RISK OF LUNG CANCER, CHRONIC BRONCHITIS, ISCHAEMIC HEART DISEASE, AND STROKE IN RELATION TO TYPE OF CIGARETTE SMOKED, PASSIVE SMOKING AND OTHER FACTORS

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VOLUME 1

TEXT

FOREWORD

This report describes a hospital case-control study carried out with 3 objectives:

(i) to study the relationship between type of cigarette smoked and the prevalence of four index diseases; lung cancer, chronic bronchitis, ischaemic heart disease and stroke,

(ii) to study the relationship between passive smoking and the prevalence of the same four index diseases,

(iii) to study the relationship between dietary Vitamin A intake and the prevalence of lung cancer.

The first objective was the original reason for starting the study and is considered first, and at most length, in sections 1 to 5. A short paper on type of cigarette smoked has recently been published (Alderson et al, 1985).

Passive smoking and Vitamin A intake are considered as extensions to the study and are only allocated a section each, 6 and 7 respectively. A short paper on passive smoking (Lee et al 1986) has recently been submitted for publication.

The report is divided into two Volumes. Volume 1 gives the text of the report, while Volume 2 gives tables and appendices. While the report gives much more detail of the findings than given in the papers for publication, it still remains a summary of an extensive amount of work carried out. The interested

reader may wish to consult Dr. Wang's thesis for the Degree of Doctor of Philosophy "An exploration of data derived from a case-control study of cigarette type and lung cancer and other diseases" which is available for inspection at the University of London Library, Senate House.

It is anticipated that further analyses will be required, both in the near future and perhaps in years to come. Because the research team has now left the Institute of Cancer Research, arrangements are being finalised to store tapes in two academic departments with an interest in smoking studies and to make available one copy of the material without identification particulars to Mr. Peter Lee.

Any views expressed in this paper are those of the authors and not of any other person or company.

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1. TYPE OF CIGARETTE - BACKGROUND

In 1970, Professor M.R.Alderson was awarded a grant by the DHSS to investigate the relative risk of lung cancer in patients and controls smoking filter cigarettes in the Manchester area. However, this coincided with his move to Southampton University and he was unable to implement the study. At the same time, the Tobacco Research Council (TRC) had an interest in the subject and in 1973 funded a study in North East England. This Teeside study, reported in TRC Research Paper 14 (Dean et al., 1977), found a considerably reduced risk of death from the 4 major smoking-associated diseases (lung cancer, chronic bronchitis, ischaemic heart disease and 'stroke') in filter smokers as against plain smokers. However, the study had 3 limitations:

(a) information for cases was obtained secondhand from relatives some years after death, whereas information for controls was obtained first hand from the living population. This technique was open to objections and had been criticised strongly by Sir Richard Doll;

(b) the results were only applicable to an area of North-East England and more nationally representative conclusions would be valuable;

(c) the study only looked at the filter/plain comparison. With continuing changes in products on the market, one also needs information on the relationship of tar, nicotine and CO level to risk of smoking-associated diseases.

By 1976 Professor Alderson had taken up his chair at the Institute of Cancer Research and he agreed to carry out a further study for the TRC, the results of which are reported here. Before describing the study it is important first to consider present scientific views on studies carried out on type of cigarette, a number of which have reported results since 1976.

At a US workshop on 'A safe cigarette?' Gori (1980) summed up by saying that evidence had been presented that users of low tar nicotine cigarettes (usually filtered) show a reduced risk of disease roughly proportional to their reduced smoke intake. There are 3 main ways of studying the evidence: (1) examining trends in mortality in relation to trends in smoking, (2) case-control studies, (3) prospective studies. The following comments cover these different approaches:

1.1 Smoking and Lung Cancer Trends

Since 1950 there have been major changes in the type of cigarettes smoked. At that time nearly all British smokers consumed untipped plain cigarettes with a mean tar yield of over 30mg. In 1984, well over 90% of cigarettes sold have filters,

and average tar yields are around 15mg. Hardly any cigarettes, even without filters, are above the range referred to (until the recent changes in tar classification) as 'middle tar' (17-22mg); the 'low tar' range (0-10mg) represents about 15% of the sales since 1980. These British trends have been mirrored in most developed and developing countries (Lee,1984).

In addition to testing the hypothesis of the 'safer cigarette' by prospective or case-control studies, trends in mortality patterns can be examined. Lung cancer mortality is an index of choice due to the high risk in smokers relative to non-smokers, and to there being other powerful aetiological agents operating for chronic bronchitis and ischaemic heart disease, the other common smoking-associated diseases. Trends in overall (all ages) lung cancer mortality in England and Wales are not indicative of a reduction in risk. Such trends may, however, be misleading. Lung cancer risk is much more closely related to duration of smoking than to daily level of consumption (Doll and Peto, 1978) and is much higher in the old than the young. Any favourable trends resulting from the switch to the 'safer cigarette' are likely to be outweighed by the fact that men and women currently in the oldest age groups have been smoking for longer than men and women of similar ages in earlier years. What may be more relevant is the markedly reduced mortality rate in men under 60 and women under 45 in England and Wales. However, even in younger men, there is great difficulty in drawing reliable conclusions about the effects of lower tar

cigarettes from these mortality statistics, since the start of the decline in rates appears to antedate the change in tar yields, and cannot obviously be explained by changes in cigarette consumption (Todd, Lee and Wilson, 1976).

1.2 Case-control and Prospective Studies

Lee and Garfinkel (1981) reviewed 3 prospective studies and 6 case-control studies where results were available on the risk of mortality associated with type of cigarette smoked. There were marked differences in the types of study, the sample size, the calendar period of the study, the populations from whom the subjects were drawn, and the statistical analyses carried out. However, Lee and Garfinkel concluded that smokers of filter or low tar/nicotine cigarettes had lower risk of those diseases most strongly associated with smoking and a slightly reduced risk for those diseases less closely associated with smoking. Since this review was prepared, the studies discussed below have been published.

A case-control study in Austria (Vutuc and Kunze, 1982) involved 297 female lung cancer patients, 270 inpatient and 270 neighbourhood controls. There was a significant gradient in risk from those smoking low tar/medium/high tar cigarettes (both for (a) exclusive, and (b) predominant smoking in each tar band). The results for males have now been reported, involving 252 lung cancer patients (Vutuc and Kunze, 1983). Comparison of

medium and high tar cigarette smokers showed a significant reduction of risk in those smoking 11-20 cigarettes, but not in those smoking > 20 cigarettes per day; the various comparisons must have been based on small numbers of subjects - but details of the actual results are not provided.

A case-control study in north-eastern USA of men under 55 developing a first myocardial infarct was utilized to study the association with smoking. There was a significantly increased risk with cigarette smoking, but the risk did not appear to vary in relation to either nicotine or carbon monoxide levels of the 'current' cigarettes smoked by the subjects (Kaufman et al., 1983).

A prospective study in north-west England (Rimington, 1981) followed up 2393 non-filter and 3045 filter cigarette subjects from a sample of male mass radiography volunteers aged 40 or more. After about 6 years, during which 104 cases of lung cancer were identified, incidence was found to be significantly lower in filter than in non-filter cigarette smokers.

In an analysis of data from the well-known Framingham prospective study over a 14 year follow up period, Castelli et al (1981) found no significant difference in coronary heart disease or mortality rates between smokers of filter and non-filter cigarettes. However, as Lee (1981) pointed out, the total number of deaths was so small, 60, that, even had the

filter smokers the same coronary heart disease death rate as non-smokers, no significant difference would have been found.

Lubin et al, in 2 separate papers (1984a, 1984b) have described the results of a large lung cancer case-control study carried out in 7 European centres. Lifelong filter smokers were reported as having about half the risk of lung cancer compared to lifelong non filter smokers after controlling for duration of cigarette use and number smoked per day. Since the reduced risk was only seen in lifelong filter smokers and not in smokers who had switched to filter cigarettes, and since substantial proportions of lifelong filter smokers were reported as having smoked for 40 years or more whereas filter usage was uncommon so long ago, one must have some reservations about these findings.

Tables 1 and 2 set out the results from the studies reviewed by Lee and Garfinkel and the more recent papers. These indicate the consistent reduction in risk of lung cancer reported for filter or low/medium tar cigarette smokers. This is not nearly so clear cut for risk of ischaemic heart disease.

In addition, Rimington (1972) compared the prevalence of persistent daily phlegm production in males attending mass X-ray. This was significantly lower in filter tip than plain cigarette smokers, when adjusted for age within number of cigarettes smoked.

A committee of the US National Research Council considered smoking behaviour (and reduced tar/nicotine cigarettes) in relation to health (Gerstein and Levison, 1982). They concluded that 'the degree of benefit most smokers can expect from switching to lower T/N brands, if any, is small compared with the benefit of stopping smoking completely.' They appeared to pay considerable attention to: the rising trends in respiratory cancer deaths in males and females in the US (failing to take into account the possibility of this being caused by increases in duration of smoking - Doll and Peto (1981) have concluded that US trends are compatible with a benefit of tar reduction); the possibility of smokers of low tar/nicotine cigarettes compensating for the type of cigarette, including obtaining very different levels of tar/nicotine than a smoking machine; some aspects of reported case-control or prospective studies which did not show lowered risk of various smoking associated diseases in those using low tar cigarettes.

The above studies are considered further in Section 4 which considers the interpretation of the present study and the pattern of results from the scientific literature.

2. TYPE OF CIGARETTE - METHODS AND RESPONSE

The main objective of the present study was to investigate the relationship between type of cigarette smoked and the prevalence of the four index diseases - Lung Cancer (ICD 162), Chronic Bronchitis (ICD 491,492,496), Ischaemic Heart Disease (ICD 410-414), and 'Stroke' (ICD 431-438 excluding subarachnoid haemorrhage). The intention was to collect information on other known risk factors, to enable the independent contribution of type of cigarette to be identified.

The overall design was a case-control study of hospital in-patients. For each of the 4 index diagnoses, the intention was to interview 200 cases and 200 matched controls in each of the 8 sex/age cells (i.e. male or female, and aged 35-44, 45-54, 55-64 or 65-74). This gave a total target of 12,800 patients, though it was recognised that for some categories it would not be possible to reach the target (e.g. young female chronic bronchitics). Controls were patients individually matched to cases on sex, 10 year age group, hospital region, and normally on hospital. When possible matching on hospital ward and time of interview was also achieved. Patients were selected for interview from medical (including chest medicine), thoracic surgery and radiotherapy wards in order to obtain a high yield of index patients. Patients were designated cases or controls according to whether the provisional diagnosis of the patient was or was not an index disease, ward staff being provided with a white card giving synonyms of the 4 case diagnoses to assist

in the identification. The provisional diagnosis of the controls was not recorded. Nor, at this stage, were controls with smoking associated diseases other than the index diseases excluded.

All of the interviewers were employed, trained and supervised by Research Surveys of Great Britain (RSGB) Ltd. RSGB is a founder-member of the Market Research Society's "Interviewer Card Scheme", initiated by the Society as part of its policy of constantly improving standards in survey research. Interviewers receive a formal 3-day training course, comprising 2 days "classroom" training on interviewing techniques, plus 1 day's practical training in the field whilst accompanied by a supervisor. All interviewers and supervisors who participated in the basic study were personally briefed by an RSGB survey director. The briefing session was followed by a series of visits to participating hospitals; Professor Alderson arranged the necessary introductions to ward staff and medical records staff.

