>
<td>NSE</td>
</tr>
<tr>
<td>Dead</td>
<td></td>
</tr>
<tr>
<td>Non-Response</td>
<td></td>
</tr>
</tbody>
</table>

\* : Significantly different from the percentage for 'stably' employed men in the same employment group at the Postal Questionnaire (P < 0.05).

\(a\) : Data missing on 16 men

10.6.3 Weight

At Initial Screening 'non-stably' employed men were more likely to be overweight than 'stably' employed men (9.2% versus 7.9%) (Table 10.7). The same pattern of obesity also occurred within non-employment groups. A slightly higher percentage of 'non-stably' employed men were underweight than 'stably' employed men. In particular, 8.9% of 'non-stably' employed men who were unemployed ill at the Postal Questionnaire were underweight at Initial Screening compared to 6.2% of 'stably' employed men who were unemployed ill at the Postal Questionnaire. Also 6.3% of men who died before the Postal Questionnaire were underweight.
'Non-stably' employed men showed an even greater tendency to gain more than 10% in weight on experiencing further non-employment than men who were 'stably' employed at Initial Screening (9.2% versus 5.9%). The same pattern occurred within non-employment groups. 'Non-stably' employed men also appeared to be more likely to lose more than 10% in weight than 'stably' employed men (4.3% versus 2.3%). The cut-off of a 10% gain in weight was used rather than 15% as in Chapter 8, due to the small numbers involved in the employment groups.

Table 10.7  Body weight at Initial Screening and changes in weight. Figures are percentages adjusted for age, social class and town unless otherwise stated (SE='stably' employed at screening, NSE='non-stably' employed at screening).

<table>
<thead>
<tr>
<th>Employment Status at Initial Screening</th>
<th>Changes in Weight#</th>
<th>Initial Screening</th>
<th>Changes in Weight#</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N/a Under-Obese Weight</td>
<td>Loss &gt;10% Gain &gt;10%</td>
</tr>
<tr>
<td>All Men</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>6190</td>
<td>3.0* 7.9</td>
<td>2.3* 5.9*</td>
</tr>
<tr>
<td>NSE</td>
<td>1055</td>
<td>5.0* 9.2</td>
<td>4.3* 9.2*</td>
</tr>
<tr>
<td>Continuously Employed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>4412</td>
<td>2.7 8.1</td>
<td>2.0 5.2</td>
</tr>
<tr>
<td>NSE</td>
<td>278</td>
<td>4.0 10.7</td>
<td>2.6 5.6</td>
</tr>
<tr>
<td>Discontinuously Employed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>446</td>
<td>3.3 8.6</td>
<td>2.1 5.1</td>
</tr>
<tr>
<td>NSE</td>
<td>207</td>
<td>5.6 7.8</td>
<td>3.1 9.1</td>
</tr>
<tr>
<td>Employed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part Time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>134</td>
<td>3.0 7.4</td>
<td>4.5 6.3</td>
</tr>
<tr>
<td>NSE</td>
<td>37</td>
<td>2.4 7.8</td>
<td>5.8 9.3</td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>129</td>
<td>6.2 10.6</td>
<td>7.5 12.3</td>
</tr>
<tr>
<td>NSE</td>
<td>184</td>
<td>8.9 11.9</td>
<td>6.4 15.6</td>
</tr>
<tr>
<td>Unemployed Not-ill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>376</td>
<td>4.1 8.6</td>
<td>2.8* 7.2</td>
</tr>
<tr>
<td>NSE</td>
<td>140</td>
<td>4.2 9.0</td>
<td>7.3* 11.1</td>
</tr>
<tr>
<td>Retired</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>211</td>
<td>5.8 7.4</td>
<td>5.4 11.0</td>
</tr>
<tr>
<td>NSE</td>
<td>118</td>
<td>4.3 8.8</td>
<td>6.1 9.3</td>
</tr>
<tr>
<td>Retired Not-ill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>482</td>
<td>2.6 5.5</td>
<td>1.5 7.6</td>
</tr>
<tr>
<td>NSE</td>
<td>91</td>
<td>2.0 4.3</td>
<td>3.4 8.2</td>
</tr>
<tr>
<td>Dead</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non Response</td>
<td>296</td>
<td>6.3 9.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>191</td>
<td>3.4 8.6</td>
<td></td>
</tr>
</tbody>
</table>

* : Significantly different from the percentage for 'stably' employed men in the same employment group at the Postal Questionnaire (P < 0.05).

# : Town was not adjusted for.

a: Data missing on 3 men
10.6.4 Conclusions

'Non-stably' employed men were more likely than 'stably' employed men, to be current smokers, heavy smokers, heavy drinkers and be overweight at Initial Screening, even after controlling for their subsequent employment. The exceptions appeared to be amongst the ill groups, were the higher prevalence of illness at Initial Screening amongst 'non-stably' employed men, may already be having an effect on their health-related behaviour. This prevalence of illness is also possibly indicated by the raised percentages of underweight men and the higher levels of non-drinkers. By the time of the Postal Questionnaire 'non-stably' employed men were less likely to have stopped smoking cigarettes than 'stably' employed men. They appeared more likely to have reduced their levels of alcohol consumption, but within non-employment groups there was no consistent pattern of changes in alcohol consumption. Both weight gain and weight loss appear more likely amongst 'non-stably' employed men than amongst 'stably' employed men.

10.7 MORTALITY

During the average follow-up period of five and a half years after the Postal Questionnaire, 122 'non-stably' employed men died, giving an annual death rate of 17.8 per 1000 men, compared to a death rate of 11.1 for 'stably' employed men (Table 10.8). Within employment groups, the death rates were similar amongst 'stably' employed and 'non-stably' employed men, apart from for unemployed ill men. Unemployed ill men who were 'stably' employed at Initial Screening had a higher death rate than unemployed ill men who were 'non-stably' employed (40.9 versus 27.7). The relative odds of death from all causes compared to a continuously employed man who was 'stably' employed at Initial Screening were generally similar for 'stably' employed and 'non-stably' employed men within the different non-employment groups once age, town, social class, self-assessed health at the Postal Questionnaire, smoking and drinking at Initial Screening and the Postal Questionnaire and changes in weight between Initial Screening and the Postal
Questionnaire were adjusted for. The largest differences in the relative odds of mortality between 'stably' employed and 'non-stably' employed men occurred amongst discontinuously employed men and men employed part time. In both cases the 'stably' employed men had higher odds than the 'non-stably' employed men, but due to the small numbers these differences were not statistically significant.

Table 10.8  (a) Number (mortality/1000/year) of deaths during 5+ years of follow-up and Relative Odds (95% CI) of death from all causes compared to a continuously employed men who was 'stably' employed at screening (b) adjusted for age, town and social class and (c) also adjusted for health, smoking, drinking and weight change.(SE='stably' employed at screening, NSE='non-stably' employed at screening).

<table>
<thead>
<tr>
<th>Employment Status at</th>
<th>Number (mortality/1000/year)</th>
<th>Relative Odds (95% CI) of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) Deaths from all causes</td>
<td>(b) Adj Age, Town Social Class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(c) Adj A,T,SC,Health Smoking, Drinking Weight change</td>
</tr>
<tr>
<td>All Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>6191</td>
<td>379 (11.1)</td>
</tr>
<tr>
<td>NSE</td>
<td>1247</td>
<td>122 (17.8)</td>
</tr>
<tr>
<td>Continuously</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed SE</td>
<td>4260</td>
<td>174 (7.2)</td>
</tr>
<tr>
<td>Employed NSE</td>
<td>269</td>
<td>15 (9.8)</td>
</tr>
<tr>
<td>Discontinuously</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed SE</td>
<td>429</td>
<td>30 (12.2)</td>
</tr>
<tr>
<td>Employed NSE</td>
<td>197</td>
<td>9 (7.9)</td>
</tr>
<tr>
<td>Part Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>127</td>
<td>8 (10.9)</td>
</tr>
<tr>
<td>NSE</td>
<td>37</td>
<td>2 (9.8)</td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>111</td>
<td>29 (40.9)</td>
</tr>
<tr>
<td>NSE</td>
<td>160</td>
<td>28 (27.7)</td>
</tr>
<tr>
<td>Non-ill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>349</td>
<td>34 (16.4)</td>
</tr>
<tr>
<td>NSE</td>
<td>133</td>
<td>13 (16.9)</td>
</tr>
<tr>
<td>Retired</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>180</td>
<td>45 (38.8)</td>
</tr>
<tr>
<td>NSE</td>
<td>103</td>
<td>29 (43.5)</td>
</tr>
<tr>
<td>Retired</td>
<td></td>
<td></td>
</tr>
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<td>SE</td>
<td>438</td>
<td>59 (22.3)</td>
</tr>
<tr>
<td>NSE</td>
<td>79</td>
<td>13 (26.0)</td>
</tr>
</tbody>
</table>

* : Significantly different from the percentage for 'stably' employed men in the same employment group at the Postal Questionnaire (P < 0.05).
10.8 CONCLUSIONS: MEN NOT 'STABLY' EMPLOYED AT INITIAL SCREENING

As expected there were significant differences between men who were 'stably' employed at Initial Screening and those who were not. 'Non-stably' employed men were more likely to have experienced unemployment prior to the five years before Initial Screening (indicated by them being more likely to have been in their longest held occupation for less than ten years) and to experience non-employment in the five years after Initial Screening.

'Non-stably' employed men had evidence of more ill health at Initial Screening, consulted their General Practitioners more and had a less healthy lifestyle, when considering cigarette smoking, alcohol consumption and body weight. 'Non-stably' employed men who later became non-employed due to illness had a high level of ill health already present at Initial Screening. The differences in health status and health-related behaviour observed in 'non-stably' employed men at Initial Screening, are consistent with the differences observed amongst 'stably' employed men who became non-employed after Initial Screening.

The changes in consultation rates and health-related behaviour on experiencing periods of non-employment were different in 'non-stably' employed men compared to 'stably' employed men. 'Non-stably' employed men did not show the same increases in consultation rates that 'stably' employed men did on becoming non-employed. They also did not exhibit the same tendency to reduce their alcohol consumption or smoking levels. However, they did have the same tendency to gain weight on experiencing non-employment.

In the five years after the Postal Questionnaire, 'non-stably' employed men had a higher death rate than 'stably' employed men. However, within non-employment groups the odds of death, compared to continuously employed men who were 'stably' employed at Initial Screening, were similar after socio-economic factors,
self-assessed health and health-related behaviour had been adjusted for.

Men employed part time at the postal questionnaire did not appear similar either to continuously employed men or to any of the non-employed groups of men.

10.9 IMPLICATIONS

In this population of middle-aged men 'non-stably' employed men did differ from 'stably' employed men at Initial Screening. These differences were consistent with possible effects of previous periods of unemployment. The 'a priori' decision to exclude these men, to eliminate the effects of previous periods of non-employment, appears justified.

Changes in consultation rates and smoking and drinking differed in 'stably' employed and 'non-stably' employed men. This may be because non-employment, and perhaps also illness, was not a new experience for 'non-stably' employed men. Therefore excluding these men from the analyses concerned with the changes occurring between Initial Screening and the Postal Questionnaire was also reasonable. The only change in health-related behaviour that occurred amongst both 'stably' employed and 'non-stably' employed men and within all non-employment groups was the increased tendency to gain weight. This is also consistent with 'non-stably' employed men being more likely than 'stably' employed men to be obese at Initial Screening, indicating that the previous periods of unemployment were also associated with an increased tendency to gain weight.

The relative odds of death from all causes in the five and a half years after the Postal Questionnaire for non-employed men compared to continuously employed men were similar for 'stably' and 'non-stably' employed men. Therefore including these men in the analysis would not have reduced the observed increased odds of death from all causes amongst non-employed men compared to employed men.
CHAPTER 11

CONCLUSIONS

SUMMARY

'We know that the unemployed are, for various reasons apart from unemployment, more likely to suffer ill health. What we need to find out is whether and how much of the disproportionate amount of illness experienced by the unemployed is caused by their unemployment and how much is caused by their life experiences before being unemployed'. (Stern J 1982)

Some 28% of men in the British Regional Heart Study who became non-employed stated that this was due to illness. Even men who did not attribute their subsequent unemployment to ill health, were more likely to have had evidence of ill health prior to the unemployment occurring than men who remained employed. Men who subsequently became non-employed were more likely to be heavy drinkers and smokers than men who remained employed.

An increase in general practice consultation rates was associated with loss of employment, which may reflect an adverse effect of non-employment on health. The only evidence to suggest that non-employment adversely affected health-related behaviour was that on experiencing non-employment, there was an increased propensity to gain over 15% in weight.

Five and a half years after the recorded non-employment occurred, non-employed men had an increased risk of death from all causes compared to employed men, despite adjusting for a range of factors reflecting general life circumstances, health and health-related behaviour. This suggests that loss of employment is associated with an increased risk of mortality.
CONCLUSIONS

11.1 INTRODUCTION

This chapter first summarises the findings of earlier chapters. Second, it examines the implications of these findings within the context of the unemployment and health debate.

11.2 SUMMARY OF RESULTS

11.2.1 Non-employment in the BRHS cohort (Chapter 4)
Non-employment at the Postal Questionnaire was more common amongst older men, manual workers and those from the North. It was also associated with being in a longest held occupation for less than ten years. At Initial Screening, 85% of the cohort were 'stably' employed (that is they were employed at Initial Screening and had been so continuously for the previous five years). The following results are applicable to these 'stably' employed men who either remained continuously employed or experienced some non-employment in the five years between Initial Screening and the Postal Questionnaire, unless otherwise stated.

11.2.2 Unemployment or early retirement (Chapter 4)
Whether a man classified himself as being unemployed or retired at the Postal Questionnaire was age dependent, with older men being more likely to consider themselves retired. Men from social classes I and II were more likely to consider themselves retired rather than unemployed, and to state that their retirement was not due to illness.
11.2.3 Health prior to non-employment (Chapter 5)

Some 28% of unemployed or retired men at the Postal Questionnaire stated that their unemployment or retirement was due to ill health. These men showed evidence of poor health in both subjective and objective health measures at Initial Screening. Men who stated their subsequent unemployment was not due to ill health exhibited evidence of poor health in some of the measures, particularly with respect to being moderately/severely breathless, having chronic phlegm production, a recall of at least one doctor diagnosis or to be on regular medication. Men who stated that their subsequent early retirement was not due to ill health appeared healthier than men who remained continuously employed.

Recalling a doctor's diagnosis of Angina, reporting symptoms of chronic phlegm production or moderate/severe breathlessness, having measured high blood pressure and being on any medication all significantly increased the risk of becoming non-employed even amongst men who stated their unemployment was not due to illness. The increased risk of non-employment due to ill health was similar in manual and non-manual workers.

11.2.4 Loss of employment and changes in General Practice consultation rates (Chapter 7)

Non-employed men, apart from retired not-ill men, were likely to consult their GP more frequently prior to experiencing their non-employment than continuously employed men. Men who stated their non-employment was due to ill-health increased their consultation rates on becoming non-employed. Men who said their retirement was not due to ill-health increased their consultation rates to a lesser extent on retiring. Men who stated their unemployment was not due to ill-health did not reduce their consultation rates as much as continuously employed men consulting at the same initial level did.
11.2.5 Loss of employment and changes in drinking, smoking and weight

(Chapter 8)

Men who subsequently experienced unemployment or retirement had significantly higher levels of cigarette smoking and alcohol consumption than men who remained continuously employed. There was no evidence that men increased their smoking or drinking on becoming non-employed. Men whose non-employment was due to illness were significantly more likely to reduce their levels of smoking and drinking than men who remained continuously employed. These men were also more likely to lose weight than continuously employed men. All men who experienced non-employment, whatever the reason, were more likely to gain over 15% in weight than men who remained continuously employed.

11.2.6 Non-employment and subsequent mortality (Chapter 9)

Non-employed men had an increased risk of death from all causes in the five and a half years following their non-employment compared to employed men. This raised mortality remained despite adjusting for age, social class, town, self-assessed health and health-related behaviour, even amongst retired not-ill men. Men who retired not due to ill health had few background factors in common with other groups of non-employed men, which implies that the observed raised mortality is unlikely to be totally explained by other background factors associated with both mortality and non-employment.

11.2.7 Men not ‘stably’ employed at Initial Screening (Chapter 10)

These men were older, more likely to come from the North, be manual workers, to have been in their longest held job for less than 10 years and to be non-employed at the postal questionnaire, with illness being the reason given. They had evidence of more ill health at screening, consulted their GPs more and had higher levels of cigarette smoking and alcohol consumption. On experiencing further periods of non-employment, they did not show the same increases in consultation rates that ‘stably’ employed men did on becoming non-employed. They also did not exhibit the same tendency to reduce their alcohol consumption or smoking levels.
They did have the same tendency to gain weight on experiencing non-employment. They had a similar risk of death from all causes in the five and a half years after the Postal Questionnaire compared to ‘non-stably’ employed men once employment status at the Postal Questionnaire was controlled for.

11.3 CONTRIBUTION TO THE UNEMPLOYMENT AND HEALTH DEBATE

'The fundamental problem with establishing a causal relationship between unemployment, ill-health, and/or mortality is that the incidence of both unemployment rates and morbidity/mortality rates are strongly statistically associated with poverty across individuals and across regions.' (Stern J 1981)

The British Regional Heart Study is a large prospective study of middle-aged men from 24 Towns in Great Britain. The size ensures adequate power to investigate differences between employed and non-employed men, the sampling allows the results to be generalised to middle-aged men in Great Britain and the prospective nature of the study allows health and health-related behaviour prior to loss of employment and the changes in health-related behaviour associated with non-employment to be examined.

11.3.1 Common background factors of unemployment and ill health
There was clear evidence that certain members of the cohort were more likely than others to become non-employed and to continue to experience periods of further non-employment. In agreement with other reported studies, these men were more likely to be manual workers, to be older and to come from the North (Moylan S, Davies B 1980; Stern J 1983b; Krahn H, et al 1985). These factors are all associated with high morbidity (Townsend P, Davidson N 1982). An advantage over other reported studies is that, the prospective nature of the BRHS data enabled the smoking and drinking habits of men just prior to their non-employment occurring, to be examined. Men who subsequently became non-employed were more
likely than men who remained employed, to be heavy smokers and drinkers, which have long term health implications. Men who retired for reasons other than ill-health differed from other non-employed men; they were more likely to come from the South, to be non-manual workers and not to be heavy smokers or drinkers.

11.3.2 Health selection into non-employment

That some individuals do not work because they are ill is so uncontentious a statement that it requires no research; on the other hand, the question of what levels of ill-health lead to unemployment has hardly been addressed in the reported literature. Ill health has been shown to increase the duration of unemployment (Colledge M, Bartholomew R 1980; Grayson JP 1985; Moylan S, Davies B 1981). In the British Regional Heart Study cohort, some 28% of men who lost employment stated that this was due to illness. Of particular interest is the fact that even men who did not attribute their subsequent unemployment to ill health, were more likely than men who remained continuously employed, to have had evidence of ill health prior to the unemployment occurring. Only men who subsequently retired for reasons other than ill health appeared healthier than men who remained continuously employed. The levels of morbidity prior to non-employment were also reflected by the GP consultation rates. All non-employed men, apart from retired not-ill men, were likely to consult their GPs more than continuously employed men.

11.3.3 Unemployment causing ill health

Only longitudinal studies are able to address the problem of establishing causality as opposed to association. The main evidence of a causal link between unemployment and physical ill health comes from census-based longitudinal studies (for example the OPCS longitudinal study; section 2.3.3 page 39). However, these studies firstly, only measured mortality and secondly, did not have enough measurements on background variables to adequately control for the effect of common factors associated with both unemployment and increased morbidity. In agreement with the longitudinal studies, in the BRHS cohort non-employed men
compared to employed men, had an increased risk of death from all causes in the five and a half years after their measured non-employment occurred. This raised mortality remained despite being able to adjust for more background variables (in particular self-assessed health and health-related behaviour) than other studies have been able to do. Men who retired for reasons other than ill health had few background factors in common with other groups of non-employed men, which implies that their observed raised mortality is unlikely to be totally explained by other background factors associated with both mortality and non-employment. This suggests that some of the increased risk of death is attributable to the direct and indirect consequences of non-employment.

Smaller reported studies have measured a wider range of background variables. However, they tend to lack power to detect any health effects and most of these studies were based on factory closures, which prevents the results being generalised to a wider population of unemployed people (section 2.3.3 page 46). Also there was a lack of objective health measures in these studies; self-reported health status and general practice consultation rates were usually the health measures (for example the Calne Study section 2.3.3 page 48). The present thesis did not analyse changes in health status between Initial Screening and the Postal Questionnaire, but changes in GP consultation rates were examined. On experiencing non-employment, unemployed ill and retired ill men dramatically increased their GP consultation rates, retired not-ill men increased their rates to a lesser extent and unemployed not-ill men did not decrease their rates as much as might have been expected from their high levels prior to unemployment.

Few reported studies have examined the changes in health-related behaviour associated with non-employment. In the BRHS, the only evidence to suggest that non-employment adversely affected health-related behaviour was that on experiencing non-employment, men were more likely to gain over 15% in weight than men who remained continuously employed. There was no evidence to suggest that these men started smoking or drinking more heavily. In fact men who stated
Chapter 11 Conclusions

11.3.4 Unemployment affecting some men more than others

Data from the GHS suggest that the class differences in health for the jobless are greater than the class differences in health among those in work (Aber S 1987). There was very little evidence that unemployment had a greater effect on certain groups of the BRHS cohort. The only evidence was a suggestion that manual workers were more likely to gain weight than non-manual workers on becoming non-employed. Men who had experienced more non-employment in the past were less likely to change their health-related behaviour on experiencing further periods of non-employment. They were still more likely to gain weight.

11.3.5 Early retirement

The largest reported study on early retirement and subsequent mortality (3971 men) reported no significant differences in mortality over nine years of follow-up of men who retired early (aged 62-64) compared to men who retired at age 65 (Haynes SG, et al 1978). In contrast, men who retired early for reasons other than ill health in the BRHS had an increased risk of death from all causes in the five and a half years of follow-up compared to men who remained employed. These differences may reflect the differences in life circumstances of men retiring in the late 1960's in America and the early 1980's in Great Britain.

11.4 IMPLICATIONS FOR THE DEBATE ON UNEMPLOYMENT AND HEALTH

This thesis demonstrates that the health and health-related behaviour of non-employed men both prior to and during their non-employment needs to be taken into account when comparing their subsequent morbidity and mortality with employed men. However, the raised mortality of non-employed men compared to
employed men in the BRHS, still could not be explained fully by a wide range of background factors including self-assessed health status and health-related behaviour. The morbidity and mortality of men who retire early also needs to be considered when examining the health implications of high levels of unemployment in society.

11.5 LIMITATIONS OF THE DATA

In this thesis the definition of unemployment does not depend on men 'seeking employment', in particular many of the unemployed ill men were not actively seeking work and so would not be classified as unemployed in other studies. Thus the results cannot be directly compared to many other studies of health of unemployed men. The lack of objective health measures on the Postal Questionnaire, the lack of knowledge regarding the precise timing and amount of unemployment occurring between Initial Screening and the Postal Questionnaire, and the lack of reasons for consulting the GP all limit the results that can be obtained from the data. In particular it was only possible to assess the effect of the non-employment on health by examining the mortality data. Finally, the lack of any psychological measures, results in this thesis being unable to consider a major impact of unemployment on these men.

11.6 FURTHER WORK

The main area of further work to be completed is to examine the association between mortality and non-employment in greater detail (see 9.6 for specific topics to be investigated).
11.7 THE LAST WORD...

The effects of non-employment on physical health cannot be examined in isolation from other features of both the individual and the society he is living in. This thesis is about individuals experiencing non-employment, so it seems fitting to end with a quote from one of the respondents on being asked the reasons for non-employment:

"Illness mainly. But my firm no longer exists. So if was fit no place to go. And at the age of 60 years no chance" ...
REFERENCES


THIS IS A MEDICAL RESEARCH SURVEY

ALL THE INFORMATION IS CONFIDENTIAL

PERSONAL HEALTH RECORD

All the information recorded in this personal health record will be treated as strictly confidential and will be available only to your own doctor and the Regional Heart Study team. The results of the analysis of your replies to the questionnaire and the physical measurements made will be used by your own doctor as part of the individual health care which he provides for you. The results of the research involving all the men taking part in the study will appear only in the form of general statistics from which it will be impossible to identify you as an individual.

If you have any questions or problems about any of the procedures included in your examination, do not hesitate to ask the members of the Study team.

THANK YOU FOR YOUR CO-OPERATION IN THIS STUDY. THE FINDINGS WILL HELP TO IMPROVE THE HEALTH OF MEN THROUGHOUT THE COUNTRY.
### 1. GENERAL

#### What is your date of birth?
- Day
- Month
- Year

#### Where were you born?
- Town
- County
- Country

#### How many years have you lived within 10 miles of this town?
If you have moved to this area within the last five years, where did you move from?

#### What is your marital status?
- Single
- Married
- Widowed
- Other

#### How many children do you have?
- <5 yrs.
- 5-10 yrs.
- 11-16 yrs.
- >16 yrs.

### 2. YOUR FATHER

#### Where was your father born?
- Town
- County
- Country

#### Is your father alive? (Y/N)
- [ ] Yes
- [ ] No

#### How old is he now? / How old was he when he died?
- [ ] [ ] years
2.4 If your father has died, what were you told was the cause of his death?
   Heart trouble 1
   High blood pressure 2
   Stroke 3
   Respiratory disease 4
   Cancer of lung 5
   Other cancer .......... 6
   Accident or injury 7
   Other .................. 8
   Don't know 9

3. YOUR MOTHER

3.1 Where was your mother born?
   Town ......................
   County ....................
   Country ....................

3.2 Is your mother alive? (Y/N)

3.3 How old is she now? / How old was she when she died?

3.4 If your mother has died, what were you told was the cause of her death?
   Heart trouble 1
   High blood pressure 2
   Stroke 3
   Respiratory disease 4
   Cancer of breast 5
   Other cancer .......... 6
   Accident or injury 7
   Other .................. 8
   Don't know 9

4. OCCUPATION

4.1 What is your present job? ..............................
   If employed go to question 4.4

4.2 If you are unemployed, for how long has this been? <6 weeks 1
   6wk.-5mo. 2
   6mo.-1yr. 3
   >1 year 4
4.3 Is this because of ill health? (Y/N)  
........................................................................................................

4.4 What kind of work have you done for the longest period of time?  
........................................................................................................

4.5 What business or industry is this?  
........................................................................................................

4.6 How many years have you done this kind of work?  

4.7 Are/were you:

SELF-EMPLOYED
- with 25 or more employees 1
- with less than 25 employees 2
- without employees 3

MANAGER
- of 25 or more people 4
- of less than 25 people 5

FOREMAN ................................. 6

ORDINARY EMPLOYEE...................... 7

ARMED SERVICES ......................... 8

5. SEVERE CHEST PAIN

5.1 Have you ever had a severe pain in your chest lasting for half an hour or more? (Y/N)
If NO, go to question 6.

5.2 Where did you get this severe pain?
(Show chart.)

5.3 Did you see a doctor because of this pain? (Y/N)

6. CHEST PAIN

6.1 Do you ever have any pain or discomfort in your chest? (Y/N)
If NO, go to question 7.

6.2 When last did you get the pain?
- Within 1 month 1
- 1-5 months ago 2
- 6-12 months ago 3
- Over 1 year ago 4
- Occasionally 5
6.3 How often do you get it?
- Daily 1
- Weekly 2
- Monthly 3
- Once only 4
- Occasionally 5

6.4 Where do you get this pain or discomfort?
(Show chart.)

6.5 When you walk at an ordinary pace on the level, does this produce the pain? (Y/N)

6.6 When you walk uphill or hurry, does this produce the pain? (Y/N)

6.7 When you get any pain or discomfort in your chest on walking, what do you do?
- Stop 1
- Slow down 2
- Continue at the same pace 3

6.8 Does the pain or discomfort in your chest go away if you stand still? (Y/N)

6.9 How long does it take to go away?
- 10 minutes or less 1
- More than 10 minutes 2

7. PHLEGM, COUGH AND BREATHING

7.1 Do you usually bring up phlegm (spit) from your chest first thing in the morning in the winter? (Y/N)
If NO, go to question 7.4.

7.2 Do you bring up phlegm like this on most days for as much as 3 months in the winter each year? (Y/N)

7.3 In the past 3 years have you ever had a period of increased cough and phlegm lasting 3 weeks or more?
- Yes, once 1
- Yes, twice or more 2
- Never 3

7.4 Does your chest sound wheezy or whistling on most days (or nights)? (Y/N)
7.5 Does the weather affect your breathing?
And if so, at what season of the year is it most affected?

<table>
<thead>
<tr>
<th>Option</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not affected</td>
<td>1</td>
</tr>
<tr>
<td>Winter</td>
<td>2</td>
</tr>
<tr>
<td>Summer</td>
<td>3</td>
</tr>
<tr>
<td>Both</td>
<td>4</td>
</tr>
</tbody>
</table>

8. BREATHLESSNESS

8.1 Do you get short of breath walking with people your own age on level ground? (Y/N)

8.2 On walking up hills or stairs, do you get more breathless than people your own age? (Y/N)

8.3 Do you ever have to stop walking because of breathlessness? (Y/N)

S.E.G.

Social Class

Activity Score
9. **LEG PAIN**

9.1 Do you ever get pain in your calf muscles on walking at an ordinary pace, on the level? (Y/N)

9.2 Do you get pain in your calf muscles when you walk uphill or hurry? (Y/N)

10. **MEDICAL HISTORY**

10.1 Have you ever been told by a doctor that you have, or have had, any of the following?

<table>
<thead>
<tr>
<th>Condition</th>
<th>(Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angina</td>
<td></td>
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<tr>
<td>Heart attack</td>
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<tr>
<td>Coronary thrombosis</td>
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<tr>
<td>Myocardial infarction</td>
<td></td>
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<tr>
<td>Other heart trouble</td>
<td></td>
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<tr>
<td>High blood pressure</td>
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<td>Stroke</td>
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<td>Diabetes</td>
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<td>Peptic ulcer</td>
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<td>Gout</td>
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<td>Gall bladder disease</td>
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<td>Thyroid disease</td>
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<tr>
<td>Arthritis</td>
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<td>Bronchitis</td>
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<tr>
<td>Asthma</td>
<td></td>
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<tr>
<td>Other condition(s)</td>
<td></td>
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<tr>
<td>including surgery</td>
<td></td>
</tr>
</tbody>
</table>

10.2 Are you on any regular medical treatment from a doctor for any condition? (Y/N)

If NO, go to question 10.3.

Do you know if the pills/medicines/injections are:-

<table>
<thead>
<tr>
<th>Medication</th>
<th>(Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tranquillizers</td>
<td></td>
</tr>
<tr>
<td>Pain killers</td>
<td></td>
</tr>
<tr>
<td>Antihypertensive drugs</td>
<td></td>
</tr>
<tr>
<td>Anticoagulants</td>
<td></td>
</tr>
<tr>
<td>Lipid lowering drugs</td>
<td></td>
</tr>
</tbody>
</table>
### Oral antidiabetics (Y/N)

### Injection of insulin (Y/N)

### Any others (Y/N)

### Don't know (Y/N)

#### 10.3 Have you taken any of these in the last 48 hours?

- Tranquillizers (Y/N)
- Pain killers (Y/N)
- Antihypertensive drugs (Y/N)
- Anticoagulants (Y/N)
- Lipid lowering drugs (Y/N)
- Oral antidiabetics (Y/N)
- Injection of insulin (Y/N)
- Any others (Y/N)
- Don't know (Y/N)

### 11. DIET & ALCOHOL

#### 11.1 How many times during an average week would you have the following foods?

- Meat (including beef, lamb, pork, bacon in any form)
- Chicken
- Fish
- Eggs - how many eggs do you eat in a week?
- Cheese - how often do you eat cheese, including cheese dishes?
- Breakfast cereals - how often do you eat these (porridge included)? State kind

#### 11.2 What kinds of bread do you eat?

- White (Y/N)
- Brown (Y/N)
- Wholemeal (Y/N)
- Other (Y/N)

#### 11.3 Spreading fats: What kinds do you use at home?

- Butter (Y/N)
- Margarine
  
  (State kind or brand name.)

#### 11.4 Do you take sugar?

- In tea (Y/N)
- In coffee (Y/N)
- In other drinks (Y/N)
11.5 Do you use milk?  
   On cereals  (Y/N)  
   In tea  (Y/N)  
   In coffee  (Y/N)  
   As a milk drink  (Y/N)  

11.6 (i) Would you describe your present alcohol intake as:  
   None  1  
   On special occasions only  2  
   Once or twice a month  3  
   Weekends  4  
   Daily/most days  5  

If NONE, go to question 12.  

(ii) What type of drink do you usually take?  
   Beer  1  
   Spirits  2  
   Wine/sherry  3  
   Mixed beer & spirits  4  
   Mixed beer, spirits, wine and sherry  5  

(iii) How much do you usually take?  
   2 drinks a day or less  1  
   3-6 drinks a day  2  
   More than 6 drinks a day  3  

(One drink is a single whisky, gin or brandy, a glass of wine, sherry or port or half a pint of beer.)
12. SMOKING

12.1 (i) Do you smoke at present? Yes, regularly 1

No 2

Occasionally 3

If NO, go to question 12.6.

(ii) How old were you when you started?

(iii) Have you ever given up smoking? (Y/N)

(iv) If yes, what is the maximum time for which you have given up smoking?

12.2 (i) Do you smoke cigarettes now? Yes, regularly 1

No 2

Occasionally (<1 day) 3

If NO, or OCCASIONALLY, go to question 12.3.

(ii) How many cigarettes do you usually smoke a day?

(iii) If hand rolled, how much tobacco do you use a week? (ozs.)

Now proceed to 12.4.

12.3 (i) Were you previously a regular cigarette smoker? (Y/N)

(ii) If yes, how many cigarettes did you usually smoke a day?

(iii) At what age did you change to a pipe and/or cigars?

12.4 (i) Do you smoke a pipe now? Yes, regularly 1

No 2

Occasionally 3

If NO, or OCCASIONALLY, go to question 12.5.

(ii) If YES, how many ozs. a week do you smoke?

12.5 (i) Do you smoke cigars now? Yes, regularly 1

No 2

Occasionally 3

(ii) If YES, how many cigars do you smoke a day? Large 31

Small 33

If you smoke ANYTHING currently, go to question 13.
12.6 (i) Have you ever smoked for more than 1 month? (Y/N)

How much did you usually smoke:
- Cigarettes (per day)
- Pipe (ozs) (per week)
- Cigars (per day) Large
- Small

If NO, go to question 13.

(ii) At what age did you start smoking?

(iii) At what age did you finally stop smoking?

(iv) What was the maximum time between these two ages for which you gave up smoking?

13. EXERCISE

13.1 (i) Do you usually walk or cycle in the course of your journeys to or from work each day? Yes 1
- Walk 2
- Cycle 3

If YES, how many minutes do these journeys take?

(ii) Apart from your journeys to or from work, do you usually walk or cycle on weekdays? Yes 1
- Walk 2
- Cycle 3

If YES, how many minutes do you walk/cycle each day?

(iii) Would you say that in your occupation you are physically:
- Very active 1
- Fairly active 2
- Average 3
- Fairly inactive 4
- Very inactive 5

13.2 On average, a man of your age spends 4 hours on most weekends on some of the following activities: walking, gardening, household chores, DIY projects.

Compared to such a man, how physically active do you consider yourself?
- Very active 1
- Fairly active 2
- Average 3
- Fairly inactive 4
- Very inactive 5
13.3 Apart from these activities, do you take active physical exercise, e.g. running, digging, swimming, tennis, golf, sailing, etc. 

<table>
<thead>
<tr>
<th>Frequency</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Occasionally</td>
<td></td>
</tr>
<tr>
<td>Frequently</td>
<td></td>
</tr>
</tbody>
</table>

If NO or OCCASIONALLY - stop here.

13.4 Please state type of activity ...........................................

13.5 How many years have you been involved in this activity?

13.6 How many times a month (on average) do you undertake these activities?

<table>
<thead>
<tr>
<th>Season</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td></td>
</tr>
</tbody>
</table>

Administrator □ □
Coder □ □
<table>
<thead>
<tr>
<th>Units</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>11</td>
</tr>
<tr>
<td>Weight</td>
<td>16</td>
</tr>
<tr>
<td>Blood Pressure $S_1$</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Blood Pressure $S_1$</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>29</td>
</tr>
<tr>
<td>FVC</td>
<td>32</td>
</tr>
<tr>
<td>FEV1</td>
<td>35</td>
</tr>
<tr>
<td>FVC</td>
<td>38</td>
</tr>
<tr>
<td>FEV1</td>
<td>41</td>
</tr>
<tr>
<td>Pulse Rate</td>
<td>44</td>
</tr>
</tbody>
</table>
What is your age? 

<table>
<thead>
<tr>
<th>30-39</th>
<th>Over 40</th>
</tr>
</thead>
</table>

**START ANSWERING QUESTIONS HERE**

1.0  How would you describe your health at present? 

- Excellent
- Good
- Fair
- Poor

2.0  Have you ever been told by your doctor that you have, or have had, any of the following?: 

- Angina
- Heart attack
- Coronary thrombosis
- Myocardial infarction
- Other heart trouble
- High blood pressure
- Stroke
- Diabetes
- Peptic ulcer
- Gout
- Gall bladder disease
- Thyroid
- Arthritis
- Bronchitis
- Asthma
- None of the above conditions
- Other conditions (including surgery) ......

3.0  Are you on any regular treatment from a doctor for any condition? 

- YES 
- NO 

3.1  IF YES, please tick (✓) all those you are on 

- Drugs to lower blood pressure
- Diuretics ("water tablets")
- Tranquillisers
- Insulin injections
- Tablets for diabetes
- Other treatments - give name if possible
4.0 CHEST PAIN

4.1 Do you ever have any pain or discomfort in your chest?

YES

NO

IF NO, turn over to Question 5.0

IF YES, please answer the following questions:

4.2 Where do you get this pain or discomfort?

Mark X on the appropriate places

RIGHT SIDE

LEFT SIDE

4.3 When you walk at an ordinary pace on the level, does this produce the pain?

YES

NO

4.4 When you walk uphill or hurry, does this produce the pain?

YES

NO

4.5 When you get any pain or discomfort in your chest on walking, what do you do?

Stop

Slow down

Continue at the same pace

4.6 Does the pain or discomfort in your chest go away if you stand still?

YES

NO

4.7 How long does it take to go away?

10 minutes or less

More than 10 minutes
5.1 Have you ever had a severe pain across the front of your chest lasting for half an hour or more?

IF YES

5.2 Did you see a doctor because of this pain?

YES

5.3 What year(s) did this happen? ..............


6.0 ILLNESS AND INJURY

1 In the last 5 years, have you had any illness or injury which has kept you off work for more than one month?

YES

NO

2 IF YES, how many times?

Once

Twice

Three times

More

3 How long was the longest period off work with illness or injury?

........................................................................................................

4 What was the illness/injury?

........................................................................................................


7.0 WEIGHT

Has your weight changed since you were examined 5 years ago?

No change

Increased

Decreased

Don't know

What is your present weight?

(Indoor clothes, no shoes)

st. lb. or kg

If you have no scale, please fill in an estimate.
8.0 PERSONAL CIRCUMSTANCES

8.1 Are you:
   married
   single
   widowed
   other e.g. divorced, separated

8.2 If married, does your wife work?
   No
   Yes - part-time
   Yes - full-time

8.3 Please describe your accommodation. Are you:
   an owner-occupier
   renting privately
   renting from the council
   other ...................................................(please specify)

8.4 How many cars are there available for use in your household?
   None
   One
   Two or more

9.0 SMOKING

9.1 Do you regularly smoke cigarettes?
   YES
   NO

9.2 IF YES, how many cigarettes do you usually smoke a day?  

9.3 Do you regularly smoke a pipe or cigars?
   YES
   NO
10.1 Would you describe your present alcohol intake as:
- Daily/most days
- Weekends only
- Once or twice a month or special occasions
- None

10.2 How much do you usually take?
- More than 6 drinks a day
- 3-6 drinks a day
- 2 drinks a day or less
- Any additional information

FOR NON-DRINKERS ONLY - please answer these questions:

10.3 Why do you not drink at present?
- Personal choice
- Doctor's advice
- Definite illness

Name of illness ..........................................................
Other reasons (state) ..................................................

10.4 Did you drink in the past?
- YES
- NO

10.5 IF YES, would you describe your PREVIOUS alcohol intake as:
- Daily/most days
- Weekends
- Once or twice a month or special occasions

10.6 How much DID you usually take when you were drinking?
- More than 6 drinks a day
- 3-6 drinks a day
- 2 drinks a day or less

One drink is half a pint of beer, a single whisky, gin or brandy, a glass of wine or sherry.
COUNT PINTS OR DOUBLES AS 2 DRINKS.
11.1 AT PRESENT are you:
- Employed full-time
- Employed part-time
- Unemployed
- Registered Disabled
- Retired

11.2 IF RETIRED:
- Age at retirement
- Reason for retirement:
  - Normal retiring age
  - Illness (completely or in part)
  - Other reasons
- Please give details (of illness or other reasons)

11.3 How long have you been unemployed on this occasion

11.4 Reasons for present unemployment:
- Redundancy
- Illness (completely or in part)
- Other reasons
- Please give details
12.0 TO BE ANSWERED BY EVERYONE - whether employed, unemployed or retired.

This question is about any unemployment in the last five years, i.e. since you were examined by our nurses.

12.1 Have you had any periods of unemployment in the past five years? (apart from any present unemployment)

YES [ ]

NO [ ]

IF YES, please answer the following questions:

12.2 How many separate periods of unemployment have you had in the past five years (excluding any present unemployment)?

1 [ ]

2 [ ]

3 or more [ ]

12.3 How long was the longest of these periods of unemployment (not counting any present unemployment)?

.....................

12.4 Reasons for longest period of unemployment

Redundancy [ ]

Illness (completely or in part) [ ]

Other reasons [ ]

Please give details .....................

..........................................

..........................................
13.0 **TO BE ANSWERED BY EVERYONE** - whether employed, unemployed or retired.