12693 interviews were achieved (Table 3). The questionnaire (a copy of which is provided as Appendix I) contained detailed questions on the smoking habits of the respondent, including a historical account of brand smoked at admission and 1, 3, 5 and 10 years before admission and of number of cigarettes smoked both at these times and at ages 16, 20, 25 and at the age at which cigarette smoking was at its

heaviest. Smoking habits at the time of onset of disease were not directly recorded as the time would have been difficult to identify and this would have complicated analysis. The questions on brand smoked allowed categorisation of tar, nicotine, and, for some years, carbon monoxide (CO) levels. A question on time of switching from smoking mainly plain to mainly filter cigarettes was included and is critical for the main objectives of the study. Other aspects of the smoking habit considered were pipe, cigar and handrolled smoking, age of starting to smoke, number of years given up smoking, inhalation, as well as the reason for giving up smoking and for switching from plain to filter cigarettes or to cigarettes with lower tar levels. Questions were also asked regarding a number of possible confounding variables:- age, marital status, height, weight, area of residence, occupation, social class, education, family history of disease, presence of cardiorespiratory symptoms, past history of certain diseases, use of the pill and whether past the menopause (women only) and drinking of tea, coffee and alcohol.

Final discharge diagnoses were subsequently abstracted from the hospital records for 11,847 (93%) of the patients interviewed by HAA clerks, or by more senior records staff after the HAA record had been completed. The validity of this abstraction was checked in a 10% sample by MRA. The discharge diagnoses were used to reallocate cases and controls as necessary. Up to 5 discharge diagnoses were coded. If none

indicated an index diagnosis, the patient was designated a control. Patients with no final diagnosis kept their provisional diagnosis. Patients with multiple index diseases on final diagnosis were classified as lung cancer, if present, and, if not, to the index disease provisionally diagnosed. The number of interviews carried out by the original and final allocation is shown in Table 4. Overall 1,966 (17%) of the patients for whom final diagnoses were available changed their status, 1,067 from a case to a control, 720 from a control to a case and 179 from one type of case to another. Where changes had occurred, patients were regrouped into new case control pairs as appropriate.

With the assistance of Sir Richard Doll and Mr.Richard Peto, non-index patients were allocated to one of four classes, using the 'main' discharge diagnoses, as follows:

class 1A "definitely not smoking-associated"
class 1B "probably not smoking-associated"
class 2A "probably smoking-associated"
class 2B "definitely smoking-associated"

Patients interviewed as controls without a final diagnosis were assigned to class 1B. At the end of this procedure there were 4950 patients with class 1 controls and 730 pairs with class 2 controls (Table 5). The number of reallocated controls by final diagnosis is shown in Table 6.

A pilot study (involving over 1,000 interviews) began in the Newcastle locality in 1977. Subsequently it was decided to include the Newcastle interviews in the overall data analysed. Interviewing in the main study started in Leeds hospitals in 1978, and extended slowly to the Manchester, Birmingham, Bristol, East Anglia, South Hampshire, Leicester and Nottingham localities. The number of interviews achieved was closely monitored and it was apparent that there would be no problem reaching the target numbers of interviews for all the cells in the 55-64 and 65-74 age groups. As had been envisaged at the outset, the younger age-groups caused more of a problem and it was decided to open interviewing in the younger age groups only in the Liverpool area midway through 1980. An attempt was also made to obtain interviews in the rarer age/sex/disease groups in the outer London area, but this was abandoned after a few months due to a poor pick up rate (believed to be because we had not used the main teaching hospitals to which the rarer cases might be referred). During 1981 it was decided to increase the number of lung cancer interviews above the original target with the aim of increasing numbers interviewed after the passive smoking questionnaire had been introduced at the end of 1979 (see section 6). Interviewing in the 55-74 age groups for chronic bronchitis, ischaemic heart disease and 'stroke' cases and their

controls ceased in all regions midway through 1981. All remaining interviewing ceased around the end of 1981. A list of the hospitals participating in the study is given in Appendix II.

The main hospitals in the Oxford region declined to participate because of other studies ongoing at the time. Those in Sheffield declined because the area was then being reorganised. These localities were not further involved. In the other 10 main regions 7 of the 53 hospitals contacted declined to participate. Within the 46 hospitals, 11 of the clinicians approached did not wish their patients to be involved. During the course of the study, less than 1% of the patients invited declined to be interviewed, whilst a small number of interviews were not completed for various reasons. All of those were excluded from the basic study data set.

The statistical methods used generally followed classical methods used for analysis of data derived from case control studies (Breslow and Day, 1980). cases and controls being separately tabulated by several levels of the risk factor of interest (i.e. a 2 x K table), with the effects of potential confounding factors taken account of by stratification. Results

presented are for the combined strata and show the relative risk (Mantel-Haenszel estimate) together with the significance of its difference from a base level (risk 1.0) and/or the dose-related trend. Analysis was generally restricted to comparison of cases with their matched class 1 controls. Analysis also generally excluded the five pairs with ages outside the range initially specified. Table 7 gives the numbers of pairs used in most analyses by age, sex and index disease.

3. RESULTS

In this report, presentation has been restricted to key results bearing on the main aim of the study. The interested reader may also wish to consult the thesis submitted by Dr.Wang to the University of London.

3.1 Reorganisation of data

From the original data file containing 8 cards per subject, 8 reduced data files were set up, one for each of the sex/disease combinations. These contain 163 variables per subject containing all the important data, except for passive smoking and Vitamin A data which (only being recorded on a subset of subjects) are considered separately in Sections 6 and 7. Each file consists of pairs of cases and controls matched on 10 year age-group (35-44,45-54,55-64,65-74). If possible pairs originally matched on hospital and time of interview (within 1 year) were retained; if this was not possible (due to change between provisional and final diagnosis), controls were sought in order of preference:- matched on hospital and date of interview; matched on hospital; matched on region; different region.

All the analyses presented in Section 3 are based on data from case/control pairs in which the controls were class 1, i.e. suffering from diseases that were "definitely not smoking-associated" or "probably not smoking-associated", as defined in Table 6. Details of the number of pairs considered in the analysis, together with information on the proportion for which final diagnosis was available and by quality of pair matching are given in Table 8.

3.2 Validity of study material

3.2.1 Reinterviews

A total of 508 patients were deliberately interviewed twice; the second interview (reinterview) was performed by a more senior interviewer who had not performed the first interview. The main reason for this was to check on any problems as each new ward was entered into the study. All the reinterviews were performed within a month of the first interview except for one patient who was reinterviewed on the 42nd day after the first interview. About 63% (318/508) were reinterviewed on the same day or the next day, 95% (483/508) within seven days, and 98% (500/508) within 14 days. The median interval between interview and reinterview was about 30 hours; this will tend to underestimate any indication of random memory error. (The shorter the interval to reinterview, the greater the probability the subject remembers what they said at the first interview, rather than provides an 'independent'

answer to questions about recent or past experience.) The reinterviews were not conducted on a random sample of respondents, but were carried out relatively early in the course of the field work at each location, on days when the supervisor for the location was available.

The second interviewer took the previous questionnaire and recorded the reinterview results on the same record form. The answers from the first interview were absolutely open to the interviewer performing the second interview. For 104 patients exactly the same answers were obtained to all questions between the two interviews, including questions such as "what was your weight at the age of 20? (write in st lbs)", and "how many cups of coffee did you drink per day as a rule?", "number of cigarettes smoked per day on average at age 16", "name of brand smoked most often 10 years previously", etc. This suggests the estimated repeatability from the reinterview data is likely to be inflated, compared with results based on a second 'blind' interview.

Questions having numerical answers: After excluding the subjects with missing values at either interview, no significant difference was found between the mean values of the first and the second interviews for any of the wholly numerical answers in the questionnaire used in the study.

Qualitative items: Most of the questions were designed to be answered either "Yes" or "No". For the majority of the remainder, alternative answers were laid down from which a choice had to be made. A few questions were open-ended; the answers were eventually transformed into a factor with limited levels, such as "job title for the longest time" being transformed into social class with 6 levels. In general, the more levels that there are, the higher the disagreement rate that can be expected; by decreasing the number of possible choices in answer to a question the reliability of answers to that question will be expected to increase.

In the interview-reinterview data set the answers to all the non-numerical questions have a small proportion of disagreements (less than 5%), except those answers to questions on tea/coffee/alcohol drinking and angina/respiratory symptoms. Reason for changing smoking habits and brand of cigarette smoked 10 years ago had discrepancies of 3.5-5.0% in the various subsets of smokers.

When the answers to the following symptom questions were categorised into 3 classes of answer, the disagreement rates were:

Angina	7.3%
Cough	8.7%
Phlegm	9.8%
Breathlessness	10.0%

3.2.2 Different sources of diagnostic information

In addition to coding all the discharge diagnoses for the patients, some specific questions were asked of the patients about suffering from certain illnesses. For example, subjects were asked if they had diabetes; the following results were obtained:

Discharge diagnosis		Patients' answer to specific diabetes question at interview	
		Yes	No
Diabetes	Men	296	66
	Women	282	55
Not Diabetes	Men	135	6057
	Women	97	4811

Similarly, the patients' answers regarding bronchitis could be compared with the final discharge diagnoses:

Discharge diagnosis		MRC Cough and Phlegm Questions *	
		Positive	Negative
Chronic Bronchitis	Men	480	319
	Women	265	233
Other Diagnoses	Men	1151	4638
	Women	682	4079

* Positive in answering 'yes' to questions 11(a) or (b), 11(c), 12(a) or (b), and 12(c).

These results are compatible with the MRC questionnaire missing a proportion of genuine clinical diagnoses, but a much higher proportion of subjects with some symptoms of bronchitis not having a discharge diagnosis of this recorded. The clinician may even be clearly aware of the diagnosis, but not record it as it was not one of the problems being treated during the spell in hospital.

The standard Chronic Bronchitis and Ischaemic Heart Disease questionnaires were developed for use in large scale epidemiological studies. They have been validated against objective measures of respiratory function and heart disease. However, it must be borne in mind that they do not produce identical results on individual patients subject to the conventional clinical diagnostic procedures. For example, by excluding subjects who do not have productive cough on most days for 3 months, a sub-set of patients are not labelled as having chronic bronchitis who might be so categorized by a clinician (see Fletcher et al., 1974).

3.2.3 Different sources of smoking information

As well as asking patients directly about their smoking filter/plain cigarettes, brand was recorded. This item was converted to type of cigarette and permitted comparisons; the discrepancy between the two sources increased with lengthening of the time-span being asked about:

	% Discrepancy on Filter/Plain			
	Cases		Control	
	Men	Women	Men	Women
1 year before admission	3.5	2.6	2.6	1.5
10 years before admission	10.3	8.5	9.8	8.0

There was, however, little difference between the proportion of subjects smoking filter and plain cigarettes when estimated from the direct question or from the question on brand smoked.

3.2.4 'Blind' interviews

The admission diagnoses of all patients were known to the interviewers, but final discharge diagnoses were not known at the time of interview. Four groups can be used to examine the effect of this awareness, according to whether the diagnoses did or did not change among cases and controls.

(1) Confirmed Controls were those patients whose previous diagnosis was not an index disease (i.e. not suffering from lung cancer, chronic bronchitis, ischaemic heart disease or 'stroke') and whose final discharge diagnoses confirmed that this was correct.

(2) Confirmed Cases were those patients whose previous diagnosis was an index disease, and whose diagnosis was confirmed to be correct in the final discharge diagnoses. These patients can be divided into four subgroups: confirmed lung cancer, chronic bronchitis, ischaemic heart disease and 'stroke'.

For the confirmed cases and controls the interviewers were not blind to the diagnoses of the patients at the time of the interview.

(3) Became Controls were those patients who were previously diagnosed as cases but who proved to be controls (i.e. not suffering from the four index diseases at all). They can be divided into four subgroups, when necessary: became controls having initially been lung cancer, chronic bronchitis, ischaemic heart disease or 'stroke' cases.

(4) Became Cases were those patients who were not previously diagnosed as having an index disease but who finally proved to have an index disease. They could have been controls or cases with another index disease on initial diagnosis.

The Odds Ratios of ever-smoked/never smoked, adjusted for age and social class were:

		Confirmed Controls	Became Controls	Became Cases	Confirmed Cases
Lung Cancer	Men	1	1.38	6.98	9.30
	Women	1	1.74	10.37	7.00
Chronic Bronchitis	Men	1	1.33	3.49	2.82
	Women	1	1.37	2.08	2.99
Ischaemic Heart Disease	Men	1	1.86	0.91	1.62
	Women	1	1.29	1.14	1.70
'Stroke'	Men	1	1.20	0.90	1.24
	Women	1	0.88	1.02	1.01

Although numbers of patients are small in some categories, it appears possible to draw three general conclusions for the diseases most clearly associated with

smoking. First, the associations with smoking are more marked when patients are classified on final diagnosis than when they are classified on initial allocation. Thus proportions who have ever smoked are clearly higher in those transferring to the index disease than in those transferring out of it. Second, there is a modest tendency for a higher proportion of those interviewed as cases who became controls to be smokers than those who stayed as controls. This finding is consistent not only with knowledge of the (assumed) disease having an effect on the interviewer or the respondent, but also with knowledge of smoking habits biasing the preliminary diagnosis of a disease. Third, the proportion of cases who smoke does not appear to depend on whether the cases were originally allocated as such or whether they were allocated as controls or as cases with another index disease.

3.2.5 Smoking habit distribution of class 1 controls compared with national estimates

One major source of U.K. smoking data has been the Tobacco Research Council (TRC)*, for whom Research Services Ltd. conduct annual surveys. Results of a comparison of the smoking habit distribution at admission of the class 1 controls with that expected from TRC figures (standardised to the age and year of admission distribution of the hospital controls) are presented in Table 9. The table indicates that there are only small differences between the controls and the TRC data in respect of the proportion who

* Tobacco Advisory Council (TAC) since 1978.

had never smoked, but that, compared to the TRC data, the hospital controls contain a considerably higher percentage of ex-smokers and a considerably lower percentage who were current smokers. Essentially the same conclusions were reached when a comparison was made between the class 1 controls and the General Household Survey (GHS) for the years for which the GHS provided data.

There are undoubtedly large differences between the controls and either the GHS or the TRC in sampling procedures, questions, questionnaire structures (content and order of questions), surroundings of interviews (national family interviews in the GHS, market research interviews in the TRC, and hospital in-patient interviews in the basic study), and in social class and region and other characteristics of the respondents, etc. Despite these differences in methods, the direction of the differences between the controls and the general population (no matter whether the GHS or the TRC) suggests that more smokers in the controls have given up their smoking habits than smokers in the general population in the U.K. Data on reason for giving up smoking suggest that the smoking habits of these control patients, who are judged to be in hospital for a disease which is probably not smoking related, have been affected by their health and conditions; this effect of health status on smoking behaviour had appeared as far as 10 years before these patients were admitted to hospital.

Table 9 also shows that, in both sexes, the proportion of hospital patients who were smokers of filter cigarettes or were smokers of products other than manufactured cigarettes was lower than expected from TRC figures. In contrast the proportion who were smokers of plain cigarettes was higher than expected. This indicated that, at admission, the controls contained a higher than expected proportion of plain smokers. As the relative proportion of plain and filter manufactured cigarette smokers among the controls was of obvious relevance to the main objectives of the study it was decided to investigate this further, by carrying out a comparison over the whole period for which questions on brand were asked.

For this purpose Research Services Ltd., who conduct the annual survey on which the Tobacco Research Council published smoking data are based, provided us, for the years 1969, 1974, 1976 and 1979, with tables giving the numbers of current plain and current filter cigarette smokers by 10 year age group from age 25 to age 74 and by region (North, Midland and South - excluding London) and, in the case of 1969 data, also by social class. Based on these data a comparison was made between the proportion of then current cigarette smokers smoking plain cigarettes (according to the filter/plain switch question) observed in our study and the proportion expected from the Research Services Ltd. data

given the age and region (or social class) distribution of the hospital study patients. As can be seen from Table 10, the relative odds of being a plain smokers was much higher in the hospital study controls than seen in the Research Services data, by a factor averaging around 1.5 for males and 2.2 for females.

A similar discrepancy could be seen when (based on 1969 age and region standardised data) the percentages of smokers smoking plain cigarettes among the cases were compared with those expected from the Research Services data (Table 11).

Essentially similar conclusions were reached when the percentages of smokers smoking plain cigarettes in the hospital study were based on the brand questions rather than on the question on time of switch from plain to filter cigarettes. Nor did standardising the 1969 comparison for age and social class rather than age and region materially affect the issue.

A further anomaly in the reported smoking habits of the controls up to 10 years before admission to hospital relates to estimation of King size usage, as shown in the table below.

Recall (years)	% King size usage (as % of all manuf. cigs)		
	Hospital Controls	Market	Relative Odds
10	13.4	6.6	2.2
5	21.9	10.9	2.3
3	31.4	25.3	1.4
1	44.2	55.2	0.6
0	51.9	64.0	0.6

While the market percentages quoted are not standardised to the age and region distribution of the hospital controls, as the relevant data are not available, the overestimation of King-size usage 5 or 10 years before interview is striking, bearing in mind that the percentage of filter cigarette smokers in the hospital controls was lower than expected.

Two possible reasons for the difference in distributions seen between the controls and national data come to mind. One is a general tendency to underestimate recall periods in a rising King-size market. The other is a tendency, possibly for social (image) reasons for smokers of two brands, e.g. mini-filters at work, King-size for social gatherings, to mention King-size preferentially.

Whatever the causes it is clear that the differences between the distribution of cigarette type reported by the

hospital patients and that seen nationally at the time are substantial. If the reasons apply differentially to cases and controls major bias in the estimates for the relative risk of smoking different types of cigarette could occur.

3.2.6 Check of final diagnoses

MRA independently abstracted the final diagnoses from clinical records for 1002 subjects in the study. These diagnoses were then compared with those provided by the records staff. In 12% there was some discrepancy, but the majority of these were minor and would not have affected the final allocation of the patient to their case/control group. However, there were errors in 1.4% of the records of a major nature, which would have affected the group to which the patient was allocated.

3.2.7 'Compensation'

It has been suggested that smokers who primarily smoke for nicotine may alter their smoking habits on switching to filter cigarettes, so as to attain their usual dose of nicotine (Russell et al., 1980). This might be through change in number smoked, or way of smoking to alter delivery of nicotine (Lee, 1982).

Though the latter form of compensation could not be evaluated in our study, it was possible to examine the

reported change in the number of manufactured cigarettes smoked per day in relation to the change in nicotine yield of the cigarettes used between 10 and 5 years before admission (Table 12).

There was no evidence that individuals reducing the nicotine content of their cigarettes increased long-term the number of cigarettes smoked. It should be noted, however, that the table provides some evidence that a higher proportion of both males and females report an increase in smoking whatever the change of nicotine content. This is compatible with a memory bias (it seems unlikely that there is a genuine tendency for cases and controls to increase their smoking consumption, when cohort trends from population surveys indicate the reverse).

3.3 Relationship of the four Index Diseases to the main smoking variables

The main findings are presented in Tables 13-20. The first 5 tables Tables 13-17 (one for each index disease except for ischaemic heart disease, which has been split for those aged 35-54 and 55-74) give findings in relation to 8 aspects of the smoking habits, identified by A to H, covering the following issues:

A. Lifetime history of smoking. Male subjects were classified according to whether they had never smoked any tobacco product at all, whether they had smoked pipes and/or cigars but no cigarettes, whether they had smoked pipes and/or cigars and also cigarettes, whether they had only ever smoked handrolled cigarettes, whether they had smoked handrolled and manufactured cigarettes (but never pipes or cigars) or whether they had smoked manufactured cigarettes only. Few women smoked pipes, cigars or handrolled cigarettes so, as one of the criteria used for the construction of the new set of tables was to try to get adequate numbers in each subgroup considered, results are only given for those who had never smoked at all and for those who had only ever smoked manufactured cigarettes.

B. Time last smoked manufactured cigarettes. Subjects were classified according to whether the last time they reported smoking manufactured cigarettes was at admission, 1 or 3 years before, 5 or 10 years before, more than 10 years before, or whether they had never smoked at all. In components B-H, those who had ever smoked pipes, cigars and/or handrolled cigarettes are excluded.

C. Number of manufactured cigarettes smoked per day at time of heaviest smoking. Subjects have been classified into four groups, 0, 1-17, 18-27 and 28+ to avoid small numbers and to illustrates the trend more clearly. The trend chi-squared calculations have been based on the approximate relative average amounts smoked in the 4 groups. The group 0 indicates those who had never smoked at all as well as a small number of people who stated that they had smoked manufactured cigarettes but did not answer the question on number smoked most often.

D. Age of starting to smoke. Subjects who only ever smoked manufactured cigarettes are classified according to whether they started to smoke at ages <15, 15-19, 20-24 or 25+. The relative risks are standardised for number of cigarettes smoked most often (as well as for 5 year age group). For trend analysis an estimated midpoint for each group was used: 12, 17, 22 and 30.

E. Time of switch from plain to filter cigarettes. Three sets of groupings were used, one relating to the time of admission, one to 5 years before and one to 10 years before. For each time point, subjects who had only ever smoked manufactured cigarettes and who were smoking at the time were classified according to whether they then smoked plain cigarettes, whether they then smoked filter cigarettes but had switched inside the 10 years before the time point, or whether they then smoked filter cigarettes and had then been smoking them for 10 years or more. The relative risks are standardised for number of cigarettes smoked at relevant time points. Trend coefficients used were 1, 2 and 3.

F. Tar band. The same three time points were used as for E, also with standardisation for number of cigarettes then smoked. The breakdowns used, 0-16mg and 17-22mg for admission, 0-22mg and 23-28mg for 5 years before admission, and 17-22mg, 23-28mg and 29+ mg for 10 years before admission, are designed to avoid basing relative risks on small numbers, there being very few smokers outside these groups. For the final breakdown, trend coefficients of 1, 2 and 3 were used.

G. Carbon monoxide. This uses two time points, 3 and 10 years before admission, and splits the CO levels up to 15mg and more than 15mg. Again relative risks are standardised for the number of cigarettes smoked at that time.

H. Reason for giving up in last 5 years. Subjects smoking manufactured cigarettes 5 years before admission were subdivided according to whether they were still smoking at admission, or whether they had given up because of symptoms the respondent thought were associated with smoking, because of general health (including doctor's advice) or because of other reasons. Relative risks were standardised for the maximum number of cigarettes ever smoked.