In the *5 years BEFORE* you were examined by the nurses:

13.1 Were you unemployed at any time?

   [ ] YES  
   [ ] NO

IF YES, please answer the following questions:-

13.2 How long was your longest period of unemployment ............... 

13.3 Reasons for longest period of unemployment

   Redundancy  [ ]
   Illness (completely or in part)  [ ]
   Other reasons  [ ]

   Please give details ...........................................................................................................

   ..............................................................................................................................

PLEASE **READ THROUGH FROM THE BEGINNING AND CHECK THAT YOU HAVE ANSWERED ALL THE RELEVANT QUESTIONS. THEN, PLEASE RETURN THESE PAGES TO US IN THE ENVELOPE PROVIDED.**

THANK YOU.
Dear Doctor

Eight years ago your patient (details enclosed) participated in the Regional Heart Study and was examined by our team of nurses. Since that time he has been followed for the development of major cardiovascular events. We now propose to make the FINAL check of medical records and to withdraw the blue card from the patient's notes.

We would be grateful if you could answer the questions on the enquiry form by reviewing the records on this patient over the last eight years, even though he may not have been registered with you for all this time.

When you have completed the review could you please enclose the enquiry form, together with the blue card, in the envelope provided and return to us as soon as possible.

The diagnostic criteria relating to the events with which we are concerned are printed on the back of the blue card which has previously been placed in his notes.

May we take this opportunity of thanking you for your help in this study which has expanded from 25 group practices in 1978-80 to include almost 1000 GPs all over Great Britain.

If you would like to receive any reprints of publications from the study we would be pleased to supply them.

With kind regards

Yours sincerely

[Signature]

Professor A G Shaper
GP Consultation Rate Questionnaire

REGIONAL HEART STUDY - 8TH YEAR REVIEW SHEET

1. Is this patient still registered with you? YES  NO
   If NO, to which FPC area has he moved? .................
   If YES, please continue

2. Date of last consultation? ....................................

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<tbody>
<tr>
<td>Total No of consultations for any condition in each year</td>
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3. Since 1980 (during the last eight years) has any new or recurrent diagnosis been made of the following conditions? (We are not concerned with repeat visits for any of the established conditions.)

   Please give the month in which the diagnosis or visit was made by writing it in the appropriate box. If hospital letters are available relating to this event please circle this date.

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<tbody>
<tr>
<td>Myocardial Infarction</td>
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<td>Stroke</td>
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<tr>
<td>Transient Ischaemic Attack</td>
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<tr>
<td>Angina</td>
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<td></td>
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<tr>
<td>Coronary artery By-pass graft Angioplasty</td>
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</tr>
</tbody>
</table>

4. Signature of doctor ........................................ Date ....................................

Space for further comment over page.
APPENDIX D

CLEANING AND CODING THE EMPLOYMENT STATUS DATA

D.1 INTRODUCTION

The purpose of this appendix is to provide documentation so that given the raw data file of the BRHS the men can be classified into the same employment categories that have been used in this thesis. Any alterations that have been made to the raw data and the reasons for them are fully documented here.

D.2 JUSTIFICATION FOR CODING MEN WHO STATED THAT THEY HAD RETIRED AND WERE WORKING PART TIME AS WORKING PART TIME RATHER THAN RETIRED

29 men ticked both the working part time and the retired boxes on the Postal Questionnaire. 21 (72%) of these men were from social classes I or II and many indicated on the forms that it was a voluntary decision to work part time. These 29 men differed from the retired men and also from those men who just stated that they worked part time. Therefore it was decided to classify them as working part time and to take account of the heterogeneity of this group in the analyses. (In fact part time workers were excluded from the majority of the analyses).

D.3 INDIVIDUALS WITH NO EMPLOYMENT CODE AT INITIAL SCREENING (N=7)

6 men stated that they were unemployed, but did not state whether this was due
to illness or not (105803, 139021, 211223, 212554, 221046, 237898). These men were included in the analyses, as the reason for unemployment at Initial Screening was not used. The 7th man did not complete the question on whether he was employed/unemployed or retired (141198). He was not included in subsequent analyses.

D.4 INDIVIDUALS WITH NO EMPLOYMENT CODE AT POSTAL QUESTIONNAIRE (N=29)

14 men did not complete any of the unemployment questions (18822, 109497, 112171, 112513, 117121, 130544, 205822, 219726, 242463, 243134, 243202, 246271, 249008, 2325753), 4 men stated that they were unemployed, but gave no reason for it (133497, 215803, 220744, 230846) and 5 men stated that they were retired with no reason (101696, 102697, 110793, 202805, 203149). One man stated that he was waiting to have an operation and implied that he did have a job, but this was unclear (21828). Two men stated that they were unemployed, but then proceeded to give the age at which they had retired and the reasons for it (113281, 116197). Three men filled in the form in incorrectly (127502, 108879, 110515). All these men are excluded from the analyses.

D.5 SAS PROGRAM TO CORRECT THE RAW DATA AND CREATE THE EMPLOYMENT CATEGORIES

```sas
* FILE TO CREATE ALL EMPLOYMENT CODES ETC
* C = RAWDATA FILE
* LAST MODIFIED : 1 DECEMBER 1990
*
DATA TEMP;
INFILE C;
* THIS INPUTS THE DATA
*
INPUT #1 CODE 1-8 SEMP 46 SILL 47
  #7 DEATH 21
  #9 MOVED 25-27 DATEM 30-31 MOVED2 32-34
```
Appendix D  Cleaning and Coding the Employment Status Data

* THIS CODES THE OLD EMPLOY CODE

1. IF EMP1 = 1 OR EMP2 = 1 THEN EMP = 1;
2. IF EMP1 = 2 AND EMP2 NE 5 THEN EMP = 2;
3. IF EMP2 = 2 AND EMP1 NE 5 THEN EMP = 2;
4. IF EMP1 = 3 AND EMP2 NE 6 THEN EMP = 3;
5. IF EMP2 = 3 AND EMP1 NE 6 THEN EMP = 3;
6. IF EMP1 = 5 AND EMP2 NE 6 THEN EMP = 5;
7. IF EMP2 = 5 AND EMP1 NE 6 THEN EMP = 5;
8. IF EMP1 = 9 THEN EMP = 9;
9. IF EMP1 = 4 AND EMP2 = 9 THEN EMP = 9;
10. IF EMP = 5 AND RRET = 1 THEN EMPLOY = 7;
11. IF EMP = 5 AND RRET = 2 THEN EMPLOY = 6;
12. IF EMP = 5 AND RRET = 3 THEN EMPLOY = 6;
13. IF EMP = 5 AND RRET = 4 THEN EMPLOY = 6;
14. IF EMP = 5 AND RRET = 9 THEN EMPLOY = 6;
15. IF EMP = 9 THEN EMPLOY = 9;
16. IF EMP = 3 AND REMP = 1 THEN EMPLOY = 4;
17. IF EMP = 3 AND REMP = 2 THEN EMPLOY = 3;
18. IF EMP = 3 AND REMP = 3 THEN EMPLOY = 3;
19. IF EMP = 3 AND REMP = 5 THEN EMPLOY = 3;
20. IF EMP = 6 THEN EMPLOY = 3;
21. IF REMP = 9 AND EMP = 3 THEN EMPLOY = 9;
22. IF EMP = 1 THEN EMPLOY = 1;
23. IF EMP = 2 THEN EMPLOY = 2;

* THIS CODES SCREENING EMPLOY CODES

1. IF SEMP = 0 OR SEMP = . THEN SEMPLOY = 1;
2. IF SEMP = 1 OR SEMP = 2 OR SEMP = 3 OR SEMP = 4
   OR SEMP = 9 THEN DUMMY = 2;
3. IF DUMMY = 2 AND SILL = 1 THEN SEMPLOY = 3;
4. IF DUMMY = 2 AND SILL = 2 THEN SEMPLOY = 5;
5. IF SEMP = 5 AND SILL = 2 THEN SEMPLOY = 6;
6. IF SEMP = 5 AND SILL = 1 THEN SEMPLOY = 8;

* THIS RECODES INDIVIDUALS

1. IF CODE = 216316 THEN TIMEU = 98;
2. IF CODE = 28803 THEN UYORN5 = 3;
3. IF CODE = 110452 THEN UYORN5 = 3;
4. IF CODE = 110452 THEN UYORN = 8;
5. IF CODE = 118851 THEN UYORN5 = 3;
6. IF CODE = 205789 THEN UYORN = 8;
7. IF CODE = 208222 THEN UYORN5 = 3;
8. IF CODE = 208222 THEN UYORN = 8;
9. IF CODE = 213836 THEN UYORN5 = 3;
10. IF CODE = 218736 THEN UYORN5 = 3;
11. IF CODE = 219847 THEN UYORN5 = 3;
12. IF CODE = 219847 THEN UYORN = 8;
13. IF CODE = 247314 THEN UYORN5 = 3;
14. IF CODE = 247314 THEN UYORN = 8;
15. IF CODE = 1009341 THEN UYORN5 = 3;
16. IF CODE = 1019547 THEN UYORN5 = 3;
17. IF CODE = 1028325 THEN UYORN5 = 3;
18. IF CODE = 1028325 THEN UYORN = 8;
19. IF CODE = 2359688 THEN UYORN5 = 3;
20. IF CODE = 2359688 THEN UYORN = 8;
21. IF CODE = 2388783 THEN UYORN5 = 3;
Appendix D  Cleaning and Coding the Employment Status Data

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IF CODE = 2388783 THEN UYORN = 8;
IF CODE = 3331593 THEN UYORNS = 3;
IF CODE = 3331593 THEN UYORN = 8;
IF CODE = 121634 THEN EMP1 = 3;
IF CODE = 136814 THEN EMP1 = 9;
IF CODE = 136676 THEN EMP2 = 6;
IF CODE = 142781 THEN EMP2 = 6;
IF CODE = 100992 THEN RRET = 1;
IF CODE = 103588 THEN RRET = 3;
IF CODE = 107724 THEN RRET = 3;
IF CODE = 233278 THEN EMP2 = 2;
IF CODE = 115128 THEN EMP1 = 3;
IF CODE = 115128 THEN REMP = 2;
IF CODE = 6812 THEN AGE = 56;
IF CODE = 200431 THEN AGE = 60;
IF CODE = 110694 THEN AGER = .;
IF CODE = 140186 THEN AGER = .;
IF CODE = 144332 THEN AGER = .;
IF CODE = 200245 THEN AGER = .;
IF CODE = 207703 THEN AGER = .;
IF CODE = 212723 THEN AGER = 57;

* THIS CREATES NEW EMPLOY CLASSIFICATION

IF EMP1 NE . THEN JOB = 9;
IF EMP1 = 6 OR EMP2 = 6 THEN JOB = 3;
IF EMP1 = 5 OR EMP2 = 5 THEN DJOB = 8;
IF RRET = 1 AND DJOB = 8 THEN JOB = 7;
IF RRET = 2 AND DJOB = 8 THEN JOB = 6;
IF RRET = 3 AND DJOB = 8 THEN JOB = 8;
IF RRET = 4 AND DJOB = 8 THEN JOB = 8;
IF RRET = 5 AND DJOB = 8 THEN JOB = 6;
IF EMP1 = 3 OR EMP2 = 3 THEN DJOB = 5;
IF REMP = 1 AND DJOB = 5 THEN JOB = 4;
IF REMP = 2 AND DJOB = 5 THEN JOB = 3;
IF REMP = 3 AND DJOB = 5 THEN JOB = 5;
IF REMP = 4 AND DJOB = 5 THEN JOB = 3;
IF REMP = 5 AND DJOB = 5 THEN JOB = 3;
IF EMP1 = 2 OR EMP2 = 2 THEN JOB = 2;
IF EMP1 = 1 OR EMP2 = 1 THEN JOB = 1;

* THIS CREATES ANOTHER EMPLOY CLASSIFICATION

FEMP = JOB + 1;
IF SEMPLOY = 1 AND JOB = 1 AND UYORN = 2 THEN FEMP = 1;
IF JOB = 9 THEN FEMP = 11;
IF FEMP = . AND DEATH > 0 AND DEATH < 5 THEN FEMP = 10;
IF FEMP = . THEN FEMP = 11;

* THIS CODES MISSING VALUES FOR TIMEUB TIMEUS TIMEU

* AGER AGE UYORN UYORNS

IF UYORN = 9 THEN UYORN = .;
IF UYORNS = 9 THEN UYORNS = .;
IF TIMEU = 99 THEN TIMEU = .;
IF TIMEUB = 99 THEN TIMEUB = .;
IF TIMEUS = 99 THEN TIMEUS = .;
IF AGER = 99 THEN AGER = .;
IF NOU = 4 THEN NOU = 3;
IF AGE > 65 THEN AGE = .;
ENDSAS;
D.6 REASONS FOR RECODING INDIVIDUALS IN ABOVE PROGRAM

The variable UYORN (any unemployment between Initial Screening and the Postal Questionnaire) was coded 8, meaning continuous unemployment between Initial Screening and the Postal Questionnaire for 11 men who were unemployed at the Postal Questionnaire and had been so since Initial Screening (110452, 136195, 205789, 208222, 218386, 219847, 247314, 1028325, 2359688, 2388783, 3331593). The variable UYORN5 (any unemployment before Initial Screening) was coded 3 for 15 men who were unemployed at Initial Screening (28803, 110452, 118851, 11381, 208222, 218386, 218736, 219847, 247314, 1009341, 1019547, 1028325, 2359688, 2288783, 3331593). For 6 men it was assumed that the data had been incorrectly entered as the data on the employment questions on the forms did not agree with the data on computer (136676, 142781, 233278, 121634, 136814, 216316). This was also true for the age of two men (6812, 200421). The relevant corrections were made. One man had two completed Postal Questionnaires, one with more details about his employment status (115128). One man stated that he had retired at 65 and then gave no reasons for retirement. He was classified as retiring due to age (100992). Two men stated that they had retired, after having been made redundant. They were classified as having retired due to other reasons (103588, 107724). For 6 men, their age of retirement was coded as missing as it was inconsistent with their actual ages (110694, 140186, 144332, 200245, 207703, 2020418).

D.7 INCONSISTENCIES IN THE DATA

D.7.1 Men unemployed for > 5 years at the Postal Questionnaire

All men unemployed for longer than 5 years at the Postal Questionnaire would be expected to have been unemployed at the time of the Initial Screening. However, this was not the case for 10 men who had stated that they were employed when screened initially. 4 men stated that they were retired at Initial Screening, but this inconsistency might be due to the employment questions being different at Initial
Screening and the Postal Questionnaire. These inconsistencies were not recoded.

D.7.2 Men retired for > 5 years at the Postal Questionnaire
All men retired for longer than 5 years at the Postal Questionnaire would be expected to have been retired/unemployed at the time of the Initial Screening. However, this was not the case for 5 men who had stated that they were employed when screened initially. These inconsistencies were not recoded.

D.7.3 Men retired for < 0 years at the Postal Questionnaire
The length of time a man was retired was calculated from his age and the age at which he stated he had retired. For 6 retired men, their age of retirement was older than their current age. These were recoded as appropriate (see D.6)

D.8 CONCLUSIONS ON QUALITY OF THE DATA

There are very few noticeable inconsistencies in the unemployment data and very few corrections have been made to the raw data.
APPENDIX E

CLEANING AND CODING THE GENERAL PRACTICE CONSULTATION RATE DATA

E.1 INTRODUCTION

The purpose of this appendix is to provide documentation on any alterations that have been made to the raw data and the reasons for them. As this data had not been used previously extensive checks were carried out.

E.2 CODING THE DATA

See Appendix C for the form completed by the general practitioners).

i) Any comments written on the form were taken account of first.

ii) '0' 'nil' 'none' etc were taken to be 0 ALWAYS

iii) Signs such as ' -' 'X' and blanks were sometimes taken to be 0 and sometimes taken to mean missing values depending on:

a) If 0's were filled in elsewhere on the form they were missing values.

b) If the 8 boxes were all filled in or left blank with the same sign then:

i. If the date of the last consultation was filled in and before 1978 then they were taken as 0.

ii. If the date of the last consultation was filled in and was between 1978 and 1988, then they were taken as missing values.

iii. If the date of the last consultation was not filled in and no other indication was given on the form, then they were taken as missing values.

iv. If there was any indication that the form had not been completed (eg a note on the back saying no time) they were taken as missing values.
c) If all of the boxes were left blank just before a move and the rest of the form was completed fully after the move these were assumed to be missing values.

E.3 FORMS EXAMINED

E.3.1 All forms punched with ALL missing values (N=78)

These were reclassified as:

- Deaths : 5
- Emigrations : 3
- All zeros : 15
- Other figures : 3
- Partial completion : 4
- Still all missing : 48

E.3.2 All forms with some missing values punched (N=19)

These were reclassified as:

- Totally complete : 2
- Still incomplete : 17

E.3.3 All forms with all zeros before the first move (N=149)

(Note that 1043 men had moved). This was to try to identify those men who had moved and the current GP had completed the form for the years that the man had been registered with him, but not the previous years AND had not indicated it clearly on the form. (There are several men who moved that had missing values punched already).
These complete forms were reclassified as:

- **Totally missing**: 9
- **Partial completion**: 41
- **Altered (still complete)**: 2
- **Unaltered**: 97

**E.3.4 All forms with all zeros between the first and second move (N=5)**

This was to try and see if it was possible that the notes from the first GP had been examined, but the notes from the second were not. No alterations were found necessary. Also it was therefore felt that it was not worth examining the forms of the men who had moved in any greater detail.

**E.3.5 All forms with emigration coded, date of emigration prior to Year 8 and no missing values (N=3)**

Number recoded to some missing values: 3

**E.4 OTHER DATA CHECKS**

The dates of emigration and death were examined and it was found that data was missing due to emigration, but not coded as such on 12 forms and similarly data was missing due to death, but not coded as such on 7 forms. The date of death was checked on totally complete forms, to check that the man had not died prior to Year 8 and been incorrectly coded as not seeing the GP rather than having been excluded from the analysis. This had not in fact occurred.
E.5 FINAL NUMBERS AVAILABLE FOR ANALYSIS

Original no of men : 7735

No of deaths before Year 8 : 545

No totally missing due to emigration : 59

No totally missing due to none completion /incorrect completion of form : 54

No not located : 6

No partially complete : 61

No totally complete : 7010

Therefore out of 7131 men alive and living in Great Britain :

No complete (%) : 7010 (98.3)

No incomplete (%) : 61 (0.9)

No missing (%) : 60 (0.8)

E.6 CORRECTIONS MADE TO THE DATA

The majority of the above corrections were made to the raw data file. However there are 3 corrections that were not found in time. The men : 111299, 112071 and 226733 should have missing data as they emigrated and then returned to Britain. These corrections were made temporarily to my personal SAS system file, they are not present in the raw data file.

E.7 CONCLUSIONS ON QUALITY OF THE DATA

Very few corrections have been made to the raw data. However there is some uncertainty as to the coding of ‘zero’ values. Chapter 6 investigates the validity of the data by comparing it to other published data.
APPENDIX F

NOMINAL POLYTOMOUS REGRESSION MODELS

F.1 INTRODUCTION

Logistic regression is most frequently employed to model the relationship between a dichotomous outcome variable and a set of covariates. Logistic regression can be extended to model a polytomous outcome variable. If the categories of the outcome variable are not ordered the model fitted is called a nominal polytomous regression model (Hosmer D, Lemeshow S 1989).

F.2 THEORY

Given Y, a nominal response variable which has k categories, then the form of the nominal polytomous regression model is:

\[
(A) \quad g_j(X) = \log \left( \frac{P(Y = j|X)}{P(Y = S|X)} \right) = A_j + B_j X \quad j=1,\ldots,s-1,s+1,\ldots,k
\]

where X = the explanatory variables

B_j = the regression coefficients

A_j = the regression coefficients that are dependant on j only.

Therefore:

\[
(B) \quad P(Y = j \mid X) = \frac{\exp(g_j(X))}{\sum_{i=1}^{k} \exp(g_i(X))}
\]

where As = 0 and Bs = 0
The probability of being in category \( j \) is compared to the probability of being in category \( S \), for all \( k-1 \) categories. Nominal polytomous regression models were fitted using PROC CATMOD in SAS (Version 6.03). In the case where \( k = 2 \), the model reduces to the usual logistic regression model.

### F.3 JUSTIFICATION

Nominal polytomous regression models are useful when the outcome variable is categorical with an obvious reference category, but no intrinsic ordering of the categories. For instance when examining whether a factor influences subsequent employment status, the natural way of thinking about this is to compare the probability of experiencing a certain type of non-employment rather than remaining continuously employed. Continuous employment is a natural reference group and the other types of non-employment fall into no natural order.

The fit of a nominal polytomous regression model can be approximated by fitting individual binary logistic regression models (Begg CB, Gray R 1984). For example using the above notation \( k-1 \) models could be fitted separately modelling the probability of being in category \( j \) rather than \( S \) for the \( k-1 \) categories. The estimates of the logistic regression coefficients obtained from these models are consistent with fitting a nominal polytomous regression models and the loss in efficiency is not usually too great.
APPENDIX G

WILCOSKY'S MARGINAL PREDICTION METHOD OF ADJUSTING FOR COVARIATES

G.1 INTRODUCTION

One method of comparing epidemiological measures across populations is to use direct adjustment to control confounding. In this thesis, age, town and social class are the most common factors to be adjusted for. Even categorising age into only 4 5 year age bands results in direct adjustment becoming impractical as the strata have few observations, and the stratum specific measures and their standard errors become very unstable. Also, as interactions exist between age, town and social class, it was judged preferable to use regression adjustment based on analysis of covariance (Wilcosky TC, Chambless LE 1985).