Presentation of Tables 13-17. For each category of smoking A-H, columns of the new table show for males and females:-

R = Relative Risk

(N)= Number of cases

P = Probability (Where a positive difference from the base group is seen +++ < 0.001, ++ < 0.01, + < 0.05; negative differences use -, with the same scoring)

The foot of each table shows the chi-squared value for the between group variation, with the degrees of freedom and p value indicated by asterisks on the same scoring as above. Where appropriate, the chi-squared for trend is also shown, with + indicating positive and - negative trend from the base group.

The last 3 tables, Tables 18-20, give results of some further more complex analyses relating the index diseases to type of cigarette smoked. Tables 18 and 19 both take account of the possible confounding effect of number of manufactured cigarettes smoked by standardisation. They also attempt to take account of the tendency for smokers to change their habits because of disease by ignoring changes in smoking habits in the 3 years prior to the hospital admission at which the interview occurred. In Table 18, comparisons are based on filter/plain status at specific time points, 3, 5 or 10 years before admission, while in Table 19 comparisons are based on lifetime smoking habits up to 3 years before admission. In the latter Table, patients are classified into 4 groups: (a) always plain (b) switched to filter up to 10 years before admission (c) switched to filter more than 10 years before admission and (d) always filter. Additional comparisons are made of never filter vs. ever filter (a vs. b-d) and of ever plain vs. never plain (a-c vs. d). Table 20, which relates only to lung cancer, repeats Table 19, but: (a) excluding those previously hospitalised or with symptoms of chronic bronchitis (in an attempt to exclude patients who had altered their smoking habits because of onset of symptoms) and (b) including smokers of products other than manufactured cigarettes (here results are presented only for males because of the small number of women who smoke other products).

A large number of additional analyses were carried out. Among these were analyses similar to Tables 13-17 for additional disease categories (lung cancer separated as to whether or not squamous or oat cell, myocardial infarction broken down by age groups as for ischaemic heart disease) and for additional smoking variables (inhalation, relighting, holding the cigarette in the mouth and butt length). Tables are available but are not included in this report. On occasion the text below discusses some of the findings from these extra analyses.

3.3.1 Lung cancer

Table 13A shows there is a significant excess risk in those only smoking pipes and/or cigars; however, the risk of lung cancer is, as expected, most markedly increased in smokers of cigarettes. Handrolled cigarettes in males are associated with an even greater risk than manufactured cigarettes.

Table 13B shows a similar trend in both sexes in relation to giving up smoking. In longer term ex-smokers risk falls off steadily with length of time since cigarettes were last smoked. Risk is, however, significantly higher in those men and women smoking 1-3 years before admission and then giving up than in those who were still smoking at the time of admission. This is consistent with the hypothesis that some subjects with lung

cancer give up smoking because of disease in the last few years before admission. It is notable that, even for those who gave up as long as 5-10 years before admission, relative risks, compared with continuing smokers, were only reduced by a factor of about two. This emphasises the difficulty of detecting benefits of changes in type of cigarette in the 10 years or so before admission.

Table 13C shows risk of lung cancer in relation to the number smoked at time of heaviest smoking; there is a very clear positive trend in both sexes.

Table 13D shows that in both sexes there is a significant tendency for risk to be less in those starting to smoke later than in those who started young.

None of the analyses in Table 13 gave any significant indication of a relationship between time of switch to filter, tar band or carbon monoxide and risk of lung cancer (Tables 13E, 13F, 13G).

The analyses of lung cancer risk by reason for giving up in the last 5 years did not clearly discriminate between those who had given up because of symptoms, because of general health or because of other reasons. All 3 groups in Table 13H had an increased risk of lung cancer compared with those still smoking at admission, but risk was as high

in those who gave up for reasons not apparently health related than for those who gave up for health related reasons. One must inevitably wonder whether the question on reason for giving up in fact produces useful and valid answers. However, Table 13B has already shown that those who gave up between 5 and 10 years before admission had reduced risks of lung cancer compared with those continuing to smoke over the period, regardless of reason for giving up.

Various additional analyses were carried out in an attempt to take account of the tendency to give up smoking bacause of disease in evaluating the relative risk of filter and plain cigarettes.

Analyses relating risk to those who had switched from plain to filter cigarettes by reason for giving up did not produce any very useful answers, possibly due to the relatively small numbers in the breakdowns.

Analyses ignoring changes in smoking habits in the 3 years before admission were of more interest, however. In Table 18, in which comparisons were made based on filter/plain status at specific time points, no evidence of a relationship to lung cancer was seen in either sex, but in Table 19, in which comparisons were based on lifetime habits up to three years before admission, some evidence of

an advantage to filters was seen in females. Here a significant ($p<0.05$) reduction in risk was evident in those who had never smoked plain cigarettes, though no trend in relation to length of use of filter cigarettes was seen. The analysis in Table 19, as the previous analyses, showed no advantage to filters in males. Nor was any significant advantage seen in males in the analysis in Table 20 which was restricted to those who had not been previously hospitalised and who did not have symptoms of chronic bronchitis. Interestingly, however, there was some indication of an advantage to filters in the analysis in Table 20 where smokers of products other than manufactured cigarettes were included. (All previous filter/plain comparisons had excluded these smokers.) Further investigation showed that among those who smoked manufactured cigarettes and other products, those who had ever smoked filter cigarettes, had less than half the risk of lung cancer of those who had never smoked fiter cigarettes ($R=0.45$, $p<0.01$). Thus, albeit only in certain analyses, some advantage of filter cigarettes over plain cigarettes had been demonstrated for women and also for men who additionally smoked pipes, cigare or hand-rolled cigarettes. None of the analyses however showed any advantage to filter cigarettes among "pure" manufactured cigarette smokers.

No significant relationship was found between lung cancer risk and inhalation, relighting or holding the cigarette in the mouth or butt length. There was no evidence of variation in the risk of lung cancer with inhaling at different levels of smoking in males or females. (Tables are available, but not included here.)

3.3.1.1 Lung cancer histology

Histology was available for just over 50% of the patients; tables are available, but not presented here. For 288 men and 192 women the lung cancer was classified as squamous or small cell, whilst for 149 men and 129 women it was classified as being of some other histology.

The main differences within histology, compared with the results in Table 13A-H for lung cancer regardless of histology were: (1) the increase in risk by number of cigarettes smoked was slightly more marked in the Squamous/Small Cell group and much less marked in the Other Histology groups; (2) the trend towards an increased risk in those starting to smoke at younger ages was not evident for the Other Histology group. Indeed a slight but non-significant decrease was seen. (3) there was a (non-significant) tendency for Squamous/Small Cell patients switching to filter cigarettes to have a slightly increased risk.

However, these results were based on some cells with small numbers of patients. The closer relationship with smoking of Squamous and Small Cell tumours than with tumours of Other Histology was confirmed but no clear pattern by type of cigarette could be seen.

3.3.2 Chronic bronchitis

As for lung cancer, risk was most markedly increased in smokers of cigarettes only, especially handrolled, though an excess risk was seen in men who smoked pipes and/or cigars as well as cigarettes. The relative risk of cigarette smokers to those who had never smoked was, however, not so great for chronic bronchitis as it was for lung cancer (Table 14A).

Table 14B shows a very slightly elevated bronchitis risk in relation to giving up smoking just before admission and little reduction in risk was seen for those who had given up as long as 5 to 10 years before admission. This suggests that perhaps giving up smoking because of the disease could have occurred over a longer period before admission than for lung cancer. In long term ex-smokers risk was clearly reduced, though not to the level of those who had never smoked at all.

A highly significant trend in risk shows for men and women by number of manufactured cigarettes smoked at time of heaviest smoking (Table 14C). As for lung cancer, there was a tendency for risk to be less in those starting to smoke later than in those who started young (Table 14D), with the trend statistic just significant at the 95% confidence level in both sexes, and highly significant for the sexes combined.

In men, though compared with lifelong plain smokers there was a slightly increased risk of chronic bronchitis in those who had switched to filter cigarettes shortly before admission, there was evidence that those who had smoked filter cigarettes had lower risks, especially those who had smoked filter cigarettes for a long period of time (Table 14E). This was more clearly evident in Tables 18 and 19, where changes in smoking habits up to 3 years before admission were ignored. All the comparisons in Table 14F for men based on substantial number of subjects show an increased risk in those smoking higher tar cigarettes. Unlike for lung cancer, the conclusions regarding chronic bronchitis risk and type of cigarette smoked were unaffected by whether or not manufactured cigarette smokers additionally smoked other products or not.

In contrast for women, a similar pattern is not seen and the data do not seem to clearly support the hypothesis of an advantage resulting from the switch to filters and lower tar, although in Table 19, risk was lowest in those who had never smoked plain cigarettes.

For neither men nor women was a clear relationship found between carbon monoxide yield of cigarettes and risk of chronic bronchitis (Table 14G). All the values of risk for those on the higher yield cigarette were below 1.0, but no differences were significant.

For both men and women, the final section of Table 14 shows that in both sexes people who reported giving up because of symptoms and general health had somewhat greater risks than those who were still smoking at admission or who had given up because of other reasons. It is interesting to note that a similar finding was also seen in both sexes in the analyses relating to giving up smoking between 5 and 15 years before admission (tables are available, but not included here); this tends to confirm the fact that many people with chronic bronchitis give up smoking because of the disease but survive many years subsequently.

In women, but not clearly in men, there was a tendency for switchers to filter for health reasons to have higher risks of bronchitis than switchers to filter for non-health

reasons. These results are, however, fairly unreliable being based on small numbers. (Tables are available, but not included here.)

No obvious relationship was seen between chronic bronchitis risk and inhalation, relighting or holding the cigarette in the mouth, or butt length. (Tables are available, but not included here.)

3.3.3 Ischaemic heart disease

The main analyses separated those above and below 55 years at interview. In general, the relationship between smoking and ischaemic heart disease (IHD) was more strongly seen in women than in men, and in those aged 35-54 rather than those aged 55-74. There was little evidence of an association between smoking and IHD at all for men aged 55-74 (Table 16). Where an association was seen, risk tended to be lowest in those who had never smoked cigarettes at all or who had given up for more than 10 years and highest in current smokers, with those who had given up for 1-10 years having intermediate risk (Tables 15B and 16B).The excess risk related to cigarette smoking was concentrated in the heavier smokers (more than 27/day in men and more than 17/day for women) with those smoking 1-17 cigarettes a day at the time of heaviest smoking having only marginally and non-significantly increased risks in women and reduced risk in men (Tables 15C and

16C). No significant trend was seen between IHD risk and age of starting to smoke in any analysis (Tables 15D and 16D).

The results relating to type of cigarette smoked were somewhat confusing. In men, a number of the analyses (Tables 15E, 16E, 18, 19) showed higher risks in filter smokers than plain smokers. However it was interesting to note that though some of the differences were statistically significant they were generally as marked in older men, where no overall association of smoking itself to risk was seen, as in younger men, where a strong association was seen. It was also noticeable that when subjects were classified according to smoking habits 10 years before admission, no filter/plain differences were seen.

In women, no real indication of a filter/plain difference was seen in those aged 55-74. In the younger women, however, quite a substantially reduced risk was seen in relation to filter cigarette smoking in a number of the analyses - young women who had always smoked plain cigarettes having relatively high risks.

The only significant relationship between ischaemic heart disease and tar level occured in older men (Table 16F), with smokers of lower tar cigarettes having the

highest risks. Again it is difficult to reconcile this finding with the fact that older men were the subgroup showing no apparent association with cigarette smoking at all.

No significant relationship of risk with carbon monoxide level was seen (Tables 15G and 16G).