G.2 THEORY

Suppose, that the outcome variable is binary (0,1) and the probability of being in category 1 is required, after adjusting for age. A logistic model is fitted and then the probability of being in category 1 is calculated for each person in a reference population given their actual age and other covariates. The sum of these probabilities gives the adjusted proportion of this population in category 1. J Lee gives the formulae to calculate the confidence intervals of the adjusted proportions using the covariance matrices of the estimated coefficients (Lee J 1981). (See Flanders WD, Rhodes PH 1985 for the derivation of the formulae). In practice the reference population chosen is usually the whole cohort. The method is easily extended to nominal polytomous regression models.
G.3 CALCULATION OF ADJUSTED PROPORTIONS

Suppose that a nominal polytomous regression model has been fitted, where:

\[ Y = \begin{cases} 
0 & \text{if man loses weight} \\
1 & \text{if man remains stable weight} \\
2 & \text{if man gains weight} 
\end{cases} \]

\[ X_1 = \text{Age of man} \]

\[ X_2 = \begin{cases} 
0 & \text{if man remains continuously employed} \\
1 & \text{if man experiences some non-employment} 
\end{cases} \]

The proportions of men in the different weight change categories by employment group adjusted for age are calculated in the following way.

A nominal polytomous regression model is fitted; the probability of gaining weight or losing weight compared to maintaining a stable weight is modelled (see F.2).

\( X_2 \) is set to zero for each man in the cohort and the probabilities of being in the different weight change categories are calculated from equations (F.2.A) and (F.2.B) using the estimated regression coefficients for each man. This is equivalent to assuming that each man is continuously employed and calculating his probability of weight change given his age. These probabilities are then summed over all the men, to give the estimated proportions of continuously employed men in each weight change category, given the age distribution of the whole cohort.

\( X_2 \) is then set to 1 and the probabilities recalculated and summed over all the men, to give the estimated proportions of men who experienced some non-employment in each weight change category, given the age distribution of the whole cohort.
These two sets of proportions are therefore adjusted for age and are directly comparable, as they assume the age distribution of the whole cohort.

This method can be extended to as many covariates as required. However it does assume that there are no interaction terms between the independent categorical variable of interest and the other covariates in the model. (There can be interactions between the other covariates). In practice this has proved a reasonable assumption for the data in this thesis.
APPENDIX H

ANALYSING CONSULTATION RATES

H.1 INTRODUCTION

Many different methods of analysing and modelling consultation rates have been reported. The methods used have been strongly dependant on the objectives of the study and the way in which the data were collected. In this appendix these different methods are reviewed and found not to be ideal for analysing the BRHS data. An alternative method is derived and its validity and power investigated.

H.2 PUBLISHED WORK ON ANALYSING AND MODELLING CONSULTATION RATES

H.2.1 Analysing consultation rates

The National Morbidity Studies collect the number of consultations over a whole year (NMS II, NMS III). The data are then generally analysed using the average number of consultations per annum per patient. This does have the advantage that the average is a good measure of the GPs workload, but the average is a poor summary statistic for describing the skew distribution of consultation rates.

The General Household Surveys record the number of times a patient has contacted their GP in the past 14 days. The probability of contacting the GP or not is then analysed. In order to estimate the average number of consultations over a year the number of visits in 14 days is multiplied by 26, which will give a reasonably precise estimate of the average consultation rate for a large group of people, but will be subject to large sampling errors for smaller groups.
In order to investigate various characteristics of people who visit their GP frequently compared to those who consult infrequently, studies often classify the subjects into ‘consulting’ groups according to their patterns of consultations (Courtenay MJF, et al 1974; Blaxter M 1985; Freer CB, et al 1986; Corney R, Murray J 1988). The main problem with studies using this approach is the arbitrariness of forming the ‘consulting’ groups. The final group of high consulters will usually contain a very large range of consultation rates. Emphasis is often placed on the non-consulters (Baker CD 1986; Kessel N, Shepherd M 1965).

H.2.2 Methods of modelling consultation rates

Several studies have attempted to model consultation rates. One study compared analysing use vs non-use in a year, with analysing the logged number of visits in the year and a truncated distribution (truncated at 13 visits per annum) (Beland F 1988). Transforming or truncating the data were preferable to analysing use vs non-use. An alternative study used the log of the actual number of visits, stating that this transformation was sufficient to normalize the data (Boaz R, Muller C 1989).

Various more complicated methods of modelling the number of consultations and their type (eg home visits, surgery attendances etc) have been attempted (Ashford JR, Pearson NG 1970; Ashford JR, Hunt RG 1974). These models were based on the concept that the individual patient is subject to episodes of ill health which start at defined points in time and each episode will generate varying numbers of contacts of different types. It is assumed that patients vary in their general health and that susceptibility to illness follows a characteristic distribution within a population of patients.

The only study which attempted to model several years data used a negative binomial distribution to model the number of consultations per annum over 3 years (Froggatt P, Merrett JD 1969). This was based on the hypothesis that differences in the likelihood of individuals in a homogeneous population to consult are distributed over the group as a Pearson type III curve.
Problems of interpretation may explain why such models do not seem to have been used in the subsequent literature.

H.3 ANALYSING AND MODELLING THE BRHS CONSULTATION RATE DATA

H.3.1 The univariate distribution of the consultation rates

Table H.1 gives the mean, standard deviation, skewness and kurtosis for each Year of the eight years of consultation rate data. The average number of consultations increased from 2.0 to 3.0 over Years 1 to 8. The skewness lies between 2.6 and 3.1 and the kurtosis between 10 and 24 (the skewness and kurtosis for a normal distribution are 0 and 3 respectively). This is because in any Year about 30% of the men did not consult their GP at all and a further 20% consulted only once, while some men consulted over 30 times.

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Maximum Value</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2.026</td>
<td>2.976</td>
<td>32</td>
<td>2.66</td>
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</tr>
<tr>
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</tr>
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<td>3.567</td>
<td>36</td>
<td>2.23</td>
<td>17.58</td>
</tr>
<tr>
<td>8</td>
<td>2.990</td>
<td>3.801</td>
<td>68</td>
<td>3.10</td>
<td>23.04</td>
</tr>
</tbody>
</table>
H.3.2 Initial analysis of the data

The aim of this appendix is to establish a method of analysing the number of consultations per annum which could be used not only in examining the association between non-employment and consultation rates, but could also be used in analysing the association between consultation rates and other factors not covered in this thesis.

The first approach was to attempt to normalise the consultations in Year 8 by applying various transformations to the data. No simple transformation managed to cope with the heavy tail of the distribution. More complicated transformations (such as the negative binomial distribution) were not attempted, because of the difficulty of interpreting the models.

The second approach was to categorise the data. The categories had to satisfy the following criteria:

1. Consultation rates would be used as an indication of the GPs workload and therefore just classifying men into whether they consulted or not in any one year would not be sufficient.
2. There had to be enough categories to be able to detect individual changes in consultation rates from one year to the next.
3. There is considerable interest in the non-consulters (due to the implications of the 1990 GP Contract), and therefore this group needs to be able to be identified.

The aim of section H.4 was to develop an objective method of deriving the categorisation of the consultation rates independently of other factors that might be associated with consultation rates. It was hoped that this categorisation would satisfy the above criteria.
H.4 CATEGORISING THE DATA

H.4.1 The relationship between the number of consultations in one Year and the number of consultations in the previous Year.

One of the best predictors of consultation rates in any one Year is the number of consultations in the previous Year. The Spearman Correlation coefficients of the rank correlations of one Years data with the next Years data are high and remain fairly stable over this eight Year time period (Table H.2). Therefore the aim was to develop a model that predicts efficiently the consultations in Year 8 (Y8) from the number of consultations in Year 7 (Y7). This has the advantage of being independent of any other factors whose associations with consultation rates will be analysed later. Ordered polytomous regression models were considered, as they preserve the ordered nature of the number of consultations in a Year without imposing the assumption of normality (Anderson A, Philips PR 1981). They are also more powerful than logistic regression models (Armstrong BG, Sloan M 1989).

Table H.2 Spearman correlation coefficients of the number of consultations in one Year with the number of consultations in the previous Year.

<table>
<thead>
<tr>
<th>Pair of Years</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>0.443</td>
</tr>
<tr>
<td>2 and 3</td>
<td>0.474</td>
</tr>
<tr>
<td>3 and 4</td>
<td>0.486</td>
</tr>
<tr>
<td>4 and 5</td>
<td>0.475</td>
</tr>
<tr>
<td>5 and 6</td>
<td>0.504</td>
</tr>
<tr>
<td>6 and 7</td>
<td>0.518</td>
</tr>
<tr>
<td>7 and 8</td>
<td>0.525</td>
</tr>
</tbody>
</table>
H.4.2 Theory of ordered polytomous regression models

Given $Y$, an ordinal response variable which has $k$ ordered categories, let $p^1, \ldots, p^k$ be the probabilities associated with each category. Then the $k$-category ordered logistic model is defined as:

$$
\log \left( \frac{p_i}{1-p_i} \right) = A_i + BX \quad i=1, \ldots, k-1
$$

where $p_i = p^{i+1} + p^{i+2} + \ldots + p^k$

- the cumulative probability
- $X$ = the explanatory variables
- $B$ = the regression coefficients

The intercepts $A_i$ satisfy the condition:

$$A_1 > A_2 > A_3 > \ldots > A_{k-1}$$

The models are all fitted using the PROC LOGIST procedure in SAS, which estimates the $A_j$ and $B$ via maximum likelihood estimation using a modified Gauss-Newton method with step-halving.

H.4.3 Fitting ordered polytomous models to predict the number of consultations in Year 8 ($Y_8$) from the number in Year 7 ($Y_7$)

Dependent versus independent variables

In fitting models predicting the number of consultations in Year 8 ($Y_8$) from the number in Year 7 ($Y_7$), $Y_7$ is the independent variable and $Y_8$ is the dependent variable. However, as in future applications we wanted to predict $Y_7$ from the number of consultations in previous Years, the optimum model will treat $Y_7$ and $Y_8$ identically. This means that as $Y_8$ is to be modelled as an ordered categorical variable, $Y_7$ will also be treated as an ordered categorical variable.
**Truncation of consultations in Year 7 and Year 8**

Only 46 men (0.6%) consulted more than 18 times in Year 8. These men were grouped into the category ‘>18 consultations’. An initial model was fitted on the 20 categories of Y7 and Y8:

\[
\text{logit } p_{8i} = A_i + \sum_{j=0}^{19} B_j D_{7j} \quad \text{for } i = 0 \text{ to } 19
\]

where:

- \( p_{8i} \) = probability of consulting more than \( i \) times in Y8
- \( D_{7j} \) = 1 if man consults more than \( j \) times in Y7
  - 0 otherwise

The fit of the above model was compared to that of fitting a similar model truncating Y7 and Y8 at 12; that is forming 13 categories, the highest being > 11 consultations (Table H.3).

The \( A_i \) and \( B_j \) do not differ markedly for the 2 models up to the cut-off of > 11 consultations. As under 2.5% (174 men) consulted more than 12 times in Y8 the model truncating Y7 and Y8 at 12 consultations seems to be the more parsimonious model.

**Further reduction of categories for Year 7 and Year 8**

There were two steps involved in deciding how far to amalgamate the given 13 categories of Year 7 and Year 8. First, the ‘best’ model for a given number of categories (from 13 down to 2) was determined by the method of amalgamating adjacent categories outlined below. Secondly these 12 ‘best’ models were compared to determine the number of categories required to model the data.
Table H.3  Ordered polytomous models predicting consultations in Year 8 from consultations in Year 7, with annual consultations (truncated at a) >18 consultations and b) >11 consultations per annum

<table>
<thead>
<tr>
<th>Model</th>
<th>a) Truncated at &gt;18 Consultations</th>
<th>b) Truncated at &gt; 11 Consultations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square (DF)</td>
<td>2451 (19)</td>
<td>2414 (12)</td>
</tr>
<tr>
<td>Variable</td>
<td>Estimate</td>
<td>SE(Estimate)</td>
</tr>
<tr>
<td><strong>Intercepts (A) :</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y8 &gt; 0</td>
<td>-0.048</td>
<td>0.041</td>
</tr>
<tr>
<td>Y8 &gt; 1</td>
<td>-0.976</td>
<td>0.044</td>
</tr>
<tr>
<td>Y8 &gt; 2</td>
<td>-1.676</td>
<td>0.047</td>
</tr>
<tr>
<td>Y8 &gt; 3</td>
<td>-2.215</td>
<td>0.050</td>
</tr>
<tr>
<td>Y8 &gt; 4</td>
<td>-2.675</td>
<td>0.053</td>
</tr>
<tr>
<td>Y8 &gt; 5</td>
<td>-3.103</td>
<td>0.056</td>
</tr>
<tr>
<td>Y8 &gt; 6</td>
<td>-3.518</td>
<td>0.059</td>
</tr>
<tr>
<td>Y8 &gt; 7</td>
<td>-3.933</td>
<td>0.064</td>
</tr>
<tr>
<td>Y8 &gt; 8</td>
<td>-4.290</td>
<td>0.068</td>
</tr>
<tr>
<td>Y8 &gt; 9</td>
<td>-4.622</td>
<td>0.073</td>
</tr>
<tr>
<td>Y8 &gt; 10</td>
<td>-4.985</td>
<td>0.080</td>
</tr>
<tr>
<td>Y8 &gt; 11</td>
<td>-5.335</td>
<td>0.087</td>
</tr>
<tr>
<td>Y8 &gt; 12</td>
<td>-5.671</td>
<td>0.096</td>
</tr>
<tr>
<td>Y8 &gt; 13</td>
<td>-5.951</td>
<td>0.105</td>
</tr>
<tr>
<td>Y8 &gt; 14</td>
<td>-6.220</td>
<td>0.115</td>
</tr>
<tr>
<td>Y8 &gt; 15</td>
<td>-6.489</td>
<td>0.127</td>
</tr>
<tr>
<td>Y8 &gt; 16</td>
<td>-6.643</td>
<td>0.134</td>
</tr>
<tr>
<td>Y8 &gt; 17</td>
<td>-6.950</td>
<td>0.151</td>
</tr>
<tr>
<td>Y8 &gt; 18</td>
<td>-7.142</td>
<td>0.163</td>
</tr>
<tr>
<td><strong>Dummy Variables (B) :</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y7 &gt; 0</td>
<td>0.800</td>
<td>0.065</td>
</tr>
<tr>
<td>Y7 &gt; 1</td>
<td>0.441</td>
<td>0.076</td>
</tr>
<tr>
<td>Y7 &gt; 2</td>
<td>0.309</td>
<td>0.090</td>
</tr>
<tr>
<td>Y7 &gt; 3</td>
<td>0.431</td>
<td>0.106</td>
</tr>
<tr>
<td>Y7 &gt; 4</td>
<td>0.278</td>
<td>0.120</td>
</tr>
<tr>
<td>Y7 &gt; 5</td>
<td>0.378</td>
<td>0.134</td>
</tr>
<tr>
<td>Y7 &gt; 6</td>
<td>0.020</td>
<td>0.160</td>
</tr>
<tr>
<td>Y7 &gt; 7</td>
<td>0.369</td>
<td>0.190</td>
</tr>
<tr>
<td>Y7 &gt; 8</td>
<td>0.404</td>
<td>0.208</td>
</tr>
<tr>
<td>Y7 &gt; 9</td>
<td>0.102</td>
<td>0.228</td>
</tr>
<tr>
<td>Y7 &gt; 10</td>
<td>0.267</td>
<td>0.275</td>
</tr>
<tr>
<td>Y7 &gt; 11</td>
<td>-0.128</td>
<td>0.319</td>
</tr>
<tr>
<td>Y7 &gt; 12</td>
<td>0.279</td>
<td>0.358</td>
</tr>
<tr>
<td>Y7 &gt; 13</td>
<td>0.224</td>
<td>0.426</td>
</tr>
<tr>
<td>Y7 &gt; 14</td>
<td>-0.261</td>
<td>0.460</td>
</tr>
<tr>
<td>Y7 &gt; 15</td>
<td>1.283</td>
<td>0.558</td>
</tr>
<tr>
<td>Y7 &gt; 16</td>
<td>-0.164</td>
<td>0.609</td>
</tr>
<tr>
<td>Y7 &gt; 17</td>
<td>-0.813</td>
<td>0.853</td>
</tr>
<tr>
<td>Y7 &gt; 18</td>
<td>1.498</td>
<td>0.835</td>
</tr>
</tbody>
</table>
Method of amalgamating adjacent categories

The initial model had 13 categories for the consultations in Year 7 and 13 for the consultations in Year 8: 0 1 2 3 4 5 6 7 8 9 10 11 12+

and the model fitted was:

\[
\logit \ p_{8,i} = A_i + \sum_{j=0}^{12} B_j D_{7,j} \quad \text{for } i = 0 \text{ to } 12
\]

were:

\( p_{8,i} \) = probability of consulting more than \( i \) times in Y8

and

\( D_{7,j} = 1 \) if man consults more than \( j \) times in Y7

\( 0 \) otherwise

Step 1

The adjacent categories 0 and 1 were combined in Years 7 and 8 to form 12 categories:

\((0 1) 2 3 4 5 6 7 8 9 10 11 12+\)

and the above model was fitted on these 12 new categories.

Step 2

Step 1 was then repeated combining the next two adjacent categories instead, ie a model was fitted to the 12 categories:

\(0 (1 2) 3 4 5 6 7 8 9 10 11 12+\)

This was then repeated for each of the adjacent categories in turn.

Step 3

The 'best' merging of the categories was determined by choosing the model which had the largest likelihood ratio test statistic.

Step 4

The 'best' model for 11 categories was then determined by merging adjacent categories of the 'best' model derived in step 3, etc.
Comparison of ‘Best’ models

Table H.4 shows the results of the ‘best’ models determined for the specified number of categories. There is a very large decrease in the likelihood ratio from five categories down to four categories. The ‘optimum’ models would therefore appear to be the model with 5 categories, which will be used in future analyses. The five categories are: 0, 1, 2-3, 4-7, 8+ consultations per annum.

Table H.4  'Best' models for different numbers of categories in prediction of consultations in Year 8 from consultations in Year 7.

<table>
<thead>
<tr>
<th>No. of Categories</th>
<th>Actual Grouping</th>
<th>Log D of Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cate-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>gories</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

: categories merged

H.4.4  Investigation of the relative power of the ‘Best’ models compared to logistic regression models

The asymptotic relative efficiency of two methods of analysis is defined as the limit, as sample sizes increase, of the ratio of the sample sizes required for the two methods, in order that each achieve the same power (or equivalently the same
precision) when close to the null hypothesis (Cox DR, Hinkley DV 1974). The relative power of the optimal ordered polytomous models compared to a simple dichotomised logistic regression model is the ratio of the variances of the estimates of the Bj. (See Appendix I: Relative power of ordered polytomous models compared to logistic models for the theoretical details and calculations). Table H.5 gives the asymptotic relative efficiency of the optimal models in Table H.4 compared to separate logistic regression models with the same cut-offs.

**Table H.5**  The asymptotic relative efficiency of the ‘best’ models in prediction of consultations in Year 8 from consultations in Year 7 for different categorisations of Year 7 and Year 8

<table>
<thead>
<tr>
<th>Number of Categories</th>
<th>Actual Grouping</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12+</td>
</tr>
<tr>
<td>13</td>
<td>63 77 75 66 56 46 37 29 22 18 13 10 0</td>
</tr>
<tr>
<td>12</td>
<td>63 77 75 66 56 46 37 29 22 18 10 0</td>
</tr>
<tr>
<td>11</td>
<td>63 77 75 66 56 46 37 29 22 10 0</td>
</tr>
<tr>
<td>10</td>
<td>63 77 75 66 56 46 29 22 10 0</td>
</tr>
<tr>
<td>9</td>
<td>63 77 75 66 46 29 23 10 0</td>
</tr>
<tr>
<td>8</td>
<td>64 78 75 64 47 29 10 0</td>
</tr>
<tr>
<td>7</td>
<td>64 78 67 47 29 10 0</td>
</tr>
<tr>
<td>6</td>
<td>64 78 67 47 29 0</td>
</tr>
<tr>
<td>5</td>
<td>64 78 68 29 0</td>
</tr>
<tr>
<td>4</td>
<td>68 71 31 0</td>
</tr>
<tr>
<td>3</td>
<td>69 73 0</td>
</tr>
<tr>
<td>2</td>
<td>100 0</td>
</tr>
</tbody>
</table>

___ : categories merged
Compared to the polytomous model with 13 categories, the most efficient dichotomous model is when the cut-off is at greater than 1, where an efficiency of 77% is obtained. For other cut-offs the ARE is greatly reduced, falling to only 10% if it is taken at > 11 consultations. Therefore there is a significant gain in power in using the polytomous model rather than a dichotomous model particularly when looking at the probabilities of consulting heavily. The ARE's don't markedly alter until the 4 category model is used. This indicates that the gain in using more than 5 different categories is fairly small.