Men who had given up smoking in the last 5 years because of reasons classified under "general health" had a higher risk of IHD which was significant when results for all ages were combined but this difference was not seen in females (Tables 15H and 16H).

No significant relationship was found between ischaemic heart disease risk in subjects aged 35-54 or 55-74 and inhalation, relighting, holding the cigarette in the mouth, or butt length. (Tables are available, but not included here).

Though there is a high correlation between tar and nicotine in cigarettes of different brands, this is not so for nicotine and CO. The risk of ischaemic heart disease has been examined in relation to nicotine and CO levels of cigarettes smoked 10 years ago (dividing each factor into high or low, giving 4 subgroups of continued nicotine/CO levels). There was no consistent pattern of results for

males or females aged 35-54 or 55-74, though the analysis was based on small numbers. There was no clear suggestion of higher risk for high CO within the same nicotine level.

3.3.3.1 Myocardial infarction

For the age groups 35-54, 55-74 and 35-74, the standard analyses have been repeated for cases with a final discharge diagnosis of myocardial infarction, as the literature suggests a closer association between smoking and myocardial infarction than with all forms of ischaemic heart disease. It must be borne in mind that probing a sub-set of the data reduces the number of subjects in individual cells.

The main differences in this analysis, compared with those shown in Tables 15A-H and 16A-H were (1) a steeper and smoother gradient from present smokers to never smokers in those with Myocardial Infarction aged 35-54; and (2) a higher risk with increased numbers of cigarettes smoked in those aged 35-54 and 55-74.

Relative Risk for time last smoked manufactured cigarettes for age 35-54.

	Male		Female	
	IHD	MI	IHD	MI
At admission	1	1	1	1
1 - 3 years before	1.27	0.68	0.84	0.48
5 -10 years before	0.68	0.39	0.56	0.76
11+ years before	0.50	0.35	0.41	0.24
Never smoked	0.56	0.37	0.41	0.29

Relative Risk for number of manufactured cigarettes smoked per day at time of heaviest smoking.

	Male		Female	
Cigarettes/day	IHD	MI	IHD	MI
0	1	1	1	1
1-17	0.79	1.13	1.28	1.38
18-27	1.51	2.00	2.55	4.38
28+	1.96	2.23	3.02	3.44

As with the complete group of IHD subjects, the myocardial infarction subset showed a significantly increased risk for men switching to filter cigarettes within ten years of admission. There was no clear association of risk with tar or CO level of cigarettes.

3.3.4 'Stroke'

There was little reliable evidence of an association between smoking and 'stroke'. In men, those smoking at admission had the greatest risk, but this was not significantly lower for the never smoked group. In women the risk was significantly lower in those who gave up, particularly more than 10 years before admission (Table 17B).

There was no obvious effect of numbers of cigarettes smoked, but for women a significantly higher risk in those beginning to smoke at younger ages was seen (Table 17D).

In neither sex was there any association with switching from plain to filter cigarettes (Table 17E), but there was a significantly increased risk in males for those smoking higher tar cigarettes (Table 17F). The results for carbon monoxide levels were based on small numbers and show no consistent pattern (Table 17G).

In comparison with the other groups of patients, there appeared to be a suggestion of a lower risk of 'stroke' in those giving up for any reason (Table 17H).

As far as inhaling, relighting, holding the cigarette in the mouth, or butt length, the only significant difference noted was a tendency for risk to be higher in men smoking cigarettes to a small butt length but this may well be a chance finding. In women there was a significant ($p < 0.01$) tendency for risk to be higher in those who relight their cigarettes. (Tables are available, but not included here.)

3.3.5 Hand-rolled cigarette smokers

Data already presented (Tables 13A and 14A) show that hand-rolled cigarette smoking is associated with a higher risk of lung cancer and chronic bronchitis compared with manufactured cigarette smoking. Further analyses compared risk in those who had only ever smoked hand-rolled cigarettes with those who had only ever smoked manufactured cigarettes, standardised for age, number of cigarettes smoked, social class and working in a dusty job.

Although numbers of cases and controls who smoked only hand-rolled cigarettes were low, a marginally significant excess risk of lung cancer ($0.01<p<0.05$) was seen in all the analyses. The excess risk of chronic bronchitis was not significant. The relative risk of hand-rolled only to manufactured only smokers was somewhat over 2 for lung cancer and somewhat under 2 for chronic bronchitis, but had quite wide confidence limits.

3.3.6 Tar/nicotine ratio

In order to check whether the tar/nicotine ratio of cigarettes was a better indicator of risk, analyses have been carried out for all 4 index diseases, using data at various time points prior to admission. Results, for example, for the 4 diseases for smokers of manufactured cigarettes standardised for age and number of cigarettes smoked show no clear relation for either males or females. Using the tar/nicotine ratio grouped into classes, there were no significant trends in relative risk for the 8 comparisons, and only 1 of the 32 calculated relative risks was significant at the $p < 0.05$ level (4 diseases x 2 sexes x 4 classes of tar/nicotine ratio).

3.3.7 Total average tar intake

For those smoking manufactured cigarettes at admission and 1, 3, 5 and 10 years earlier, who had never smoked other products, the total (average) tar intake was obtained. The relative risk was examined for lung cancer, chronic bronchitis and ischaemic heart disease (aged 35-54). Dividing the tar intake into 5 classes showed no consistent trend for any of the six diagnostic/sex groups. The results for females with lung cancer were formally

significant, but the high chi-squared value was based on a particularly aberrant figure in the middle of the tar intake, rather than a trend.

3.3.8 Change in number of cigarettes smoked

It is possible that some smokers may have tried to reduce their daily consumption, rather than alter the tar level of the cigarettes smoked. (Though there is no evidence that the bias in change of habit with incipient disease is mediated through reduction in number smoked, change to lower tar, or giving up smoking.) Tables have been prepared of relative risk for lung cancer, chronic bronchitis and ischaemic heart disease (35-54) with change of number of cigarettes smoked for (a) maximum to admission, (b) 10 years before to admission, and (c) 10 to 5 years before admission. Again, no clear pattern appeared for both sexes within the same diagnosis; there was no significant result showing a trend in reduction of risk with reduction in numbers smoked, whilst for chronic bronchitis reductions were associated with increased risk.

3.3.9 Effect of other factors on the relationship between smoking and the index diseases

A large number of items was recorded that were known or thought to be associated with variation in risk of one or other of the 4 index diseases.

Various analyses were carried out, which differed from disease to disease, to examine the influence of these factors. The main interest was in whether these factors might have affected the interpretation of the relationship seen between smoking and the index diseases, rather than on the relationship of the factors to risk of the index diseases.

The various aspects of smoking habit considered were:

(a) only ever smoked manufactured cigarettes/never smoked at all

(b) number smoked at time of heaviest smoking (as in analysis C in Tables 13-17)

(c) time of switch from plain to filter cigarettes (as in analysis E) based on those smoking 5 years before admission.

The detailed findings are not reproduced here fully in tabular form due to their extensive nature. However, in the text that follows, the results for each factor are considered in turn. Where appropriate, numerical results are quoted.

3.3.9.1 Age group

Standardisation for 2-year age-group rather than 5-year age-group made relatively little difference to the findings in any analysis. For example, the relative risk

related to only ever smoking manufactured cigarettes standardised for 2 and 5 year age groups were:-

Relative risk in relation to only ever smoking manufactured cigarettes when standardised by 2 and 5 year age groups

		2 year	5 year
Lung cancer	- male	9.91	9.27
	- female	4.70	4.75
Chronic bronchitis	- male	2.71	2.82
	- female	2.88	2.79
IHD	- male	1.23	1.24
	- female	1.56	1.58
'Stroke'	- male	1.07	1.05
	- female	1.12	1.10

3.3.9.2 Nursing dependency

In general there did not appear to be any clear relationship between the strength of the smoking association and the level of nursing dependency of the cases and controls.

This analysis was more a precaution against potential bias - if the controls had not been so ill, their recall might have been more accurate - than against confounding.

3.3.9.3 Regional variation

Separate estimates of the relative risk associated with only ever smoking manufactured cigarettes were made for lung cancer, chronic bronchitis and ischaemic heart disease (in those aged 35-54) for each of the regions of the study. For male lung cancer and chronic bronchitis there were too few cases who had never smoked for the analysis to be helpful. For female lung cancer relative risk estimates were positive in every region, varying from 1.61 in South Hants to 13.04 in Birmingham. This variation was not, however, statistically significant (chi-squared = 12.7 on 9 d.f., $p > 0.05$). This illustrates the difficulty in picking up even substantial regional variations reliably due to the fairly small number of cases in each region. No indication of significant regional variation was seen for IHD.

3.3.9.4 Quality of pair matching

No clear variation was seen in the strength of the smoking association between pairs who were original matches, or who were not original but subsequently matched on either time of interview and hospital, hospital only, region only, or who were not even matched on region.

3.3.9.5 Good pairs/bad pairs

All other analyses in this document concern only "good pairs", i.e. those for which the controls suffered from diseases that were probably or definitely not related to smoking. It had been assumed that use of "bad pairs", controls that had diseases probably or definitely related to smoking, would bias the smoking association downward. Estimates of the only ever man.cig./never smoked relative risk for good and bad pairs were:-

		Relative risk		Difference
		Good pairs	Bad pairs	p
Lung cancer	- male	9.56	7.68	N.S.
	- female	4.82	18.06	<0.05
Chronic Bronchitis	- male	2.90	1.98	N.S.
	- female	2.77	4.60	N.S.
IHD	- male	1.50	2.76	N.S.

Although there were relatively few bad pairs (none at all for female IHD) and the relative risk estimates very variable, it is interesting to note that there was no real indication of the expected tendency for relative risks to be higher in good than in bad pairs. Indeed, the only

significant difference was in the reverse direction and this can probably be discounted due to the number of comparisons made.

3.3.9.6 Revised discharge diagnosis

Relative risk estimates were calculated separately for those whose final diagnosis was the same as their initial diagnosis and those whose initial diagnosis had been reallocated. There were relatively few who had been reallocated, but the results did not suggest that initial diagnosis affected the smoking association, given final diagnosis.

3.3.9.7 Multiple pathology

Some analysis was attempted, but the numbers who had multiple index disease pathology were far too small for any real conclusions to be reached.

3.3.9.8 Hospitalisation

Analyses were carried out looking at the smoking association separately for those who had previously not been in hospital in the last 10 years ("incident cases") and those who had been ("prevalent cases"). The number and length of hospitalisations were also considered. The only ever manufactured cigarettes/never smoked relative risk, according to previous hospitalisation, is given below:

Relative risk in relation to only ever smoking manufactured cigarettes for incident and prevalent cases

		Relative risk		Significance of difference
		Incident	Prevalent	p
Lung cancer	- male	9.84	9.37	N.S.
	- female	7.23	3.71	<0.05
Chronic	- male	2.61	2.52	N.S.
bronchitis	- female	2.29	2.92	N.S.
IHD	- male	1.31	1.26	N.S.
	- female	1.81	1.49	N.S.
MI	- male	1.53	1.31	N.S.
	- female	2.25	1.95	N.S.
'Stroke'	- male	1.00	1.13	N.S.
	- female	1.22	1.03	N.S.

As can be seen, the only significant difference is for lung cancer in females, where the smoking association was seen more clearly in those who had not previously been in hospital. This also applied when analyses by number of cigarettes smoked were examined. However, within those who had previously been in hospital, there was no clear trend

for the smoking association to be lowest in those with most or longest hospitalisation. For 8 of the 10 comparisons, the RR is higher in the incident than prevalent patients, which suggests this issue warrants further study.