**H.4.5 The proportional odds assumption**

The above polytomous models all assume that the $B_j$'s are independent of the value of $i$ (the cutoff). In other words that the effect of any level of $Y_7$ on the level of $Y_8$ is the same for all levels of $Y_8$. This may not be the case and can be tested by fitting the alternative set of models (Brant R 1990):

Given $Y$, an ordinal response variable which has $k$ ordered categories, let $p^1,...,p^k$ be the probabilities associated with each category. Then the $k$-category partial proportional ordered logistic model is defined as :

$$\text{logit}(p_i) = A_i + BX + T_iX$$

where

- $p_i$ = $p^{i+1} + p^{i+2} + ... + p^k$
- $X$ = the explanatory variables
- $B$ = the regression coefficients
- $T_i$ = the regression coefficients that are dependant on the level of $i$

The intercepts $A_i$ satisfy the condition :

$A_1 > A_2 > A_3 > ... > A_{k-1}$
The models are all fitted using the PROC LOGIST procedure in SAS version 5, which estimates the $A_i$, $B$ and $T_i$ via maximum likelihood estimation using a modified Gauss-Newton method with step-halving (Peterson B, Harrell FE 1983; 1990). PROC LOGIST in SAS Version 5 allows the proportionality assumption to be relaxed by specifying the $T_i$s. PROC LOGIST in later SAS Versions (up to 6.05) does not have the same options to relax the assumption of proportionality. Imposing no constraints on the $T_i$s results in the saturated model. Figure H.1 shows the observed logits for the 5 category model and those predicted by assuming the proportional odds. Table H.6 gives the numbers of men that would be predicted in each category by fitting the proportional odds model and the individual contributions to the goodness of fit test statistic. The fit appears worst for men who were high consulters in Year 7. Models not assuming proportional odds were fitted and the assumption of proportional odds was rejected for men who were high consulters in Year 7. (Table 6.13)

**Figure H.1** Comparison of fitted and observed logits assuming proportional odds
### Table H.6
Predicted (P) and Observed (O) numbers of men in the 5 consultation rate groups in Year 8 obtained by fitting a proportional odds model on the consultations in Year 7.

<table>
<thead>
<tr>
<th>Consultations in Year 7</th>
<th>Consultations in Year 8</th>
<th>0</th>
<th>1</th>
<th>2,3</th>
<th>4-7</th>
<th>&gt;7</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 1992</td>
<td>1224</td>
<td>1613</td>
<td>1451</td>
<td>729</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men 1992</td>
<td>1227</td>
<td>1621</td>
<td>1446</td>
<td>724</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4.77)</td>
<td>(11.10)</td>
<td>(5.0)</td>
<td>(6.36)</td>
<td>(6.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>465</td>
<td>380</td>
<td>171</td>
<td>43</td>
<td>2172</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Men</td>
<td>448</td>
<td>367</td>
<td>178</td>
<td>54</td>
<td>1261</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.60)</td>
<td>(0.43)</td>
<td>(0.29)</td>
<td>(3.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X²</td>
<td>(0.11)</td>
<td>(0.60)</td>
<td>(0.43)</td>
<td>(0.29)</td>
<td>(3.0)</td>
<td>(443)</td>
</tr>
<tr>
<td>1 408</td>
<td>282</td>
<td>327</td>
<td>191</td>
<td>53</td>
<td>1261</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.88)</td>
<td>(2.97)</td>
<td>(0.03)</td>
<td>(0.87)</td>
<td>(0.00)</td>
<td>(476)</td>
<td></td>
</tr>
<tr>
<td>2,3 327</td>
<td>298</td>
<td>460</td>
<td>352</td>
<td>113</td>
<td>1551</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>318</td>
<td>287</td>
<td>499</td>
<td>347</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.27)</td>
<td>(0.42)</td>
<td>(3.39)</td>
<td>(0.08)</td>
<td>(1.58)</td>
<td>(574)</td>
<td></td>
</tr>
<tr>
<td>4-7 124</td>
<td>151</td>
<td>354</td>
<td>475</td>
<td>226</td>
<td>1330</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>133</td>
<td>140</td>
<td>340</td>
<td>508</td>
<td>209</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.61)</td>
<td>(0.74)</td>
<td>(0.57)</td>
<td>(2.31)</td>
<td>(1.28)</td>
<td>(552)</td>
<td></td>
</tr>
<tr>
<td>&gt;7 19</td>
<td>28</td>
<td>92</td>
<td>262</td>
<td>294</td>
<td>696</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>41</td>
<td>85</td>
<td>235</td>
<td>308</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.90)</td>
<td>(6.35)</td>
<td>(0.58)</td>
<td>(2.81)</td>
<td>(0.64)</td>
<td>(133)</td>
<td></td>
</tr>
</tbody>
</table>

### Table H.7
Comparison of models fitted altering the assumption of proportional odds (PO).

<table>
<thead>
<tr>
<th>Model</th>
<th>Chi-Square</th>
<th>Degrees of Freedom</th>
<th>LR compared to Saturated Model</th>
<th>Degrees of Freedom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated Model : No assumption PO</td>
<td>2301</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assumption PO for all Consultation Groups in Year 7</td>
<td>2269</td>
<td>4</td>
<td>32</td>
<td>12</td>
</tr>
<tr>
<td>Assumption PO for all groups except 2283 highest consulters (&gt;7 per annum)</td>
<td>7</td>
<td>18</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>


The model assuming proportional odds for all the groups except high consulters does not fit significantly worse than the saturated model ($X^2 = 18$ on 9 degrees of freedom), but does fit significantly better than the model assuming proportional odds for all the groups including high consulters. ($X^2 = 2283-2269 = 14$ on 3 degrees of freedom). This implies that high consulters behave differently than other consulters, even after allowing for their past higher consultation rates. Therefore in future analysis relaxation of the proportionality assumption for this group needs to be considered.

H.4.6 Validation of the model

The 5 category model was applied to each pair of Years to determine how well it fitted. Table H.8 shows that for each Year apart from the first two the model assuming proportional odds for all men, apart from high consulters, fits reasonably well. The model assuming high consulters also have proportional odds fits significantly worse in each Year. The lack of fit in Year 2 may be due to a healthy selection effect present in Year 1 which wears off.

H.5 CONCLUSIONS

The consultation rate data will be analysed by, for each Year separately, classifying the men into the following consultation rate groups according to their number of consultations in that Year: 0, 1, 2-3, 4-7, >7. These categories have been derived by examining statistical properties of the data rather than arbitrarily categorising the data. The partial proportional ordered polytomous regression model, relaxing the assumption of proportionality for high consulters, does appear predict consultation rates in any Year reasonably well, and is more powerful than using just logistic regression. Therefore the prediction of consultation rates using other factors will be done by fitting partial proportional ordered polytomous regression models, checking the proportionality assumption for the highest consulters.
<table>
<thead>
<tr>
<th>Year</th>
<th>Chi-square</th>
<th>DF</th>
<th>Assumption Po for all groups</th>
<th>Chi-square</th>
<th>DF</th>
<th>Assumption Po for all groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1.145</td>
<td>4</td>
<td>LR Compared to saturated (b)</td>
<td>2.357</td>
<td>4</td>
<td>LR Compared to saturated (a)</td>
</tr>
<tr>
<td>5</td>
<td>1.389</td>
<td>4</td>
<td>LR Compared to saturated (b)</td>
<td>2.971</td>
<td>4</td>
<td>LR Compared to saturated (a)</td>
</tr>
<tr>
<td>4</td>
<td>1.573</td>
<td>4</td>
<td>LR Compared to saturated (b)</td>
<td>3.245</td>
<td>4</td>
<td>LR Compared to saturated (a)</td>
</tr>
<tr>
<td>3</td>
<td>1.708</td>
<td>4</td>
<td>LR Compared to saturated (b)</td>
<td>3.425</td>
<td>4</td>
<td>LR Compared to saturated (a)</td>
</tr>
<tr>
<td>2</td>
<td>1.868</td>
<td>4</td>
<td>LR Compared to saturated (b)</td>
<td>3.607</td>
<td>4</td>
<td>LR Compared to saturated (a)</td>
</tr>
</tbody>
</table>

Table H.8. Fit of best 5 category model (Q: 1: 2.3: 4.7: 47) on each years data (Po=proportional odds).
APPENDIX I

INVESTIGATION OF THE RELATIVE POWER OF ORDERED POLYTOMOUS MODELS COMPARED TO LOGISTIC MODELS

1.1 INTRODUCTION

The asymptotic relative efficiency of two methods of analysis is defined as: ‘the limit, as sample sizes increase, of the ratio of the sample sizes required for the two methods, in order that each achieve the same power (or equivalently the same precision) when close to the null hypothesis’ (Cox DR, Hinkley DV 1974). We are interested in the relative power of an ordered polytomous model compared to a simple dichotomised logistic regression model and also compared to other polytomous models. Therefore the relative power of different models is evaluated by calculating the asymptotic relative efficiency's (ARE's) of these models of interest compared with logistic regression analysis using a dichotomised outcome (Armstrong BG, Sloan M 1989).

1.2 CALCULATION OF ASYMPTOTIC RELATIVE EFFICIENCIES (ARE)

Given Y, an ordinal response variable which has k ordered categories, let \( p_1, \ldots, p_k \) be the probabilities associated with each category. Then the k-category ordered logistic model is defined as:

\[
\log \left( \frac{p_i}{1-p_i} \right) = A_i + BX \quad \text{for} \quad i=1,..,k-1
\]

where \( p_i = p_{i+1} + p_{i+2} + \ldots + p_k = \) the cumulative probability
\( X \) = the explanatory variables  
\( B \) = the regression coefficients

The intercepts \( A_i \) satisfy the condition:
\[
A_1 > A_2 > A_3 > \ldots > A_{k-1}
\]

In this case the ARE is equal to the ratio of variances of the two estimates of \( B \). Comparing the \( k \)-category ordered logistic model defined above with a 2-category model (\( k=2 \), of sizes \( n_1 \) and \( n_2 \), \( n_1+n_2=n \)), the asymptotic variance of \( B \) close to the null hypothesis, \( B=0 \), has been shown to be equal to (A) (McCullagh P 1980)

\[
\text{(A)} = \frac{n_1 \cdot n_2}{3 \cdot n} \left[ 1 - \frac{k}{\sum_{j=1}^{k} p_j^3} \right]
\]

(Since \( B=0 \), \( p_j \) is approximately equal in the two groups.)

Simple logistic regression after dichotomising between levels \( m \) and \( m+1 \) may be seen as a special case of the cumulative odds model, giving asymptotic variance near the null hypothesis:

\[
\text{(B)} = \frac{n_1 \cdot n_2}{3 \cdot n} \left[ 1 - \frac{k}{\sum_{j=m}^{p_j} p_j^3} - \left( \frac{k}{\sum_{j=m}^{p_j} p_j} \right)^3 \right]
\]

The asymptotic relative efficiency of simple logistic regression relative to the cumulative odds model is therefore (A)/(B). Using these formulae the asymptotic relative efficiencies of the different models were calculated assuming that the \( p_j \) are those observed in Year 8 of the consultation rate data.
APPENDIX J

ANALYSING CHANGES IN CONSULTATION RATES:
ALTERNATIVE METHODS OF LOOKING AT CHANGES IN CATEGORICAL VARIABLES OVER TIME, AFTER ADJUSTING FOR VARIOUS COVARIATES

J.1 INTRODUCTION

Several different methods for analysing changes in categorical variables over time after adjusting for covariates have been reported in the literature. In this appendix the changes in consultation rates between Years 1 and 5 amongst the different employment groups are examined using several different methods.

J.2 TRANSITIONAL MODELLING

The probability of consulting more than a certain amount in Year 5 is modelled by fitting an ordered polytomous regression model with age, town, social class and level of consultation in Year 1 as covariates and employment status as a set of dummy variables. The resultant relative odds can be thought of as the odds of consulting more than a continuously employed man, after adjusting for age, social class, town of residence and level of consultations at Initial Screening. It is not the same as the odds of increasing consulting. This method was proposed by Ware et al (Ware JH, et al 1988)

Table J.1 shows that after adjusting for the consultation rate in Year 1, unemployed ill and retired ill men were more likely to be higher consulters than continuously employed men. Retired not-ill men and unemployed not-ill men were also more likely to be higher consulters. However the picture is inconclusive for
<table>
<thead>
<tr>
<th>Year of Consultation Rate Data</th>
<th>Year</th>
<th>2.5</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Max</th>
</tr>
</thead>
</table>

Social class and consultation rate in year.

Relative Odds (95% CI) of being a higher consultant than a continuously employed men over 7 years accident for aglow.

Table III
discontinuously employed men, who did have higher odds of consulting more when analysing the maximum consultation rates in years 2-5, but not significantly so.

J.3 COMPARING SEPARATE MODELS

In order to determine if the effect of non-employment on consultation rates differs in years 1 (prior to the non-employment) and the subsequent years, the method by Stram involves fitting separate logistic models to the data and then comparing the resultant relative odds (i.e. comparing the relative odds for Year 1 and Year 5 given in Table J.2) (Stram DO, et al 1988). The standard errors are adjusted to allow for the non-independence of the models.

The relative odds for unemployed not-ill and discontinuously employed men appear to actually decrease, so clearly no increase in the likelihood of consulting would be detected. At the other extreme no formal method is necessary to determine that the increases in the relative odds of consulting more than continuously employed men are significant for unemployed-ill and retired-ill men. Significant increases might be detected for retired not-ill men. This method did not seem worth pursuing further, because the non-independence of the models does not seem to be adequately considered. The relative odds for the maximum consultation rates in years 2 to 5 can not be analysed using this method.
<table>
<thead>
<tr>
<th>Class and Town</th>
<th>Employment Status</th>
<th>Questionnaire No. of Postal Strips</th>
<th>Year of Consultation Race Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIL-III</td>
<td>Retired</td>
<td>8</td>
<td>1987</td>
</tr>
<tr>
<td>III</td>
<td>Retired</td>
<td>7</td>
<td>1987</td>
</tr>
<tr>
<td>III</td>
<td>Retired</td>
<td>6</td>
<td>1987</td>
</tr>
<tr>
<td>III</td>
<td>Retired</td>
<td>5</td>
<td>1987</td>
</tr>
<tr>
<td>III</td>
<td>Retired</td>
<td>4</td>
<td>1987</td>
</tr>
<tr>
<td>III</td>
<td>Retired</td>
<td>3</td>
<td>1987</td>
</tr>
<tr>
<td>III</td>
<td>Retired</td>
<td>2</td>
<td>1987</td>
</tr>
<tr>
<td>III</td>
<td>Retired</td>
<td>1</td>
<td>1987</td>
</tr>
</tbody>
</table>

Relieve Odds (95% CI) of being a higher classifier than a continuously employed men over 8 years (adjusted for age, social class, and town).
J.4 IGNORING THE REPEATED NATURE OF THE DATA

In order to determine if the effect of time on consultation rates is different in the different employment groups, the method by Agresti involves ignoring the repeated nature of the data (Agresti A, 1989). Instead the data is modelled as if each Years data was from a separate group of men. Interaction terms of time by employment status are included in the model. If these are significant this would imply that time has a different effect in the different employment groups. ie That non-employed men changed their consultation patterns more than continuously employed men. The disadvantage with this method is that the repeated nature of the data is ignored.

Table J.3 gives the results of fitting this model. No adjustments are made for age, town or social class due to the limitation on computing resources. This limitation also restricts the data to 6 Years of data rather than the full 8 Years. The results agree with earlier results, in that non-employed ill men and retired not-ill men show significant increases after Year 1, but that the effect of time on discontinuously employed and unemployed not-ill men does not significantly differ from the effect of time on continuously employed men.

J.5 MODELLING INDIVIDUALS

The ideal method would be to estimate and model regression coefficients for the eight time points for each man separately. However this is not computationally possible for 5757 men and the parameters estimated would be unstable (Harrell FE, et al 1984).
<table>
<thead>
<tr>
<th>Year</th>
<th>Non-Continuing</th>
<th>Continuously Employed</th>
<th>Retired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>I.76 (1.23-2.13)</td>
<td>I.90 (1.07-1.32)</td>
<td>1.13 (0.97-1.31)</td>
</tr>
<tr>
<td>Year 2</td>
<td>I.36 (1.23-1.52)</td>
<td>I.35 (1.28-1.45)</td>
<td>I.44 (1.22-1.70)</td>
</tr>
<tr>
<td>Year 3</td>
<td>I.39 (1.28-1.52)</td>
<td>I.27 (1.03-1.57)</td>
<td>I.22 (1.05-1.42)</td>
</tr>
<tr>
<td>Year 4</td>
<td>I.26 (1.08-1.46)</td>
<td>I.22 (1.05-1.42)</td>
<td>I.22 (1.05-1.42)</td>
</tr>
<tr>
<td>Year 5</td>
<td>I.00</td>
<td>I.00</td>
<td>I.00</td>
</tr>
<tr>
<td>Year 6</td>
<td>I.00</td>
<td>I.00</td>
<td>I.00</td>
</tr>
</tbody>
</table>

| Additional Effects After Year 1 | | | |
|---|---|---|
| | | | |
J.6 MODELLING RESPONSE PROFILES

This is an extension of modelling individuals, in that for categorical response variables over a few time points, the frequency of each possible combination of results is computed and these frequencies are modelled (Woolson RF, Clarke WR 1984; Burney PGJ, et al 1990). This again will clearly only work for short series for outcome variables with only a few categories (preferably binary). It is not feasible for the BRHS data.

J.7 ASSIGNING MATCHED CONTROLS

In order to adjust for continuous covariates such as age the easiest solution is to match for it. This is the method reported in detail in Chapter 7. For completeness just the results will be commented on here (see Tables 7.7 and 7.8 for the full results).

When age and town of residence were matched for, on average by Year 5, non-employed men had increased their consultation rates by 0.34 consultations per annum more than continuously employed men of the same age and from the same town. This increase was mainly due to unemployed-ill and retired-ill men increasing their consultations by over 2 consultations per annum more than continuously employed men. Unemployed not-ill men had a greater decrease in consultation rates than continuously employed men. Discontinuously employed and retired not-ill men did not differ from continuously employed men.

The maximum of the consultation rates in Years 2,3,4 and 5 was calculated. Again on average non-employed ill men had increased their consultation rates more than continuously employed men. Retired not-ill and discontinuously employed men also had significant increases, but unemployed-not ill men did not differ significantly from continuously employed men.
Matching for age, town and consultation rates in Year 1 markedly altered the results for the unemployed not-ill men. Once their raised consultation rates in Year 1 were adjusted for they appeared to have a greater increase in consultation rates compared to continuously employed men. This would suggest that what is happening is that they tend to be higher consulters in Year 1 and do not tend to consult less in the following Years as would be expected by the regression to the mean effect, which occurs amongst continuously employed men. Therefore when they are compared to continuously employed men who are high consulters in Year 1 they appear to increase their consultation rates more than continuously employed men.

J.8 COMPARISON OF RESULTS OF DIFFERENT METHODS

All the different methods clearly demonstrated that unemployed-ill and retired-ill men increased their consultation rates significantly more than continuously employed men. The methods also all show that retired not-ill men also significantly increased their consultation rates more than the continuously employed men. For discontinuously employed men the maximum consultation rate in Years 2 to 5 is the more applicable measure. All the methods that analysed this did find that discontinuously employed men did have a greater increase in consultation rates than the continuously employed men, but none of the tests found the increase to be statistically significant. For unemployed not-ill men the methods which did not attempt to control for consultation rate in Year 1 found no significant increase in consultation rates. However when Year 1 was taken into account there was a significant increase in consultation rates. This would imply that high consulters who are unemployed don't tend to regress back to the mean, whereas high consulters who are continuously employed do.
APPENDIX J

SOME COMMENTS WRITTEN ON THE POSTAL QUESTIONNAIRE

In the postal questionnaire, the men were asked to give reasons for their unemployment. Examining the forms of the men who were classified as unemployed ill, illuminates many aspects of the relationship between unemployment and ill health.

The level of ill health varied from people severely physically disabled (sometimes due to accidents at work) through to a man who stated his unemployment was due to illness as he was "always getting colds and viruses".

In some cases the unemployment was attributed to ill health:
"I am a window cleaner and unable to climb ladders due to dizzy spells"
"I had constant backache when lifting materials and had to give up my job"
A company manager stated that "my own company ceased trading as I could not work"
Several men also had to stop work due to being disabled by accidents at work. For example a window cleaner fell off his ladder and broke both heels in the fall.

Many men stated that they "took redundancy because of ill health".
The implication often being that if reasonably attractive redundancy packages had not been available then the man would have carried on working.
In some cases the unemployment predates the illness
"made redundant - 2 months later became ill with present illness"

The lack of distinction between retirement and unemployment is highlighted in one response:
"I was "retired" from the civil service due to my present illness".
At the age of 45 this respondent clearly did not feel retired and classified himself as unemployed.

The dynamic nature of unemployment and its downward spiral is illustrated by the following comments:
"Made redundant in March 81 on plant closure. Have had several jobs as self-employed sales man with little success until July 1984."
"Made redundant, but became self-employed until nervous breakdown"
"After being a gardener for 8 years and was very happy in this employment. Owing to government cut backs in local authority I decided to change my job to be a milkman which I found to much for me and was told by my doctor to give it up for health reasons. I am now undergoing treatment for depression."