3.3.9.9 Other indicators of chronic bronchitis

The relative risk for only ever manufactured cigarettes/never smoked for diagnosed chronic bronchitis patients did not vary appreciably according to whether they reported a history of bronchitis in either males (Yes = 2.76, No = 3.33) or females (Yes = 2.88, No = 2.58). The relative risk in males was higher for those who had MRC 3rd degree bronchitis symptoms (3.72) than it was in those with no symptoms (2.03), but this difference was not statistically significant ($0.05 < p < 0.1$). In females, the corresponding relative risks were fairly similar (2.44 - 3rd degree; 2.80 - no symptoms).

Among lung cancer patients the relationship between number of cigarettes smoked and risk of the disease was somewhat steeper for those who reported a history of chronic bronchitis than for those who did not, but the difference was not statistically significant.

3.3.9.10 Other indicators of ischaemic heart disease

The relative risk for only ever manufactured cigarettes/never smoked for IHD cases aged 35-54 was calculated according to whether they had various other indicators of heart disease as follows:

Relative risk of ischaemic heart disease in relation to only ever smoking manufactured cigarettes according to presence and absence of other indicators of heart disease

		Indicator		Sig. of diff. p
		Positive	Negative	
History of hypertension	- males	1.10	1.84	N.S.
	- females	2.57	1.84	N.S.
History of heart disease	- males	1.60	1.48	N.S.
	- females	1.43	1.47	N.S.
Angina	- males	1.17	1.78	N.S.
	- females	2.29	1.97	N.S.
Infarct	- males	2.88	0.91	<0.01
	- females	2.00	2.21	N.S.

In 4 out of the 8 comparisons those with a positive history had a higher RR. There does not seem to be any consistent pattern for those with additional evidence of heart disease to contain more smokers.

3.3.9.11 Potential confounding by other risk factors - introduction

Information was recorded on a wide range of personal, social, demographic and occupational characteristics that may have affected risk of one or more of the four index diseases. It was clearly important to determine whether these factors might have biassed the relationships noted above between smoking and the index diseases. For such an effect to be of any material importance, the potential confounding factor must be associated with both the disease and smoking. Accordingly, in extensive preliminary analyses, three types of analysis were carried out in respect of each risk factor studied and each index disease:

(i) relationship of risk factor to disease adjusted for age only,

(ii) relationship of risk factor to disease adjusted for age and smoking habits (never smoked, ever smoked manufactured cigarettes, other smokers),

(iii) for the combined controls, relationship of risk factor to smoking habits (never smoked, ever smoked).

Where these analyses revealed the possibility that a risk factor might have some effect on the relationship between smoking and an index disease, additional analyses were then carried out to determine how this relationship was affected by adjustment for the factor.

Results of these analyses are summarised below. Generally, the analyses showed that adjusting for other risk factors made little difference to the observed relationships between smoking and the index diseases. They also confirmed many established relationships between the risk factors and the diseases.

3.3.9.12 Lung cancer and potential confounding factors

For both sexes, a strong and similar relationship between number of cigarettes smoked and risk of lung cancer was seen for those

(i) who did or did not work in dusty jobs,

(ii) left education before age 15 or at age 15+,

(iii) had a maximum obesity index (defined by weight in grams divided by the square of height in centimetres) of <27 or 28+, or

(iv) who had no siblings or who had 1 or more.

Standardising for any of these factors did not materially affect the unstandardised relative risk. Nor did taking any of these factors into account significantly affect the relationship between lung cancer and time of switch from plain to filter cigarettes. As these factors were selected as being the ones found to have the strongest association with lung cancer risk (apart from smoking), it seems there is no real need to consider confounders at all when looking at the smoking/lung cancer association.

3.3.9.13 Chronic bronchitis and potential confounding factors

Similar analyses were carried out for the variables found most strongly related to chronic bronchitis risk: dusty job, age of leaving education, tea drinking, beer drinking and occupational physical activity.

While standardising for any of these factors hardly affected the relationship between chronic bronchitis risk and number of cigarettes smoked for the total sample, it was interesting to note that in both sexes the relationship was much weaker (not significant at all in males and only marginally so in females) for those who left education at age 15 or greater than for those who left at age up to 14 (where it was very highly significant in both sexes).

3.3.9.14 Ischaemic heart disease and potential confounding factors

Obesity index (both current and at maximum), whether a sibling had died and the menopause were found to be related to risk of IHD and MI. None of these factors, when taken into account, appeared to materially affect the relationships with smoking.

3.3.9.15 'Stroke' and potential confounding factors

Current obesity, tea and beer drinking and the menopause were found to be related to risk of stroke but none appeared to affect the conclusions regarding smoking and the disease.

4. DISCUSSION

4.1 Aspects of method

A crucial issue in the interpretation of the results is consideration of any faults in the study design, or doubts over the validity of the data collected.

In general, such independent checks as are possible suggest the data are of the level of accuracy as is usually obtained in large scale epidemiological studies. However, a few points need to be emphasised:

4.1.1 Blind interviews

It has been shown, for each of the index diagnoses, that those originally interviewed as cases but subsequently reallocated as controls, contained a somewhat higher proportion of smokers than those who were originally interviewed as controls and remained as such. It is not clear whether this is due to differences in the diagnostic processes between smokers and non-smokers or to bias in recording smoking history due to the patient or interviewer being aware of the (presumed) diagnosis. The level of bias indicates there might be difficulty in studying a genuine low level effect (e.g. where RR < 1.5).

4.1.2 Health bias and change in smoking habits

There is clear evidence that patients with chronic disease, whether or not they are suffering from conditions associated with smoking, have a tendency to give up smoking. Thus their smoking habit at interview and their smoking history are different from that in the general population. It was not possible to tell whether this effect is greater in subjects with the index diagnoses than in the controls.

4.1.3 Reason for change in smoking habits

Indirect evidence suggests that the patients may not be able to validly separate their reasons for changing their smoking into the classes of answer that were used in the study.

4.1.4 Long-term history of brand smoked

It is also clear that the pattern of brands smoked by the patients differed from that seen nationally, with an increase in the proportion of plain smokers to the proportion smoking filter cigarettes. This was evident in the controls at the time of admission and appeared to be so for the whole period up to 10 years before admission. This may be due to bias in the actual smoking habits of the control patients, or to differences in the validity of the two sources of data. It is not clear whether the factors

leading to this discrepancy between controls and population survey respondents will have also applied to the cases in this study. This intangible bias creates difficulty in interpreting the results of the effect of switching to filter cigarettes, and of smoking cigarettes with different tar and CO levels. However, it is not self-evident that comparison with population controls would automatically produce the correct results. The main reason for using hospital in-patients as controls is to match for subtle effects of illness and hospitalization. The study design was based upon this view. This query over the filter/plain ratio of smokers amongst the controls has an important bearing on interpretation of the results; there is no known correction for its effect which can be made in the statistical analysis.

4.1.5 Compensation in smoking behaviour

The evidence from other studies of compensation in smoking for those switching to low tar cigarettes has already been mentioned. Smokers may increase the number of cigarettes smoked daily or the delivery of nicotine from individual cigarettes. No evidence was found in the present study for a long-term compensating change in number of cigarettes smoked. It was not possible in such a large scale interview study to collect any information on 'way of smoking' that could quantify whether appreciable compensation occurred.

4.1.6 Examination of other known aetiological relationships

Subsidiary analyses of the data confirm that there is an increased risk of ischaemic heart disease in those with diabetes (in comparison to lung cancer - after allowing for the excess number of control patients with diabetes). There was also a highly significant increase in risk of ischaemic heart disease in relation to body mass index at 20 years of age and its maximum. In women aged 35-54 there was an increased risk of ischaemic heart disease in those who had ever used oral contraceptives.

These results support the general view of the robustness of the study to identify known associations.

4.1.7 The power of case-control studies

In general case-control studies should have the power to detect an appreciable increase in relative risk. However, the method has recently been subject to considerable criticism (see Alderson, 1983 for review). The biases in many such studies may distort the relative risks recorded, whilst errors in the data and small numbers reduce the chance of representative findings. As a rule-of-thumb, it is suggested that with a relative risk that is at least 2.0, a well designed study should be able to confirm this. For risks below this level, the power of the study design may not be adequate.

4.2 Main smoking effects

As many have found, the risk of lung cancer, chronic bronchitis, and particularly in those aged 35-54, ischaemic heart disease was positively associated with the number of manufactured cigarettes smoked daily and was negatively asociated with long-term giving up and later of age of starting to smoke.

4.2.1 Type of cigarette smoked

Although this aspect was the main focus of the study, it is also, as noted above, the one on which most doubt as to the quality of the data must rest.

A review (Lee and Garfinkel, 1981) of the effect of type of cigarette on risk of disease emphasised the consistency of the results, despite the diverse nature of the reported studies, noting that generally smokers of filter (or lower tar-nicotine) cigarettes have a lower mortality than smokers of plain (or higher tar-nicotine) cigarettes for those diseases most strongly associated with smoking, and a slightly reduced mortality for those diseases less associated with smoking. It is of interest to compare and contrast findings from the present study and from other studies for each of the four index diagnoses in turn.

4.2.1.1 Lung cancer

For lung cancer, findings from other studies have been summarised in Table 1. Out of 20 results, 19 show a reduced risk in filter or lower tar cigarette smokers, the weighted average relative risk being 0.71 for males and 0.60 for females. In the current study no evidence of a reduction in risk in relation to filters was seen in male smokers of manufactured cigarettes only, but some evidence of a reduction in risk was seen for those who had never smoked plain cigarettes compared with those who had ever smoked plain cigarettes (a) in females (relative risk = 0.68) and (b) among males who also smoked other products (relative risk = 0.57). For females, however, because the highest risks were seen, not in lifetime plain cigarette smokers but in smokers who had switched from plain to filter over 10 years before admission, other comparisons of risk in filter and plain smokers did not show any advantage to filters.

In comparing our results with those of other studies, a number of points have to be taken into account. First, some variation in results is to be expected due to sampling error with 95% confidence limits of the relative risk for most of the comparisons at least $\pm$ 30%. Secondly, there is the question of how to take into account the smoking of products other than manufactured cigarettes. Exclusion of

such smokers from the analysis was carried out by Dean et al (1977) for the same reasons as we originally did so in this study (i.e. to avoid problems of adequate standardisation particularly of number of handrolled cigarettes and to give a "cleaner" sample). Many studies have included such smokers. Thirdly, we have shown that our smoking history data are dubious in that the ratio of plain to filter cigarette smokers is much higher in the hospital controls than seen nationally; it is unreasonable to assume necessarily that this is a problem specific to our study. As far as we are aware, in none of the studies summarised in Table 1 was any attempt made to validate this ratio against national survey or sales figures, or indeed to validate the accuracy of smoking habits generally. It was notable that in the study by Lubin et al (1984) tables were presented demonstrating that a substantial proportion of "lifetime filter smokers" had smoked filter cigarettes for over 40 years, with no comment being made that, even 30 years ago, sales of filter cigarettes were extremely low.