One man illustrates how the relationship between unemployment and health has to be considered within the wider social context.
"illness mainly. But my firm no longer exists. The construction part has gone. So if was fit no place to go. And at the age of 60 years no chance. I got a small redundancy with being sick."
Consultation rates among middle aged men in general practice over three years

D G Cook, J K Morris, M Walker, A G Shaper

Abstract

Objective—To provide data on consultation rates in general practice for middle aged men over three years according to their age and social class.

Design—Prospective study of men over eight years. Data on consultation rates during years 6-8 were collected prospectively from practice records.

Setting—Over 1000 general practices in Great Britain by year 8. Initially (in 1978-80) the men had been selected at random from one practice in each of 24 towns.

Subjects—7013 Men aged 46-65 in the sixth year of follow up.

Main outcome measure—Number of consultations a year over three years.

Results—The mean annual consultation rate over the three years rose steadily with age (7-0 at age 46-50 to 9-7 at age 61-65) and with social class (6-4 in class I to 10-0 in class V) but was potentially misleading as the distribution was skew: 10-5% of men (736) did not consult over the three years and 17-2% (1209) consulted only once or twice, whereas 11-4% (798) of men were seen more than 18 times. The percentage of men who did not consult over three years fell only slightly with age and was unrelated to social class, with roughly a tenth of all age and social class groups not consulting. Two thirds of non-consulters in year 6 (1596/2394) consulted in year 7 or 8. Conclusions—The mean is not an appropriate summary measure of consultation rates and may conceal important differences among practices or other groups. The new general practitioner contract stipulates that all patients aged 16-74 must be provided with information to promote health and prevent illness at least once every three years. Most practices will have to approach a tenth of their men aged 46-65 specially to provide this service even if one consultation in three years is regarded as sufficient to allow a service to be provided.

Introduction

The 1990 general practitioner's contract stipulates that information on promoting health and preventing illness must be provided to patients aged 16-74 during a consultation or at a clinic at least once in three years. Those patients not seen must be specially invited to attend. Thus there is an overwhelming need to know about patterns of consultations over three years.

In the past consultation rates have been summarised either as the average annual consultation rate or as the proportion of patients consulting in the past 14 days. Unfortunately, the number of consultations with a general practitioner over one year varies strikingly between people and the distribution is highly skewed, with many people seeing their doctor only rarely and a few seeing their doctor many times. The above two summary measures are thus poor indicators to use when studying those who consult rarely or when comparing groups. Moreover, because a person's consultation pattern is not independent from one year to the next information about this dependency is necessary to predict what proportion of patients will not consult over three years from a single year's data and, if they are not, to suggest more relevant ways of presenting the data. We looked at the patterns of consultation and analysed the data by age and social class.

Subjects and methods

During 1978-80, 7735 men aged 40-59 were selected at random from one general practice in each of 24 British towns for a prospective study of cardiovascular disease (the British regional heart study). After eight years the current general practitioners of the surviving men were asked to complete a form recording the number of times each man had consulted in each year of the eight year follow up. A consultation was defined as any recording in the patient's medical notes with a date. Notes were not available for 545 men who had died before the end of the eight year follow up period and 51 who had emigrated. Data on 126 men were incomplete, and the reasons for this varied: six men could not be traced, and others had had their notes summarised or had been out of the country for part of the time. Thus complete data were available for 7013 (98-2%) of the 7139 men who were alive and had not emigrated.

Social class was determined from each man's longest held occupation by using the six social classes of the Office of Population Censuses and Surveys. Sixteen men whose longest held occupation was in one of the armed services were excluded from the analysis.

We report here the data for years 6-8 of the study. There were three reasons for this choice: firstly, we concentrated on a three year period for each man as this is central to the general practitioner's contract; secondly, these were the most recent data we had (relating to 1984-8); and, thirdly, any bias due to selection of healthy subjects at the start of the study was considerably reduced.

Throughout this paper we refer to the age of the men at the beginning of the three years—that is, in the sixth year of follow up, when the men were aged 46-65. By the eighth year of the study roughly 1000 men had changed their practice at least once.

Results

NUMBER OF CONSULTATIONS DURING EIGHTH YEAR OF STUDY

Figure 1 shows the distribution of the number of
CONSULTATIONS FOR THE 7013 MEN DURING THE EIGHTH YEAR OF THE STUDY. THE AVERAGE NUMBER OF CONSULTATIONS WAS 3.0 (SD 3.8); 4176 MEN CONSULTED LESS OFTEN THAN THIS, AND ONLY 2170 CONSULTED MORE THAN THIS. CLEARLY THE MEAN WAS NOT A GOOD SUMMARY MEASURE. A FAR BETTER MEASURE WAS THE PERCENTAGE OF MEN WHO CONSULTED 0, 1 OR 2, 3-6 AND >7 TIMES A YEAR (NON-, LOW, MODERATE, AND HIGH CONSULTERS RESPECTIVELY). THIS IS BECAUSE 4176 MEN (59.5%) CONSULTED 0-2 TIMES IN YEAR 8 BUT ACCOUNTED FOR ONLY 15.0% (3139/20967) OF THE TOTAL CONSULTATIONS WHILE ALMOST HALF (10024/20967) OF ALL CONSULTATIONS AROSE FROM THE 973 (13.9%) MEN WHO CONSULTED >7 TIMES IN YEAR 8.

NON-INDEPENDENCE OF CONSULTATION RATES FROM YEAR TO YEAR

Table I shows the distribution of consultation rates in year 6 related to the subsequent consultation rate in years 7 and 8. Non-consulters in year 6 were the group most likely to be non-consulters and least likely to be heavy consulters in years 7 and 8. Conversely, high consulters in year 6 were likely to be high consulters in years 7 and 8 and were unlikely not to consult. Moreover, low and medium consulters in year 6 were likely to be low and medium consulters in years 7 and 8. Thus knowing the number of times a man consults in one year permits a prediction of how often he will consult over the next two years.

The importance of this information is shown in table II, where the observed number of years (of three) in which a man was seen by his general practitioner is compared with the number estimated by assuming independence between successive years. Table II shows that the number of men not seen by their general practitioner over the three years was more than three times the expected number. At the other extreme the number seen in all three years was also greater than the expected number. At the other extreme 798 were seen more than 18 times.

DIFFERENCES IN CONSULTATION RATES WITH AGE

The mean consultation rate each year over the three years rose with age, being 2.0, 8.0, 9.0, and 9.7 for the age groups 46-50, 51-55, 56-60, and 61-65. To compare the consultation rates by age in further detail we divided the distribution of the number of consultations over the three years: 0, 1-6, 7-18, and >19 consultations (Table III). The proportion of men not seen over the three years fell only slightly with age from 11.4% at ages 46-50 to 9.4% at ages 61-65 ($\chi^2$ for trend=5.99, $p=0.014$). In contrast, the proportion of men consulting >19 times rose from 7.4% at ages 46-50 to 14.8% at ages 61-65 ($\chi^2$ for trend=54.55, $p<0.0001$). Thus though consultation rates clearly rose with age, there appeared to be a group of confirmed non-consulters of similar size in each age group.

DIFFERENCES IN CONSULTATION RATES WITH SOCIAL CLASS

The mean consultation rate each year over the three years rose steadily from social class I to V, being 6.4, 8.1, 9.7, 12.4, and 14.5, respectively ($\chi^2$ for trend=33.16, $p<0.001$). The mean consultation rate each year over the three years in each social class was higher than the overall mean of 8.1 and rose steadily from social class I to V, being 6.4, 8.1, 9.7, 12.4, and 14.5, respectively ($\chi^2$ for trend=33.16, $p<0.001$).
TABLE IV—Distribution of number of consultations over three years according to social class. Figures are numbers (percentages) of men

<table>
<thead>
<tr>
<th>Social class</th>
<th>No of men</th>
<th>0 1-6 7-18 ≥19</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>557</td>
<td>86 (15-4) 280 (50-3) 156 (28-0) 35 (6-3)</td>
</tr>
<tr>
<td>II (Non-manual)</td>
<td>1604</td>
<td>148 (9-2) 766 (47-8) 341 (33-7) 149 (9-3)</td>
</tr>
<tr>
<td>III (Manual)</td>
<td>3018</td>
<td>316 (10-5) 1259 (41-7) 1036 (34-3) 407 (13-5)</td>
</tr>
<tr>
<td>IV</td>
<td>695</td>
<td>67 (9-6) 299 (43-0) 254 (35-6) 64 (9-9)</td>
</tr>
<tr>
<td>V</td>
<td>279</td>
<td>34 (12-2) 106 (38-0) 94 (33-7) 45 (16-1)</td>
</tr>
</tbody>
</table>

Total 6801 715 (10-5) 2999 (44-1) 2312 (34-0) 775 (11-4)

*16 Men whose longest occupation was in the armed services have been excluded.

VARIABILITY IN CONSULTATION RATES BETWEEN PRACTICES

The estimated proportion of men not consulting over three years varied from 7-7% (20/259) in one practice to 13-2% (42/317) in another. These estimates will differ from the true proportions of non-consulters as only a proportion of men in each practice in the relevant age range was sampled. A χ² test for heterogeneity provided no evidence that the proportion of non-consulters varied among practices (p=0.85). In contrast, the proportion of men consulting more than 18 times over the three years varied far more than might be attributed to chance: from 6-0% (15/250) in one practice to 21-5% (65/302) in another (p<0.001).

Discussion

We have shown that the mean is not an appropriate summary measure of consultation rates and may conceal important differences among practices or other groups. Though mean consultation rates rose with age and were higher in manual than non-manual workers, the proportion of men not consulting over three years was about 10% at all ages and in all social classes. There was no evidence that the proportion of non-consulters varied among practices.

The new general practitioner's contract stipulates that all patients aged 16-74 must be provided with a consultation to promote health and prevent illness at least once every three years. Of the 31-5% of men not seen in year 0 in our study, two thirds were seen over the next two years, reducing the proportion who needed a special invitation to 10-5%. Thus our data suggest that most practices will have to approach a tenth of their male patients aged 46-65 specially to provide this service even if contact with those consulting at least once is regarded as sufficient for this service.

Clearly such data are needed for all ages and both sexes. Data from the Royal College of General Practitioners' morbidity survey, which relate to only one year, emphasise that the proportion of non-consulters does vary by age when women or a wider age range are studied, being highest for men aged 15-44 (45% did not consult over one year) and lowest for infants (13%), women of childbearing age (27%), and the elderly (26%). The only published data on patterns of attendance in general practice over three years that we have traced reported that a tenth of patients were not seen over that period. These data were for a new practice in Livingston, a new town in central Scotland, and were for all ages and both sexes combined. Other published data relate almost entirely to shorter periods. As we found, it is not possible to predict consultation rates (and in particular the proportion of non-consulters) over three years from one year's data unless the correlation of consultation patterns from one year to the next is known.

The main sources of data on consultation rates in general practice are the general household survey and the Royal College of General Practitioners' morbidity survey. Comparison of our data with data from these sources is difficult. Each study uses a different sampling frame (though the regional heart study and the morbidity survey are both based on general practice lists), and the data from the regional heart study and general household survey incorporate bias due to non-response, though this should not be a major problem by year 8 of the regional heart study. Evidently important is that each study uses a slightly different definition of a consultation: in the British regional heart study a consultation is defined as any recording in medical notes with a date: in the general household survey consultations are defined as any "consultations with NHS general medical practitioners ... Visits to the surgery, home visits and telephone conversations are included, but contacts only with a receptionist or nurse are excluded"; and in the morbidity survey a consultation is "Any face to face contact between the doctor and the patient at home or at the practice premises. Advice by telephone, consultations with ancillary staff and prescriptions repeated without a consultation were not recorded."

The average consultation rate in year 8 of the British regional heart study (1986–87) was 3-0. This compares with average annual consultation rates of 3-0 for men aged 45-64 in the morbidity survey (1981) and 4-0 in the general household survey (average of 1985-7). A more detailed comparison is possible with the morbidity survey (table V). Despite the identical means the proportions of both high and low consultants were lower in the British regional heart study. The lower proportion of non-consulters might be expected from the different definitions of a consultation. Other factors, however, complicate the comparison, including geographical coverage, selection of practices, and, perhaps most important, any trends in consultation rates during the 1980s. We believe that there may have been an upward trend in consultation rates then as a result of the introduction of screening by some practices. This would show up most appreciably as a change in the proportion of non-consulters.

Finally, given the cost and other implications of inviting non-attenders to attend for screening it is worth considering the likely benefits. Several studies
found them to be healthy. In younger people the yield of treatable disease will probably be even less but the potential for prevention is greater.

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A critical review of the effect of factory closures on health

J K Morris, D G Cook

Abstract

The dramatic rise in unemployment in the 1970s and 1980s has led to an increase in research into the possible effects of unemployment on health. Studies of the effects of job loss are difficult to interpret because of the difficulty in ruling out selection effects—for example, the least fit may be more likely to be made redundant. The study of factory closures is appealing since all employees are made redundant and all the studies of factory closure recorded in the Index Medicus since 1980 are reviewed. None of the studies fulfil all the criteria for an ideal study, and most fail on several counts. The small sample sizes are often unavoidable, but the lack of awareness of possible selection effects often results in a biased control group of only those people who are economically active. Also, the short duration of follow up restricts the detection of possible long term effects on health. Thus the conclusions that can be drawn about the health effects of factory closures are limited. Whereas there is evidence of short term effects on mental health and of increased use of primary health care, no long term effects have been studied and objective data on physical health are almost non-existent.

The 1980s saw a dramatic rise in the unemployment rates in most western countries. In the United Kingdom the number of people registered as unemployed reached a peak at 3.2 million in August 1986.1 Whereas links between the working environment and the physical ill health of the workers have long been established, the evidence for the effects of unemployment on health, particularly physical health, is not so definite. The major problem is that although unemployed people do tend to be less healthy,2 3 4 5 it may be that their health contributes to the likelihood of their becoming unemployed.

The advantages of using factory closures to study the effects of redundancy on health are:

1. There is no self selection—all the people followed up are made unemployed through no fault of their own and they all start off from being employed (usually full time).
2. Most subjects may have been in stable employment for many years. Analysis restricted to such people avoids the need to consider the effects of preceding unemployment.
3. If measurements are made before closure, "before and after" analysis can be done, and the changes due to redundancy examined.

The disadvantages are:

1. The populations studied are fairly homogeneous, often just men who are manual workers.
2. The people studied are likely to be reasonably healthy (the healthy worker effect).
3. Two different effects are being examined—the effect of being made redundant and also the effect of either being unemployed or adapting to a new job.
4. The job loss experience is of a specific type and different from being fired in that the degree of self recrimination is lower (previous studies suggest that self blame may be an important prelude to other adverse effects).6
5. Often the factory concerned will be the main employer in a small area and so the experiences of unemployment are different from those if the unemployment was affecting the whole community.7
6. The self selection bias cannot be eliminated when looking at the severity of the job loss experience, as the less healthy employees may find it harder to get a new job.
7. Any control group is unlikely to be directly comparable, as it will be selected from a different factory.
8. The numbers in such studies are restricted to the people working in the factory who satisfy the inclusion criteria.

The aim of this paper is to review all studies on the effects of factory closures on health referenced by Index Medicus since 1980. In the next section a brief description is given of each study, with two tables summarising the pertinent features of the study designs. Subsequent sections consider the adequacy
of the study designs, the measurements of health
collected, and the statistical analysis of these
measurements. Then we present sections on the
effects of closure of factories on physical and mental
health, use of the health service, and other health
related behaviour.

The studies

MICHIGAN (UNITED STATES)689
This is the earliest study reported (field work carried
out in 1967). The aim was to investigate the health
and behavioural effects of job loss and of the ensuing
unemployment or experience of change of job or
both. The mental and physical health of men from
two manufacturing plants that were due to close was
measured before closure and several times after­
wards. The health of the employees was compared
with the health of employees in matched control
factories. Local unemployment was low, so there was
a high rate of re-employment.

DANISH FACTORY10
The use of medical services was examined in a group
of Danish factory workers in the year before and the
year after they were made redundant. No control
group was included.

SARDINE FACTORY (NORWAY)1112
The effects of a factory closure in Norway on sick
leave in the first year after closure (unemployed
people in Norway can also claim sick leave) and the
receipt of disability pensions over the subsequent 10
years was assessed. A control group of workers from a
similar neighbouring factory was included. The study had the advantage that the two end points were
measured from general practitioners' notes and were,
therefore, not self reported. Also sick leave in the year
before closure could be measured.

NORDHAVN (DENMARK)131415
The original aim was to investigate how shipyard
workers perceived the health hazards of the job.
Therefore various measurements were made before
there was any knowledge about the closure. Once the
closure was announced, it was then decided to follow
up the workers for three years to investigate the
effects on the workers' health. No control group was
included.

NEWSPAPER (LONDON, ENGLAND)16
The original aim was to investigate the prevalence of
minor psychiatric morbidity in professionals (journ­
alists) facing the threat of redundancy and to
determine how the prevalence altered once redund­
ancy occurred. The initial measurements were
made after the redundancy notices were received.
These notices were then retracted, however, and
further measurements were made. The final
measurements were made three months later when
the threat of redundancy had been removed. The
response rate was low (about 35%) and this limits the
conclusions that can be drawn from this study. No
control group was included.

SKF (TORONTO, CANADA)17
The aim was to investigate the stress attributed to the
closure of a factory and the effects on the employees' health. Data were collected before the actual closure
but when the closure was known about, and for up to
two years after. Detailed analysis was restricted to the
small number of men for whom complete data were
available. No control group was included.

CALNE (WILTSHIRE, ENGLAND)1826
The effects of a factory closure on general practice
consultation rates were examined. Data two years
before any knowledge about the closure were availa­
bile. The employees and a comparable control group
were followed up for 10 years. The employees were
those people who were still employed at the Calne
factory in 1982. There were only 302 employees in
1982 compared with an initial workforce of 886 in
1979 and thus these employees may not have been
representative of the original workforce. Subjects
were excluded from the control group if they became
economically inactive. Because similar people were
not excluded from the study group this is likely to
lead to bias. Unfortunately the inappropriate statis­
tical analyses also limit the conclusions that can be
drawn.

ELSINORE (DENMARK)132728
There were two separate aims to this study and for
the purpose of this paper it is treated as two separate
studies, although in fact it was one shipyard that
closed down. In Elsinore 1 the effects of the closure
on health were examined using annual postal ques­
tionnaires in the three years after closure. In Elsinore
2 the numbers of admissions to hospital were
examined in the five years before and the three years
after closure. For both studies control groups were
included. In Elsinore 2 subjects who became econ­
omically inactive were excluded from the analysis.
This is likely to be a source of bias due to the relation
observed in other studies of unemployed people
being more likely to become economically inactive.29
A critical review of the effect of factory closures on health

CGE (TORONTO, CANADA)30
The health of former employees of a Canadian General Electric factory in the three to 27 months after closure was assessed by comparing their answers to the Canada Health Survey questionnaire with the answers given by the economically active population of Ontario.

SMITH'S DOCK (MIDDLESBROUGH, ENGLAND)3132
The aim was to examine the effect of the closure of the shipyard on the workforce in terms of their subsequent employment, finances, mental health, and wellbeing. A representative sample of the workforce was interviewed six times in the year after closure. No control group was included.

Study design
Tables 1 and 2 summarise the main design features of the 10 studies. Only two had a study population greater than 130 employees and only four had relevant control populations (the economically active population of Ontario does not appear to be a strictly comparable control population to the employees in the CGE study). In the Calne study economically inactive subjects were excluded from the control group and in Elsinore 2 they were excluded from the study and control groups, causing bias in both.

The studies were of two types. In the first group (Sardine factory, Calne, Danish factory, Elsinore 2) the employees' medical records were examined and the employees were not directly implicated. The response rate in these studies was high. Also, measurements were obtained on the employees before they had knowledge of the impending closure (referred to in table 2 as the "pre-closure" time, as opposed to the "anticipatory" time when the closure had been announced but had not yet occurred).

In the second group (Michigan, Nordhavn, Newspaper, SKF, Elsinore 1, CGE, Smith's Dock) the employees were directly consulted. The response rate was variable. Generally no information about the employees was available before knowledge about the impending closure. The Nordhavn study was the exception, because it was set up to investigate health hazards of the job. The later announcement of the shipyard closure was totally unexpected, and it was decided then to follow up the men to investigate the effects of the closure.

In all the studies on the effect of redundancy over time, the numbers analysed are those employees who had not been lost to follow up. The response rates given in table 1 include the effects of loss to follow up. This was generally much smaller than the initial non-response as the follow up period was very short, with only two studies having a follow up of longer than three years (Sardine factory and Calne) and three

<table>
<thead>
<tr>
<th>Factory name</th>
<th>Study name</th>
<th>Date of closure</th>
<th>Type of factory Local employment</th>
<th>Study population</th>
<th>No in survey</th>
<th>Response rate (%)</th>
<th>Controls (RR = response rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan factories</td>
<td>Michigan</td>
<td>1967</td>
<td>Four manufacturing plants; one rural, one urban</td>
<td>Low</td>
<td>Male blue collar workers, married and aged 35-60, with more than three years job tenure</td>
<td>100</td>
<td>70</td>
</tr>
<tr>
<td>Unnamed Danish factory</td>
<td>Unnamed Danish factory</td>
<td>1971</td>
<td>Unknown</td>
<td>Low</td>
<td>72 men, 13 women (part time, and full time)</td>
<td>85</td>
<td>100</td>
</tr>
<tr>
<td>Norbest Canning Co</td>
<td>Sardine factory</td>
<td>Jan 1975</td>
<td>Sardine factory</td>
<td>Low</td>
<td>21 men, 66 women from NC factory in Davengen (RR = 100%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nordhavn shipyard</td>
<td>Newspaper</td>
<td>Dec 1976</td>
<td>Shipyard</td>
<td>High</td>
<td>Skilled men</td>
<td>87</td>
<td>87</td>
</tr>
<tr>
<td>Newspaper redundancies</td>
<td>Newspaper</td>
<td>Dec 1980</td>
<td>Newspaper</td>
<td>High</td>
<td>99 employees continuously working at similar factory. (RR = 100%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SKF Canada C and T Harris (Calne) Ltd</td>
<td>SKF</td>
<td>Dec 1981</td>
<td>Bearings factory</td>
<td>High</td>
<td>Male blue collar workers who had &gt; four years tenure, made redundant June 1982. Social classes 3, 4, and 5</td>
<td>45</td>
<td>15</td>
</tr>
<tr>
<td>Elsinore shipyard</td>
<td>Elsinore 1</td>
<td>1983</td>
<td>Shipyard</td>
<td>High</td>
<td>Men with &gt; 6 months seniority</td>
<td>1001</td>
<td>60</td>
</tr>
<tr>
<td>Elsinore shipyard</td>
<td>Elsinore 2</td>
<td>1983</td>
<td>Shipyard</td>
<td>High</td>
<td>Men with &gt; 6 months seniority and economically active</td>
<td>887</td>
<td>67</td>
</tr>
<tr>
<td>Canadian General Electric factory</td>
<td>CGE</td>
<td>March 1984</td>
<td>General electric</td>
<td>High</td>
<td>Skilled workers (men and women)</td>
<td>124</td>
<td>31</td>
</tr>
<tr>
<td>Smith's Dock</td>
<td>Smith's Dock</td>
<td>Feb 1987</td>
<td>Shipyard</td>
<td>High</td>
<td>Men; 80% manual workers</td>
<td>200</td>
<td>100</td>
</tr>
</tbody>
</table>
## Table 2  Timing and type of data collected

<table>
<thead>
<tr>
<th>Study name</th>
<th>Time of data collection</th>
<th>Type of data collected</th>
<th>Health measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-closure</td>
<td>Anticipatory</td>
<td>0-12 months</td>
</tr>
<tr>
<td>Michigan</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Danish factory</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sardine factory</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nordhavn</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Newspaper</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>SKF</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Caine</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Elsinore 1</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Elsinore 2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CGE</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Smith's Dock</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Studies having a follow up of one year or less. In Elsinore 2 the effects of loss to follow up were estimated and were concluded to be negligible.

### Health measures

Only two studies clinically examined the employees (Michigan and Nordhavn); the rest relied on either the employees' self reported health or else the employees' use of the health service as a measure of morbidity. The General Health Questionnaire (GHQ) was used in three studies (Newspaper, Elsinore 1 and Smith's Dock) to measure psychiatric morbidity. Although it is self administered it has been shown to be a reliable method of measuring psychiatric morbidity. In the Sardine Factory study the claiming of disability pensions was examined. Even though a medical certificate had to be obtained before a subject could claim, the presence of strong financial incentives meant that this measure could not be assumed to be directly related to the morbidity of the employees. Some of the observed differences in health between the study and control groups may have been due to different rates of smoking and alcohol consumption, but only three studies measured alcohol consumption (Nordhavn, Newspaper, and Smith's Dock) and only three measured the levels of smoking (Michigan, Nordhavn, and Smith's Dock).

### Statistical analyses

The small sample sizes and lack of controls (see table 1) restricted the types of analysis. In several studies the lack of controls was overcome by comparing the employees before and after closure. In most, however, the lack of data before knowledge of redundancies (the "pre-closure" period in table 2), meant that the baseline data were collected when the employees knew that the factory was going to close (the "anticipatory" period) and so was affected by their anticipation of redundancy. In several studies a separate problem arose after redundancy, when the health of the employees who regained employment was compared with that of those who did not (Nordhavn, Michigan, Elsinore 1). Any differences detected may have been due to healthier people finding it easier to get a new job, rather than the effects of unemployment. In the Caine study several faults in the analysis limit the conclusions that can be drawn. Despite having an excellent control group no formal comparison of the changes in consultation rates observed in the study group was made with that observed in the control group. A second flaw arises in several of the later papers where subjects were excluded from the control group if they became economically inactive. As similar people were not excluded from the study group this is likely to lead to bias. In particular, it may explain the fall in consultation rates in the control group as the group got older. Finally, whereas statistical testing was carried out using non-parametric methods, due to the skewness of the distribution of consultation rates, the data were presented as percentage increases; this is potentially misleading.
Effects of factory closure on physical health

In the Calne study the number of chronic episodes of illness per 100 patients per year rose significantly from 9.2 originally, to 18.4 in the anticipatory phase, to 24.7 after the redundancies had occurred. The control employees had non-significant changes of 14.9, to 18.8, to 17.4, but no formal comparisons of the two groups were made (a chronic episode of illness was defined as an episode still requiring active medical management more than one year after presentation). In the Michigan study in the anticipatory phase the mean serum uric acid concentrations were significantly higher for the employees than for the control group. On gaining re-employment these concentrations fell, indicating that the higher concentrations were due to the anticipation of the factory closure. Changes in consumption of alcohol could also account for these changes but no data on alcohol consumption were collected.

Any detrimental effects of factory closure must be balanced against the possible health hazards of the job. The health of the employees in the Elsinore 2 study seemed to improve, because the relative risk of admission to hospital in the study group compared with the controls fell significantly from 1.29 four to five years before closure to 0.74 three years afterwards. This was because the relative risk of accidents and diseases of the digestive system fell (1.33 to 0.46 and 4.53 to 1.03), whereas the relative risks of circulatory and cardiovascular diseases increased (0.8 to 1.60 and 1.0 to 2.6). The change in admissions was interpreted as being a result of exchanging the high health risks in the work environment for the health effects of stress due to unemployment and job insecurity. Some of the change in relative risk, however, was due to the increase in admissions for accidents and diseases of the digestive system in the control group. Moreover, there was no allowance for any changes in consumption of alcohol and smoking that might have altered the risk, particularly for diseases of the digestive system.

An effect of stress on physical health was also claimed in the Michigan study, where the ulcer activity of the study population was significantly higher than that of the control population (14 days per 1000 person days v 0-8 days). Again there were no data available on consumption of alcohol. The amount of cigarette smoking did not change.

A further problem with ulcer activity is that it is self reported and it may be that the unemployed report more diseases. This was suspected in the CGE study where three months after the factory closed the study population reported suffering significantly more ailments than the control population (an average of 2.3 ailments v 1.05). The illnesses were not all stress related (for example, eyesight problems) and were unlikely to have developed in only three months. Also the study population was made up of middle class men who would usually be assumed to be more healthy than the control population.

The health effects may also be mitigated or ameliorated by the subsequent employment experiences of the subject. In the Nordhavn study the employees who subsequently experienced the greatest amount of unemployment actually showed an improvement in chronic bronchitis and functional heart troubles. In general, however, the problem with comparing employees who subsequently find work with those who remain unemployed for longer is that there is a strong health selection effect, with the fittest finding jobs first (the SKF study and the Michigan study). In the Michigan study 53% of the employees who subsequently experienced the greatest amount of unemployment had raised blood sugar concentrations compared with 8% for the employees experiencing least unemployment. This means that any differences in health between those that find employment and those that do not is not readily attributable to the effects of unemployment.

This is important when interpreting the findings of the Elsinore 1 study in which the prevalence of various symptoms in the unemployed (from both the study and the control population) was compared with the prevalence in the employed (from both populations). The prevalence of hypertension, dyspnoea, and chest pain was significantly higher in the unemployed (the relative prevalence proportions were 2.08, 1.49, and 1.51). To overcome this problem in the Nordhavn study the use of medicine before closure is given for both the men who subsequently experienced less employment and those who experienced more, to show that both groups were similar before closure (28% and 27% reported taking medicines) whereas after two years the percentages were significantly different (31% and 57%).

Effects of factory closure on mental health

Three studies measured psychiatric morbidity using the GHQ. The Smith's Dock and Elsinore 1 study found a strong relation between the current employment state after the closure had occurred and the current GHQ score, with higher scores indicating greater morbidity. In the Elsinore 1 study, one year after the closure the odds ratio of having a score higher than 15 (15 being an arbitrary cut off point chosen by the authors) was 2.48 for the men who were unemployed compared with those who were employed. The Smith's Dock study indicates that this difference is not solely due to a self selection effect, because on finding re-employment the employees' GHQ score dropped. The Newspaper study found that just the threat of redundancy had an adverse effect on the GHQ score. On learning that their jobs were no longer under threat the prevalence of "cases" (judged from the GHQ scores) decreased significantly from 37% to 24%. 

A critical review of the effect of factory closures on health
The Nordhavn study considered the prevalence of a combination of mental symptoms that included nervousness, tiredness, and depression, and compared those who subsequently experienced the least unemployment with those who subsequently experienced the most. The prevalence was 40% in both groups before knowledge of the closure, but two years later the prevalence was 29% for those who had experienced the least unemployment and 47% for those who had experienced the most.

Two studies (SKF, CGE) that were concerned about stress resulting from the factory closure attempted to measure it by scoring three questions:

1. The person’s feelings on how much the closure bothered him.
2. Assessments about how long it was before things returned to normal.
3. Rankings of the stress generated by the closure as a life event.

Although both studies showed that the employees had very high scores, no control group comparison was possible.

Effects of factory closure on general practitioner consultation rates
The number of times someone consults their general practitioner is affected by other factors as well as their actual health. Out of the three studies that reported general practitioner consultation rates, two studies report an increase in consultation rates which starts to occur in the anticipatory phase (Danish factory and Caine) and the other study reports no difference in consultation rates (Nordhavn). The reason for this may be due to the fact that in the Danish factory and Caine studies the general practitioners’ notes were examined, whereas in the Nordhavn study the consultation rates were obtained using a retrospective questionnaire. Alternatively there may be no overall effect on the consultation rate of shipyard workers just as there was no overall effect on the hospital admission rate for the shipyard workers in Elsinore 2.

The Caine study examines the factors affecting consultation rates in the greatest detail. The conclusions that can be drawn, however, are limited by several flaws in the analysis. For completeness, table 3, which summarises some of their findings, is included but it should be interpreted with caution.

Effects of factory closure on other health related behaviour
In the Sardine factory study in the first year of follow up the employees claimed a significant excess of 2-4 disability pensions per 100 persons more than the control group. This continued to increase to an excess of 17-9 pensions per 100 persons by the end of the fourth year, after which it levelled off. Although a medical certificate is required, there is also more incentive for an unemployed person to claim disability pension rather than unemployment benefit. These long term effects may also arise because even if new employment is found it is often inferior to the previous job and more likely to be temporary. This means that the men who find new employment are often subjected to several more periods of unemployment. This is apparent in the Nordhavn study where increasingly more men withdrew from the labour market (3% were economically inactive in the first year, rising to 28% by the end of the third year), preferring to be classified as retired or sick.

Table 3 Percentage increases in consultation rates (Caine study) during anticipatory phases, lost phases, or both compared with consultation rates at time of stable employment (E = employees, C = controls, U = unknown)

<table>
<thead>
<tr>
<th>Group</th>
<th>Anticipatory and lost</th>
<th>Anticipatory</th>
<th>Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td>Men aged &lt; 40</td>
<td>-18</td>
<td>-24</td>
<td></td>
</tr>
<tr>
<td>Men aged 41-60</td>
<td>48**</td>
<td>-10</td>
<td></td>
</tr>
<tr>
<td>Men aged 61-64</td>
<td>140*</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Women aged &lt; 35</td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Women aged 36-55</td>
<td></td>
<td></td>
<td>13**</td>
</tr>
<tr>
<td>Women aged 56-59</td>
<td></td>
<td></td>
<td>-6</td>
</tr>
<tr>
<td>Married men:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aged 52-64</td>
<td>55*</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Aged 56-51</td>
<td>13*</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Long job tenure</td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Short job tenure</td>
<td></td>
<td></td>
<td>52*</td>
</tr>
<tr>
<td>Sole employment</td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Previous employment elsewhere</td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>All employees in study</td>
<td></td>
<td></td>
<td>23*</td>
</tr>
<tr>
<td>Employees subsequently experiencing greatest unemployment (matched for age and sex)</td>
<td></td>
<td></td>
<td>45*</td>
</tr>
</tbody>
</table>

*p < 0.05; **p < 0.01.
A critical review of the effect of factory closures on health

The financial advantages of being certified sick rather than being unemployed may account for some of the 41% increase in sick leave experienced by the employees in the Sardine factory study in the first year after the closure. It does not explain the significant increase in the duration of certificated sick leave for the employees in the Caine study of an average of nine days in the stable employment period to 13 days when jobs were threatened.

Effects of factory closure on alcohol and tobacco consumption
In both the Nordhavn and the Smith’s Dock studies, the employees reported decreases in consumption of alcohol. In the Smith’s Dock study 53% of the employees said they were spending less money on alcohol. In the Nordhavn study the odds ratio for a decrease in consumption of alcohol of the men who had remained unemployed v those who regained employment was four (p < 0.012). In the Newspaper study, however, no change in alcohol consumption was reported. Several reasons could account for this apparent discrepancy. For instance, the incorrect analysis may have been carried out (the average distribution of consumption of alcohol is extremely skew). There may be no effect on alcohol consumption in the anticipatory phase or the monetary aspect induces lower consumption and journalists are wealthier than unemployed shipyard workers.

Similarly for smoking the employees in the Smith’s Dock study reported spending 35% less. The Michigan study found no change in smoking habits. This discrepancy might be due to the fact that smoking was a much more expensive habit in Great Britain in 1987 compared with the United States in 1967.

Effects of factory closure on mortality
None of the studies reported were large enough or had long enough follow ups to allow analysis of mortality data. The Michigan study mentions anecdotal evidence on suicides.

Conclusions
The ideal study design would encompass a large number of employees with a similar number of controls working in a similar factory; both study populations should have high response rates. The study would collect data before any knowledge about the closure and the data would consist of both self reported health and objective measures of health and health behaviour. The follow up would be for more than five years (ideally at least 10) and the loss to follow up would be small. None of the 10 studies discussed fulfil all the criteria for an ideal study, with most failing on several counts. Thus the conclusions that can be drawn about the health effects of factory closures are limited.

As there are no large studies with follow up for more than three years, no conclusions about the long term effects on health can be made; any effects on physical health are only likely to become apparent in the long term. The short term mental health of the employees was clearly adversely affected (measured by the GHQ); their mental health, however, appeared to improve on regaining employment. No evidence is forthcoming as to whether there was a lasting effect of long term unemployment on mental health. An increase in the frequency of use of the health service (measured by general practitioner consultation rates) for workers in low risk employment was found; when their jobs had higher physical risks (shipyard workers) the improvement in the risk of accidents offset any negative effects of unemployment (measured by hospital admission rates). The consumption of alcohol and tobacco decreased, probably due to the financial constraints of unemployment.

1 Department of Employment Gazette. 1987;7:533.

Accepted 2 July 1990

Vancouver style

All manuscripts submitted to the Br J Ind Med should conform to the uniform requirements for manuscripts submitted to biomedical journals (known as the Vancouver style).

The Br J Ind Med, together with many other international biomedical journals, has agreed to accept articles prepared in accordance with the Vancouver style. The style (described in full in Br Med J, 24 February 1979, p 532) is intended to standardise requirements for authors.

References should be numbered consecutively in the order in which they are first mentioned in the text by Arabic numerals above the line on each occasion the reference is cited (Manson1 confirmed other reports2-5...). In future references to papers submitted to the Br J Ind Med should include: the names of all authors if there are six or less or, if there are more, the first three followed by et al; the title of journal articles or book chapters; the titles of journals abbreviated according to the style of Index Medicus; and the first and final page numbers of the article or chapter.

Examples of common forms of references are:

Non-employment and changes in smoking, drinking, and body weight

Joan K Morris, Derek G Cook, A Gerald Shaper

Abstract

Objective—To assess the effect of unemployment and early retirement on cigarette smoking, alcohol consumption, and body weight in middle aged British men.

Design—Prospective cohort study (British regional heart study.)

Setting—One general practice in 24 towns in Britain.

Subjects—6057 men aged 40-59 who had been continuously employed for five years before the initial screening. Five years after screening 4412 men had been continuously employed and 1645 had experienced some unemployment or retired.

Main outcome measures—Numbers of cigarettes smoked and units of alcohol consumed per week and body mass index (kg/m²).

Results—At initial screening significantly higher percentages of men who subsequently experienced non-employment smoked or had high alcohol consumption than of men who remained continuously employed: 43-0% versus 37-0% continuously employed for cigarette smoking (95% confidence interval for difference 3-2% to 9-0%) and 12-1% versus 9-0% for heavy drinking (1-3% to 5-1%). There was no evidence that men increased their smoking or drinking on becoming non-employed. Men non-employed through illness were significantly more likely to reduce their smoking and drinking than men without employed. Men who experienced non-employment were significantly more likely to gain over 10% in weight than men who remained continuously employed: 7-5% versus 5-0% continuously employed (0-9% to 4-0%).

Conclusions—Loss of employment was not associated with increased smoking or drinking but was associated with an increased likelihood of gaining weight. The long term effects of the higher levels of smoking and alcohol consumption before non-employment should be taken into account when comparing mortality and morbidity in groups of unemployed and employed people.

Introduction

Many cross sectional studies have found that unemployed men are more likely to smoke cigarettes and to consume more alcohol than employed men.¹⁻⁵ There are two possible explanations for this: firstly, loss of employment leads to increased smoking and drinking or, secondly, people who lose employment smoke and drink more heavily before losing employment compared with people who remain employed. We have examined these two explanations in a group of middle aged men using prospective data collected as part of the British regional heart study.

To overcome the possible effects on smoking and drinking habits of recurrent unemployment (often due to illness) over long periods we restricted our analysis to men who had been continuously employed for the five years before the initial screening. We attempted to control for other background factors that might confound the relation, such as age, social class, area of residence, and reason given for loss of employment. In particular health status may be an important confounding factor. Certain illnesses are known to be potent factors in persuading men to stop smoking as well as affecting employment prospects.

Subjects and methods

In 1978-80, men aged 40-59 were randomly selected from general practices in 24 towns in England, Wales, and Scotland to form the study population of the British regional heart study. The response rate was 78%, and 7735 men were screened. The criteria for selecting the towns and general practices and the methods of data collection have been reported.¹ Research nurses administered to each man a standard questionnaire which included questions on occupational history, employment status, smoking habits, alcohol intake, and usual patterns of physical activity. Each man was weighed in trousers and socks to the nearest 0-1 kg on an MPS110 field survey scale (beam balance), and height was measured without shoes to the nearest millimetre with a stadiometer (Harpenden) with digital meter. Five years later (1983-5) we sent a postal questionnaire to all surviving men still resident in Britain (n=7397) and detailed information was obtained from 7275 (98%) men on changes in smoking behaviour, past and present drinking habits, current weight, and information on employment status five years before and after screening.

The men were classified into employment groups based on their employment experience over the five years after screening, with an emphasis on their employment status at the time of the postal questionnaire: (a) continuously employed throughout the five years after screening and still employed at the time of the postal questionnaire; (b) discontinuously employed (that is, employed at initial screening and at the time of the postal questionnaire but unemployed at some time between the two); (c) unemployed because of illness at the time of the questionnaire; (d) unemployed for reasons other than illness at the time of the questionnaire; (e) retired because of illness at the time of the questionnaire; and (f) retired for reasons other than illness at the time of the questionnaire. Men who were working part time (134) were excluded because of uncertainty about whether to classify them as employed. Twenty nine men were not classified because of incomplete data, leaving 7112 men for analysis.

The reason for not being employed was based on each man's self assessed reason. Therefore those not employed because of ill health will be heterogeneous in respect of the type and severity of the illnesses experienced.

Social class was determined from each man’s longest held occupation at screening by using the six social classes of the Office of Population Censuses and Surveys.¹ Occupational information was not available for 10 men.

Cigarette smoking—Men were classified according to their reported smoking habits: never cigarette smokers, ex-cigarette smokers, light smokers (1-19 cigarettes a day), moderate smokers (20 cigarettes a day), and heavy smokers (more than 20 cigarettes a day). This categorisation was chosen because of the distribution
smoking 20 cigarettes a day (one pack) and very few smoking 16–19 or 21–24 a day. Men who currently smoked pipes or cigars and had never smoked cigarettes were classified as never having smoked cigarettes and men who currently smoked pipes or cigars and had smoked cigarettes in the past were classified as ex-cigarette smokers. Data were missing on 12 men at screening and 30 men at the postal questionnaire.

**Alcohol consumption**—The men were classified into five groups on the basis of their estimated average alcohol consumption in units per week: non-drinker, occasional drinker (<1 unit per week), light drinker (1–15 units), moderate drinker (16–42), and heavy drinker (>42 units). A unit was equivalent to half a pint of beer; a single whisky, gin, or brandy; or a glass of wine or sherry (about 8–10 g alcohol). Data were missing on two men at screening and 76 men at the postal questionnaire.