4.2.1.2 Chronic bronchitis

Such data as are available for chronic bronchitis or emphysema from other studies all show an advantage to filters or reduced tar-nicotine (T-N). Thus Dean et al (1977) found significantly reduced risks in filter cigarette smokers in both men ($R=0.66$, $p<0.05$) and women

(R=0.42, $p<0.01$) while Hammond (Lee and Garfinkel, 1981) found non-significantly reduced risks, compared with high T-N smokers, in both medium T-N smokers (males R=0.97, females R=0.86) and low T-N smokers (males R=0.78, females R=0.59). The clear reduction seen in the present study in filter cigarette smokers in males coupled with the somewhat lower risks seen in females who have never smoked plain cigarettes, are perhaps not inconsistent with this evidence. However, it should be remembered that clear analysis of the effect of type of cigarette on chronic bronchitis is particularly difficult, especially in case-control studies, because of the undoubted tendency for sufferers to change their smoking habits because of the onset of the disease.

4.2.1.3 Ischaemic heart disease

Data for other studies for ischaemic heart disease are summarised in Table 2. Although 3 out of 11 of the analyses show some apparent adverse effect of the switch to filters or reduced nicotine cigarettes, none of these differences are statistically significant. Indeed, apart from in the large Hammond study, where significant reductions in risk of 10-20% were seen in 3 of the 4 analyses, all the other results have quite wide confidence limits and are not inconsistent with the weighted average

relative risk of 0.96 for males and 0.85 for females for all the studies combined. The results from the present study, if reported smoking habits 10 years before admission are considered, are also not inconsistent with this weighted average. However, if one considers analyses based on smoking habits closer to admission the patterns are much less clear, and are conflicting for the two sexes. Thus, compared with smokers who always smoke plain cigarettes, those switching to filters in the 10 years before admission show a risk of ischaemic heart disease that is significantly increased in men, significantly decreased in women aged 35-54 and unchanged in women aged 55-74. An explanation for these conflicting patterns is not easy to find but may lie partly in the effect of incipient disease on smoking habits and partly in the inaccuracy of statements regarding smoking habits.

4.2.1.4 'Stroke'

Whether smoking itself is related to the incidence of stroke is not established. Both Dean et al (1977) and Hammond (Lee and Garfinkel, 1981) show lower risks in filter or reduced T-N smokers, though only in one analysis (Hammond : male : low v high T-N) was the reduction statistically significant ($R=0.71$, $p<0.001$). Our own study found no significant relationship of either lifetime smoking history or type of cigarette smoked to 'stroke'.

4.2.2 Tar levels

The risk of lung cancer in relation to tar levels of manufactured cigarettes showed no very clear pattern; none of the differences were anywhere near significant and 3 of the 8 comparisons show reduced risk with higher tar levels. In parallel with the 'switching' results, there was a significantly raised risk of Chronic Bronchitis in males smoking the higher tar cigarettes, but a non-significant reduction in risk for women. In men and women aged 35-54 with ischaemic heart disease there was a non-significant increase in risk in those smoking higher tar cigarettes (present in 7 of the 8 comparisons). In men aged 55-74 there was a significant reduction in risk in those smoking higher tar cigarettes, whilst the results for women are in the same direction but not significant. 'Stroke' patients of both sexes showed increased risk in those smoking higher tar cigarettes, with the trend in males for 10 years before admission being significant. This is out-of-line with the material presented earlier on the overall effect of maximum cigarette smoking and switch to filter cigarettes.

4.2.3 Carbon monoxide levels

Data on CO levels shows not a single significant difference in risk; the only set of values with appreciably

higher risks in those smoking high level CO cigarettes were men and women aged 55-74 with ischaemic heart disease. However, these results were based on small numbers.

4.2.4 Inhaling anomaly

One point of confusion in past studies has been the impact of inhaling. It has recently been suggested that (a) heavy smokers inhale more deeply than light smokers, and (b) inhaling deeply reduces the smoke condensate deposition in the main bronchi. This was thought to explain the reduction in risk of lung cancer in heavy smokers who inhale compared with those who do not (Wald et al., 1983). No evidence to support this hypothesis was found in the present study.

5. TYPE OF CIGARETTE - CONCLUSIONS

The results from the present study do not show, for any of the four index diseases, an advantage to filter cigarettes that is clearly evident in both sexes. However, they are compatible with the general impression from other studies that switching to filter cigarettes is likely to show a benefit for lung cancer and for chronic bronchitis. In trying to find reasons for the unclear result, a number of points should be made.

(i) There is clear evidence of a bias from patients with incipient disease (whatever the cause) altering their smoking habits. This has not only occurred in patients with index diseases. It has also occurred in control patients with diseases classified as definitely or probably not smoking associated, as evidenced by the markedly higher proportion of ex-smokers, and the increased ratio of plain to filter smokers, in such controls as compared with that expected from surveys of the normal population. To counter this bias, it might have been advantageous in this study to have obtained information regarding time of onset of disease though even then, for diseases of long duration, such as chronic bronchitis, there would have been problems regarding accuracy of recall of smoking habits as well as of defining the time of onset.

(ii) Smokers are now more inclined to accept that smoking entails risks of respiratory disease and heart disease than hitherto (Marsh and Matheson (1983)). The persistent educational campaigns on the hazards of smoking have steadily altered public opinion on the desirability of not smoking, or smoking few cigarettes of low tar delivery. This may not only have affected smoking habits but may also have affected the validity of the responses to the questions on smoking. While objective measurements, such as salivary cotinine, could be used to validate current smoking habits, past habits are of more relevance and the validity of smoking histories will be worse with increased duration of recall.

(iii) In comparing our results with those of other studies it should be noted that filter and plain cigarettes differ from country to country, and from time to time with consequent variation in relative risk.

(iv) It is also conceivable that those who initially switched to filter cigarettes were individuals who obtained a lower intake per cigarette by virtue of the way they smoked (thus being at lower risk of disease independently of their switch to filter cigarettes).

(v) Individuals switching to filter cigarettes "compensate" to some extent for the reduced deliveries of smoke constituents by adjusting the way in which they smoke (Lee, 1984.)

(vi) There are the possibilities of interviewer bias ('blind' interviewing would have been very difficult to achieve) and/or diagnostic bias between smokers and non-smokers. Evidence that one or both of these has occurred in our study has been demonstrated but it is not possible to distinguish which.

These points taken together may help to explain differences between our results and those seen in other studies, though it is not possible to quantify their relative importance.

It has been argued that the decline in lung cancer death rates in young and middle-aged men and in young women in England and Wales might be associated with the gradual reduction in tar yields of cigarettes over the past 20 years (ISCSH, 1983). However, because, as noted in Section 1.1, careful inspection of the period and cohort graphs of age-specific mortality rates for males and females for lung cancer (and also for chronic bronchitis and ischaemic heart disease) shows no evidence of an inflection following the changes in tar yields of cigarettes, there is great difficulty in drawing any conclusions about the effect of lower tar cigarettes from these mortality statistics.

Those concerned to reduce the burden of disease from smoking will obviously wish to consider the present results. The data suggest that never smoking is the ideal, with starting smoking "late", keeping the maximum number of cigarettes down to a low level, and stopping smoking "early" all associated with a reduced risk. The results also indicate, in line with those of other studies, that, at least for lung cancer and chronic bronchitis, switching to filter cigarettes may be associated with lower risks of these diseases. Our findings, especially for lung cancer, are not particularly clear, and the study highlights a number of difficulties in obtaining valid estimates of the effects of changing the type of cigarette smoked. More research is needed. This is in agreement with a statement that evaluation of the health effects of low yield cigarettes will remain a challenge to experimentalists and epidemiologists for many years to come (Wynder and Goodman, 1983).

Because of the variance with other results, and the desire to monitor the impact of changing manufacture and smoking habits, further studies may be contemplated. The present experience indicates that: incident rather than prevalent index cases should be used (feasible for lung cancer, difficult for ischaemic heart disease, impossible for chronic bronchitis, and not warranted for 'stroke'); the interviewers should be unaware of the diagnoses of the patients; population controls (and perhaps hospital controls) should be interviewed; attempts

should be made to check the validity of the smoking histories. The difficulties of case-control studies are well documented (see Alderson, 1983), but this does not imply that a prospective study would be preferable.

6. PASSIVE SMOKING

6.1 Introduction

The original questionnaire used in this study did not include questions on passive smoking as it was not considered important. In 1979 it was decided to extend the questionnaire to cover passive smoking for married patients for the last four regions to begin interviewing. Subsequently, in 1981, following publication of the papers by Hirayama (1981) and by Trichopoulos et al (1981) claiming that non-smoking wives of smokers had a significantly greater risk of lung cancer than non-smoking wives of non-smokers, it was decided to increase the number of interviews of married lung cancer cases and controls. The extended questionnaire was then administered to these patients in all hospitals where interviewing was still continuing.

In 1982, after interviewing in the main study had been completed, it was decided to carry out a follow-up study. In this study an attempt was made to interview the spouses of all of the married hospital in-patients with lung cancer who reported never having smoked, as well as of two married non-smoking controls for each of these index lung cancer cases. The follow-up study was intended partly to compare information on spouses' smoking habits obtained first hand with that obtained second-hand during the in-patient interviews, and partly to obtain some data on spouses' smoking habits for those patients who had not answered passive smoking questions in hospital.

6.2 Methods and response

6.2.1 Interviews of patients in hospital

There were 3832 interviews of married cases and controls where the passive smoking questionnaire was completed. Numbers by sex and case-control status are given in Table 21.

Patients were asked when the marriage started; if and when it had ended; the number of manufactured cigarettes per day smoked by the spouse both during the last 12 months of marriage and also at the period of maximum smoking during the marriage; and whether the spouse ever regularly smoked hand-rolled cigarettes, cigars or a pipe during the marriage. For second or subsequent marriages, questions related to the first marriage to give the longest latent interval between exposure and disease onset. The patients were also asked to quantify, according to a four-point scale (a lot, average, a little, not at all), the extent to which they were regularly exposed to tobacco smoke from other people prior to coming into hospital in 4 situations: at home; at work; during daily travel; during leisure time.

6.2.2 Follow-up study of spouses of patients who had never smoked

From the hospital study there were 56 lung cancer cases who reported being lifelong non-smokers, who were married at the time of interview and who were not known to

have previously been married. In a follow-up to the main study, an attempt was made to interview the spouses of these 56 cases and also the spouses of two lifelong non-smoking controls for each case, individually matched for sex, marital status and, as far as possible, for age and hospital. Where multiple potential controls in the same hospital were available, those interviewed nearest in time to the case were selected. Where suitable controls in the same hospital were not available, those in the nearest hospital were chosen.

Because names and addresses of the patients were not recorded in the hospital study, it was necessary to go back to the hospital both to obtain this information and also to get permission to interview their spouses. Following some refusals both by the hospital and by the spouses, successful interviews were obtained from spouses of 34 cases (10 wives and 24 husbands) and 80 controls (26 wives and 54 husbands) whose condition was definitely or probably not related to smoking.

Interviewing was carried out between July 1982 and August 1983. Questions related to age; occupation; social class; number and type of rooms in the home; type of central heating used; presence of respiratory symptoms; and past history of certain diseases. The spouses were also asked about their (maximum) consumption of tea, coffee,

alcohol, fruit juice, brown bread, carrots, manufactured cigarettes, cigars and pipes; nowadays, during the year of admission of the patient, or during the whole of the marriage. The spouses were not asked questions about the smoking habits of the index patient. The questionnaire used is given in Appendix I.