**Weight**—Body mass index was calculated as weight/height² and used as an index of relative weight. Bray’s classification of relative weight¹² was used to define men as underweight if their body mass index was less than 20 kg/m² and obese if their index was equal to or greater than 30 kg/m². The men were classified into six groups based on weight change calculated as the percentage change in body weight since initial screening: loss >10%; loss 0–10%; stable; gain of 0–10%; gain of 11–15%; and gain >15%. Data were missing on one man at screening and 127 men at the postal questionnaire.

**Physical activity**—At screening men were asked to indicate their usual pattern of physical activity, under the headings of regular walking or cycling, recreational activity, and sporting (vigorous) activity. Physical activity at work was excluded, but few middle aged men do physically demanding work. Regular walking and cycling related to weekday journeys, which included going to and from work. Recreational activity included gardening, walking for pleasure, and doing it yourself. Men were classified as inactive if they did no physical activity or regular walking or did infrequent recreational activity. Data were missing on 70 men at screening and no data were collected on physical activity in the postal questionnaire.

To determine the effect of becoming non-employed (unemployed or retired) on alcohol consumption, cigarette smoking, and body weight the analysis was restricted to those men who were employed at screening. Unemployed men are likely to have experienced previous periods of unemployment,¹⁰ and thus to reduce the effects of previous unemployment a further criterion was applied—that the men had to have been continuously employed for at least five years before the initial screening. Out of 7112 men, 6057 were employed at screening and had experienced no unemployment in the previous five years. Most of these men (72–8%, n =

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**STATISTICAL ANALYSIS**

The percentages in the tables have been adjusted for age, social class, and town of residence as these factors may affect the levels of smoking, drinking, and physical activity and the distribution of body weight.¹¹ Because of small numbers the percentages of heavy smokers and heavy drinkers reducing their levels of smoking and drinking respectively could not be adjusted for town of residence. The effect of town of residence on these changes, however, seem to be small. Unless otherwise indicated the adjusted proportions were calculated by fitting logistic regression models and by using the marginal prediction method described by Wilcosky and Chambless.¹² Changes in weight were analysed by fitting a nominal polytomous regression model on the six separate weight change categories.¹³ Town of residence did not affect the probability of weight change and so was not adjusted for. The adjusted proportions were again calculated by the marginal prediction method. All the models were fitted by using Proc Logist¹⁴ or Proc Catmod¹⁵ in the SAS Institute package. Complete tables containing 95% confidence intervals are available from the authors. Tests of heterogeneity are included in the tables to indicate differences between the non-employment groups.

**Results**

Table I provides summary data on the age and social and geographical status of the different employment groups. The geographical distribution of the groups is summarised by the percentage of men living in the “North”—that is, north of a line from the Bristol Channel to the Wash. The continuously employed and discontinuously employed men were on average more than two years younger than men who became unemployed, with the men who retired being older still. Many of the retirements were in men aged under 60 and, because of the age groups being studied, nearly all were in men under 65. Those who had retired for reasons other than illness and the continuously employed were reasonably similar in terms of social class and geography, while the other groups were more likely to be manual workers and to live in the north.

**CIGARETTE SMOKING**

Table II shows the adjusted percentages of never smokers, current smokers, and heavy smokers in the different employment groups both at initial screening and at the postal questionnaire five years later. The adjusted percentages of men who stopped smoking and the percentages of heavy smokers who reduced or stopped smoking are also given.

At the initial screening, compared with men who remained employed men who later became non-employed were more likely to be current smokers (43% v 37% who remained employed; 95% confidence interval of the difference 3.2% to 9.0%) and to be heavy smokers (15.5% v 13.1%; 0.4% to 4.7%). They were also more likely to have smoked at some time (22.1% v 26.3% who remained employed never smoked; 1.5% to 6.7%). Among men who later became non-employed, men unemployed through illness were significantly more likely to be heavy smokers and to be current smokers and less likely to have never smoked (table II). The tests of heterogeneity showed that the levels of smoking differed significantly between the non-employed groups, with those retired through illness smoking the least.

Five years later the level of smoking had fallen:
26.8% of smokers had stopped smoking and only 44.6% of heavy smokers still smoked heavily. Overall, men who had experienced some non-employment were still more likely to be current smokers than men who had remained continuously employed (33.0% vs 29.3% continuously employed; 1% to 6.5%), but they were no longer more likely to be heavy smokers (7.5% to 8.1%; -2.1% to 1.0%). The main changes occurred in men who stated that their non-employment was due to illness, with the percentages of heavy smokers falling from 23.6% to 5.8% for men unemployed through illness and from 16.6% to 3.1% for those retired through illness.

Only 3% of men apparently started smoking after screening, and this did not vary between employment groups. Of the men who smoked at screening, 27.9% of those who had experienced some non-employment after screening had stopped smoking, compared with 26.2% of the men who remained continuously employed (95% confidence interval of the difference -0.1% to 5.8%), with the largest percentages of men giving up being in the groups unemployed and retired through illness and retired for other reasons (table II).

Men unemployed for other reasons and those dis­continuously employed were slightly less likely to stop smoking (not significant). The test of heterogeneity shows that the tendency to stop smoking differed significantly between the non-employment groups. The differences seemed to occur between the ill and the not ill groups. The probability of giving up was affected by the initial level of smoking (light smokers being more likely to give up). However, adjusting for this had little effect on the percentages quoted.

Analysis of the percentage of heavy smokers at screening who had reduced or stopped smoking by the time of the postal questionnaire gave a similar picture to that for the percentage of all smokers stopping, though the differences between the continuously employed and the non-continuously employed were more noticeable, 53% of continuously employed men reducing their smoking compared with 61% of other men. This was due mainly to 75% of men unemployed through illness and 86% of men retired through illness decreasing their smoking. There was no evidence that men who experienced some non-employment were more likely to increase their level of smoking than men who remained continuously employed. (More detailed tables of changes in smoking by level of smoking are available).

ALCOHOL CONSUMPTION

Table III shows the adjusted percentages of non­drinkers and heavy drinkers in the different employment groups both at initial screening and at the postal questionnaire five years later. At initial screening men who later became non-employed were more likely to be heavy drinkers (12.1%) compared with men who remained employed (9%) (95% confidence interval of

### Table II

<table>
<thead>
<tr>
<th>Employment status at postal questionnaire</th>
<th>Initial screening</th>
<th>Postal questionnaire</th>
<th>Changes in smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of men</td>
<td>Never smoked</td>
<td>Current smokers</td>
</tr>
<tr>
<td>Continuously employed</td>
<td>4401</td>
<td>26.3</td>
<td>37.0</td>
</tr>
<tr>
<td>All non-continuously employed</td>
<td>1644</td>
<td>25.1</td>
<td>41.5</td>
</tr>
<tr>
<td>Discontinuously employed</td>
<td>447</td>
<td>21.7</td>
<td>42.5</td>
</tr>
<tr>
<td>Unemployed through illness</td>
<td>129</td>
<td>14.6</td>
<td>56.0</td>
</tr>
<tr>
<td>Unemployed for other reasons</td>
<td>376</td>
<td>18.4</td>
<td>44.5</td>
</tr>
<tr>
<td>Retired through illness</td>
<td>210</td>
<td>25.0</td>
<td>42.9</td>
</tr>
<tr>
<td>Retired for other reasons</td>
<td>482</td>
<td>27.4</td>
<td>38.2</td>
</tr>
</tbody>
</table>

Test of heterogeneity of percentages among the non-employed χ² on 4 degrees freedom:

- **Continuously employed**: p = 0.001
- **All non-continuously employed**: p = 0.008
- **Discontinuously employed**: p = 0.002
- **Unemployed through illness**: p = 0.003
- **Unemployed for other reasons**: p = 0.002
- **Retired through illness**: p = 0.001
- **Retired for other reasons**: p = 0.007

* All percentages adjusted for age, social class, and town of residence except for the percentages of heavy smokers reducing smoking. Due to the small number of heavy smokers only age and social class could be adjusted for. However, the effects of town of residence on changes in smoking are small.

### Table III

<table>
<thead>
<tr>
<th>Employment status at postal questionnaire</th>
<th>Initial screening</th>
<th>Postal questionnaire</th>
<th>Changes in alcohol consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of men</td>
<td>Non-drinkers</td>
<td>Heavy drinkers</td>
</tr>
<tr>
<td>Continuously employed</td>
<td>4411</td>
<td>5.6</td>
<td>9.0</td>
</tr>
<tr>
<td>All non-continuously employed</td>
<td>1644</td>
<td>5.4</td>
<td>12.5</td>
</tr>
<tr>
<td>Discontinuously employed</td>
<td>447</td>
<td>4.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Unemployed through illness</td>
<td>129</td>
<td>10.5</td>
<td>15.8</td>
</tr>
<tr>
<td>Unemployed for other reasons</td>
<td>376</td>
<td>5.2</td>
<td>14.1</td>
</tr>
<tr>
<td>Retired through illness</td>
<td>211</td>
<td>6.8</td>
<td>13.8</td>
</tr>
<tr>
<td>Retired for other reasons</td>
<td>482</td>
<td>4.4</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Test of heterogeneity of percentages among the non-employed χ² on 4 degrees freedom:

- **Initial screening**: p = 0.006
- **Postal questionnaire**: p = 0.001

* All percentages adjusted for age, social class, and town of residence except for the percentages of heavy drinkers reducing drinking. Due to the small number of heavy drinkers only age and social class could be adjusted for. However, the effects of town of residence on changes in drinking are small.

† Data missing on two men.
‡ Data missing on 30 men.
§ Significantly different from the percentage of continuously employed men (p<0.05).
Five years later the percentage of heavy drinkers had fallen and the percentage of non-drinkers had risen in all groups. Men who had experienced some non-employment were no longer more likely to be heavy drinkers than men who remained employed (4.1% vs 3.9%; -0.9% to 1.5%). Such men were more likely to be non-drinkers (10.8% vs 8.4% continuously employed; 0.7% to 4.2%) because of the very high percentages of non-drinkers among men unemployed through illness (23.8%) and retired through illness (36.7%). The test of heterogeneity indicated that the probability of being a non-drinker differed significantly between the non-employment groups. The differences seemed to be between the ill and the not ill groups.

Overall, only 10-7% of men reported increasing their alcohol consumption compared with 36.9% who reported reducing their consumption. The percentages of men reducing their alcohol consumption were higher in all the non-employed groups compared with the percentage of continuously employed men, with men non-employed through illness being the most likely to reduce their alcohol consumption (54.1% of men unemployed through illness and 50.2% of men retired through illness vs 42.2% of all non-employed men and 34.9% of continuously employed men (table III)). The probability of reducing alcohol consumption was affected by the initial level of consumption, heavy drinkers being more likely to reduce their consumption. But adjusting for initial drinking level had no significant effect on the percentages quoted. The heavy drinkers at screening who experienced some non-employment were not more likely to reduce their consumption compared with the heavy drinkers who remained continuously employed. There was no evidence that non-employed men started drinking more heavily.

Weight

Table IV shows the adjusted mean body mass index and the adjusted percentage of men underweight or obese within each employment group at initial screening and at the postal questionnaire five years later. At initial screening, the mean body mass index of men who remained employed was similar to that of men who experienced some non-employment later (25.52 kg/m² vs 25.40 kg/m² who remained employed). However, men who later became non-employed were more likely to be underweight compared with men who remained employed (3.8% vs 2.7%; 95% confidence interval of the difference 0.1% to 2.2%). This was mainly because of the high percentage of men unemployed or retired through illness who were underweight. The overall percentage of men who were obese was similar among men who later experienced some non-employment and those who did not. The tests of heterogeneity indicated that the percentages of underweight and overweight men were not significantly different between the non-employment groups.

Five years later the mean body mass index had risen slightly both in men who had experienced some non-employment (25.40 to 25.71 kg/m²) and in men who had not (25.52 to 25.77 kg/m²). The percentages of men who were underweight had fallen and the percentages of men who were overweight had risen. Men non-employed through illness still had the highest percentage of underweight men, but the percentages were not significantly different from those in the other groups of men.

Men who experienced some non-employment were less likely to remain at a stable weight than men who remained continuously employed, and they were more likely to either lose or gain more than 10% in weight; 2-9% of men who experienced some non-employment lost more than 10% in weight and 7-5% gained more than 10% in weight compared with 2-1% and 5-0% respectively of continuously employed men (95% confidence interval of the differences 0.1% to 1.8% for weight loss and 0.9% to 4.0% for gain). The higher percentage of non-employed men losing weight was due to the much greater percentages among the men non-employed through illness, whereas the higher percentage of men gaining weight was due to higher percentages in all the non-employed groups.

There was a strong association between cigarette smoking and body mass index, with an increase in body mass index occurring on stopping smoking. It is possible that men who subsequently experienced some periods of non-employment were more likely to gain weight after stopping smoking. Excluding men who stopped smoking from the analysis reduced the percentage of men who gained more than 10% in weight. However, non-employed men were still significantly more likely to gain more than 10% in weight than men who remained continuously employed.

Physical Activity

Table V shows the adjusted percentages of inactive men in the different employment groups at initial screening before any non-employment had occurred.

**Table IV**—Body weight at initial screening and postal questionnaire five years later and changes in weight. Figures are adjusted percentages of men *unless otherwise stated.

<table>
<thead>
<tr>
<th>Employment status at postal questionnaire</th>
<th>Initial screening</th>
<th>Postal questionnaire</th>
<th>Changes in weight*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SE) body mass index (kg/m²)</td>
<td>Underweight</td>
<td>Obese</td>
</tr>
<tr>
<td>Continuously employed</td>
<td>4412</td>
<td>25.52 (0.05)</td>
<td>2.7</td>
</tr>
<tr>
<td>All non-continuously employed</td>
<td>1664</td>
<td>25.40 (0.06)</td>
<td>3.9</td>
</tr>
<tr>
<td>Discontinuously employed</td>
<td>446</td>
<td>25.46 (0.15)</td>
<td>3.4</td>
</tr>
<tr>
<td>Unemployed through illness</td>
<td>129</td>
<td>25.42 (0.17)</td>
<td>6.4</td>
</tr>
<tr>
<td>Unemployed for other reasons</td>
<td>376</td>
<td>25.44 (0.16)</td>
<td>4.1</td>
</tr>
<tr>
<td>Retired through illness</td>
<td>211</td>
<td>25.51 (0.22)</td>
<td>5.7</td>
</tr>
<tr>
<td>Retired for other reasons</td>
<td>482</td>
<td>25.26 (0.15)</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Test of heterogeneity of percentages among the non-employed *on 4 degrees of freedom

<table>
<thead>
<tr>
<th>7.63</th>
<th>4.7</th>
<th>5.5</th>
<th>0.14</th>
<th>51.03</th>
</tr>
</thead>
<tbody>
<tr>
<td>p=0.107</td>
<td>p=0.320</td>
<td>p=0.240</td>
<td>p=0.998</td>
<td>p=0.000</td>
</tr>
</tbody>
</table>

*All percentages adjusted for age, social class, and town of residence by fitting a multiple logistic model except for changes in weight which were analysed by fitting a nominal polynomial regression model on six separate weight change categories. Town was not adjusted for. The test of heterogeneity is based on 20 degrees of freedom.

†Data missing on one man.
‡Data missing on 127 men.
§Significantly different from the percentage of continuously employed men (p<0.05).
Men who later became non-employed were significantly more likely to be inactive compared with men who remained employed (39-4% vs 36-7%; 95% confidence interval of the difference 0-1% to 5-7%). Only men retired for reasons other than illness were significantly less likely to be inactive than continuously employed men (31-6% were inactive; 0-4% to 9-8%).

**TABLE V — Level of physical activity at initial screening**

<table>
<thead>
<tr>
<th>Employment status at postal questionnaire</th>
<th>No of men</th>
<th>% Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuously employed</td>
<td>4364</td>
<td>36-7</td>
</tr>
<tr>
<td>All non-continuously employed</td>
<td>1623</td>
<td>39-4</td>
</tr>
<tr>
<td>Discontinuously employed</td>
<td>443</td>
<td>37-9</td>
</tr>
<tr>
<td>Unemployed through illness</td>
<td>127</td>
<td>44-1</td>
</tr>
<tr>
<td>Unemployed for other reasons</td>
<td>369</td>
<td>44-3</td>
</tr>
<tr>
<td>Retired through illness</td>
<td>208</td>
<td>46-1</td>
</tr>
<tr>
<td>Retired for other reasons</td>
<td>476</td>
<td>31-6</td>
</tr>
</tbody>
</table>

Test of heterogeneity of percentages among the non-employed χ2 on 4 degrees freedom

25-21 ------- p=0.000

*Data missing on 70 men.
†All percentages adjusted for age, social class, and town of residence.
‡Significantly different from the percentage of continuously employed men (p<0.05).

The test of heterogeneity indicated that the level of activity significantly differed between the non-employed groups. There was no association between the level of physical activity at screening and the likelihood of gaining more than 10% in weight (data not shown).

**Discussion**

**Cigarette Smoking**

In agreement with other studies,11*2 non-employed men in the British regional heart study smoked more than employed men, but this was because they smoked more heavily before non-employment. The data show that illness was an important factor associated with non-employed men stopping smoking. Men who attributed their non-employment to illness had significantly higher rates of stopping smoking or decreasing smoking than both continuously employed men and men who did not attribute their non-employment to illness. Other studies do not report on the effect of illness on changes in smoking habits among unemployed men, but financial hardship is reported to be a strong incentive to reduce smoking.12 We did not study any economic measures, but in a study on living standards during unemployment in Great Britain in 1983,13 53% of the sample reported a loss in family income of more than £30 a week.

**Alcohol Consumption**

We have shown that non-employed men were heavier drinkers before non-employment occurred, even after adjusting for age, social class, and town of residence. Once the non-employment had occurred, non-employed men were not more likely to be heavier drinkers, and men non-employed because of illness were actually more likely to be non-drinkers. In agreement with some previous studies14 15 we found that men who had experienced some non-employment were more likely to have reduced their alcohol consumption than those who remained continuously employed, particularly the occasional and light drinkers. Nevertheless, because of the categorisation of the data we could not determine whether heavy drinkers were at risk of increasing their alcohol consumption, as has been suggested.16 Men who were non-employed because of illness were the most likely to have reduced their alcohol consumption, indicating that the presence of illness was associated with some men reducing their alcohol consumption. The effect of illness is not reported in other studies. Again our data do not enable us to comment on financial pressure which may lead to reduced alcohol consumption, as reported in other studies.18

**Weight**

Since body weight five years after screening was self reported there will inevitably have been some misreporting. Nevertheless, strong correlations have been shown between self reported weight and measured weight.19 Random misreporting would not in any case bias our findings. Bias would arise if non-employed men were more likely to overestimate their weight than employed men. This seems unlikely to have occurred.

In agreement with other studies20-2 analysing mean body mass index or mean changes in body mass index did not show any differences between men who remained continuously employed and men who experienced some non-employment. However, before the non-employment occurred there were raised percentages of underweight men in the groups not employed because of illness, strongly suggesting that some of these men had chronic illness. This view is reinforced by the high incidence of substantial weight loss in these two groups by the time of the postal questionnaire. Wannamethee and Shaper found that the men in the British regional heart study cohort who were underweight at the initial screening or who subsequently lost weight were likely to have had impaired health at the initial screening.11 The percentages of men gaining >10% in weight were higher for all the non-employed groups compared with the percentage of continuously employed men. Wannamethee and Shaper found that a weight gain of more than 10% was associated with increased risk of death from cardiovascular causes over a short period of follow up.11 This indicates that men who subsequently experienced periods of non-employment not only had a higher prevalence of underlying disease at the initial screening but were more likely to adopt behaviour associated with an increased risk of death from cardiovascular disease. The increased propensity of the non-employed men to gain weight may be due to a reduction in physical activity or to changes in eating habits. We have no data to examine these issues.

**Physical Activity**

To our knowledge no other studies have reported on the physical activity of men before their non-employment. The non-employed men were less active than the men who remained employed, apart from the men retired for reasons other than illness. Studies have shown that a low level of physical activity is associated with increased risk of death from cardiovascular mortality disease.21 We have no data to examine any changes in physical activity.

**Conclusion**

In this group of British middle aged men the only evidence of those who experienced non-employment adopting behaviour detrimental to their future health was the increased propensity to gain a large amount of weight (>10%). This was not detected if only the mean weight change was analysed. The high levels of smoking and alcohol consumption observed in non-employed men were due to these men being more likely to be heavy smokers and drinkers before the non-employment occurred. There was a strong relation between illness, non-employment, and changes in body weight, alcohol consumption, and cigarette smoking. The men who stated that their non-employment was due to illness were much more likely to lose weight and to reduce their levels of smoking and drinking than both other non-employed men and men remaining continuously employed. It should be emphasised that the
groups of men non-employed through illness are likely to be heterogeneous with regard to type and severity of illness. Thus for some men, but not all, illness will be directly responsible for their weight loss and reduction in smoking and drinking.

This study indicates the need to take account of the long-term effects of higher levels of smoking and alcohol consumption and less exercise before unemployment when comparing mortality and morbidity among groups of unemployed and employed people, such as in the Office of Population Censuses and Surveys longitudinal study.\(^{11}\)

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