6.2.3 Statistical methods

The statistical methods used were generally the same as described in Section 2. In analyses of the follow-up study data, controls not included in the follow-up are excluded from analysis. In analyses of the data collected in hospital, comparisons are made between cases with a particular index disease and all the controls with diseases definitely or probably not related to smoking, pair-matching being ignored to avoid substantial loss of data due to one member of a pair not being married or not completing the passive smoking questionnaire. 6 simple indices of passive smoke exposure were considered in these latter analyses, (i)-(iv) exposure at home, at work, during travel, during leisure, (v) spouse smoking manufactured cigarettes in the last 12 months, and (vi) spouse smoking manufactured cigarettes in the whole of the marriage. Bases for (ii) are reduced as not all patients worked. In addition a combined exposure index of passive smoke exposure was calculated by the unweighted sum of the four individual exposure indices (i)-(iv), counting "not at all" = 0, "little" = 1, "average" = 2 and "a lot" = 3.

6.3 Results

6.3.1 Possible effect of passive smoking on risk of lung cancer in lifelong non-smokers

The follow-up study concerned 56 lung cancer cases and 112 matched controls who reported never having smoked in their hospital interview. Of these, there were 47 index cases (15 male and 32 female) and 96 controls (30 male and 66 female) for whom some information on smoking habits of their spouses was available. Of these 143 patients, information was available both from the spouse and from the patient for 59 (41%), from the spouse only for 55 (38%) and from the patient only for 29 (20%). Table 22 shows the estimated age-adjusted relative risk of lung cancer in relation to spouse smoking, by sex, source of data, and period of smoking. None of the 18 relative risks shown in Table 22 are statistically significant. When data for both sexes and both sources are considered, the estimated relative risks in relation to spouse smoking are close to 1, both for smoking during the whole of marriage (1.11), and for smoking during the year preceeding hospital interview (0.93). For individual sexes or sources, where numbers of cases and controls are smaller, relative risks vary more from unity, but no consistent pattern is evident.

Table 23 summarizes concordance between spouse's manufactured cigarette smoking habits as reported directly and indirectly for the 59 patients with data from both

sources. Discrepancies were seen for 9 spouses (15%) in respect of smoking at some time during marriage and in the case of 2 spouses (3%) in respect of smoking during the year of hospital interview. There was no consistent pattern in the direction of discrepancy.

Table 24 summarizes the results of analyses carried out relating 7 indices of passive smoke exposure recorded in the hospital interviews to risk of lung cancer among lifelong non-smokers. Here the controls used for comparison are all never smoking patients with diseases classified as definitely or probably not associated with smoking who completed the passive smoking questionnaire.

Overall the results showed no evidence of an effect of passive smoking on lung cancer incidence among lifelong non-smokers. In male patients, relative risks were increased for some of the indices but numbers of cases were small and none of the differences approached statistical significance. In females, where numbers of cases were larger, such trends as existed tended to be negative and indeed were marginally significantly negative ($p<0.05$) for passive smoking during travel and during leisure. For the combined sexes no differences or trends were statistically significant at the 95% confidence level; such trends as existed tended to be slightly negative. The relative risk in relation to the spouse smoking during the whole of the

marriage was estimated to be 0.80 for the sexes combined, with 95% confidence limits of a 0.43 to 1.50. Standardisation for working in a dusty job, the variable apart from smoking found to have the strongest association with lung cancer risk in the analyses described in Section 3, did not affect the conclusion that passive smoking was not associated with risk of lung cancer among never smokers in our study.

6.3.2 Possible effect of passive smoking on risk of chronic bronchitis, ischaemic heart disease or 'stroke' in lifelong non-smokers

Analyses similar to that shown in Table 24 for lung cancer were also carried out for chronic bronchitis, ischaemic heart disease and 'stroke'. Illustrative results for two of the indices are presented in Table 25.

No significant relationship of any index of passive smoking to risk of the 3 diseases was seen. For the sexes combined, the relative risk in relation to spouse smoking during the whole of the marriage was 0.83 for chronic bronchitis (95% confidence limits 0.31-2.20), 1.03 for ischaemic heart disease (limits 0.65-1.62) and 0.90 for 'stroke' (limits 0.53-1.52). For 'stroke' there was in both sexes, an approximate 2-fold increase in risk for patients with a combined passive smoke index that was high (score of 5 to 12) compared with those where it was low (score of 0

or 1). However, numbers of cases with a high score were low (14 males and 7 females) and even for the sexes combined, the relative risk estimate of 2.18 was not statistically significant (limits 0.86-5.48). In interpreting this finding it should be noted that active smoking was not found to be clearly related to 'stroke' in the analyses described in section 3, rendering a two-fold increase in relation to passive smoking a priori unlikely.

6.3.3 Further analyses of the possible effect of passive smoking on risk of the four index diseases

Section 6.3.1 and 6.3.2 have described analyses carried out investigating the possible effect of passive smoking on risk of the four index diseases, restricting attention to lifelong non-smokers. It is also of some interest to study the possible effect of passive smoking on risk in smokers.

Before doing so two points should be made clear. Firstly, when talking about possible effects of passive smoking in smokers, we are referring only to exposure from sources of passive smoke other than their own smoking. Smokers are, of course, exposed to smoke passively, as well as actively, from their own cigarettes, but one cannot separate out the possible effects of the two forms of exposure with our study design.

Secondly, if active and passive smoking are strongly correlated, failure to standardise for active smoking in the analysis is likely to lead to an apparent relationship being seen between passive smoking and the risk of a disease strongly associated with active smoking, even when no true effect of passive smoking exists at all.

It was thus clear, when preliminary analyses standardised for age and not for active smoking showed highly significant ($p<0.001$) positive associations between many of the indices of passive smoking and risk of lung cancer or chronic bronchitis in males, that these associations might well be wholly or partly artefactual, and that a much more detailed analysis would be required before any conclusion could be reached.

As a first step in this more detailed analysis, the age-adjusted association between passive smoke exposure at home and a whole range of confounding factors was studied. From the analyses a number of general conclusions could be made.

(a) passive smoke exposure at home was highly correlated with other indices of passive smoke exposure. In females the relationships with exposure at work, during travel and during leisure were all highly significant ($p<0.001$) while in males those with exposure during travel and during leisure were also highly significant ($p<0.001$) but that with exposure at work was not.

(b) passive smoke exposure at home was correlated with whether the person is currently married. In females, married women had significantly ($p<0.001$) more exposure than widowed, divorced or separated women with the similar association in men less significant ($p<0.05$).

(c) as had been suspected, passive smoke exposure at home was very strongly correlated with whether the patient smokes manufactured cigarettes him or herself. The strength of this association is illustrated in Table 26.

(d) passive smoke exposure at home was correlated with a number of attributes which were themselves related to whether a person smokes manufactured cigarettes him or herself. Examples were the chronic bronchitis syndrome, tea drinking and alcohol intake.

The next step was to carry out analyses relating passive smoking to risk of the index diseases after adjustment for various confounding factors. Since the preliminary analyses had not shown any clear relationships of passive smoking to risk of any of the 4 index diseases in females or to risk of ischaemic heart disease or 'stroke' in males, it was decided to carry out these further analyses only for lung cancer and chronic bronchitis in males. Attention was also restricted to 3 indices of passive smoke exposure, the combined index, whether the spouse smoked manufactured cigarettes in the last 12 months, and whether the spouse ever smoked manufactured cigarettes. In these analyses, all the subjects, never smokers and ever smokers, were included. 8 possible confounding variables were considered as follows:

A	Age at admission	(35-44, 45-54, 55-64, 65-74)
S	Status of first marriage	(current, ended)
D	Dusty job	(yes, no)

SM	Type of product smoked	(none, pipe/cigar, cigarettes)
HR	Ever smoked handrolled cigarettes	(yes, no)
MC	Last smoked manufactured cigarettes	(never, current, ex 1-3 years, ex 4+ years for lung cancer; never, current, ex 1-10 years, ex 11+ years for chronic bronchitis)
NC	Manufactured cigarette consumption	(0-17, 18-27, 28-37, 38+ per day)
ST	Age started to smoke manufactured cigarettes	(never, under 25, 25 or over)

Analyses involving 13 combinations of confounding factors were carried out. Results are summarized in Table 27. It can be seen that for each index/disease combination the variation in risk attributable to passive smoke exposure (as judged by the chi-squared statistic) was not markedly affected by adjustment for the non-smoking confounding factors included (S & D) but was substantially reduced by adjustment for the patient's own smoking habits. In broad terms about a third of the variation was explained by the type of product smoked (SM) with about a further third explained by other aspects of the smoking habits (HR, MC, NC and ST). The highest percentage of variation explained was 89% in the analysis relating whether the spouse had ever smoked to risk of chronic bronchitis; the lowest was 54% in the analysis relating the combined index to risk of lung cancer.

6.4 Discussion

Over the past 4 years there has been considerable research interest in the relationship between passive smoking and risk of lung cancer in nonsmokers. While some studies have claimed a positive effect (Hirayama, 1981; Trichopoulos et al., 1981; Correa et al., 1983; Gillis et al., 1984; Knoth et al., 1983), others (Buffler et al., 1984; Chan, 1982; Garfinkel, 1981; Kabat and Wynder, 1984; Koo et al., 1984) have found no significant relationship. Relative risks of lung cancer for non-smoking women married to smokers compared to non-smoking women married to non-smokers range from somewhat over 2 in the Trichopoulos and Correa studies to around 0.75 in the Buffler and Chan studies. The weighted relative risk from these studies has been estimated by us as approximately 1.3. While there is, therefore, a tendency for a small positive association between passive smoking and lung cancer, recent reviews of these data (Lee, 1984; Lehnert et al., 1984) have concluded that overall there is no reliable scientific evidence of a causal relationship between passive smoking and lung cancer. In these reviews a number of general points have been made.

First, dosimetric studies have shown that in cigarette-equivalent terms passive smoking only results in a relatively small exposure to the non-smoker. Hugod et al. (1978), for example, showed that even under quite extreme conditions the time taken for a non-smoker to inhale the equivalent of one cigarette would be 11 hours as regards particulate matter and 50

hours as regards nicotine. Similarly, Jarvis et al (1985) have shown that the increase in salivary cotinine in relation to passive smoke exposure is less than 1% of that in relation to active smoke exposure. Extrapolating linearly from the 10-fold relative risk of lung cancer in relation to active smoking would therefore predict a relative risk in relation to passive smoking less than 1.1, while a quadratic extrapolation, as suggested by Doll and Peto (1978) would predict a lower risk still. The conflict between the dose and the claimed response is particularly clear for the results of Hirayama (1981) who found a similar effect on lung cancer for passive smoking as for active smoking of 5 cigarettes a day.

Second, all the studies suffer from weak exposure data, most studies only obtaining information on the spouse's smoking habits and none obtaining objective data by measurement of ambient levels of smoke constituents in the air of the home or workplace and/or of concentrations of constituents in body fluids.

Third, no studies adequately take into account the possibility that misclassification of active smokers as non-smokers may have consistently biased relative risk estimates upward. Active smokers have a high relative risk of lung cancer and spouses' smoking habits are positively correlated. Because of this, it can be shown if a relatively small proportion of smokers deny smoking, this results in an apparent elevation in

risk of lung cancer in "non-smokers" married to smokers compared to "non-smokers" married to non-smokers even when no true effect of passive smoking exists. A demonstration that this source of bias is of real importance can be found in the study of Garfinkel et al (1985). Based on unvalidated smoking data taken from hospital notes, a relative risk of lung cancer in relation to husband's smoking at home of 1.66 was calculated, with relative risks of at least 1.3 seen in relation to each level of husband's cigarette smoking and in relation to husband's cigar and pipe smoking. When additional sources of information on smoking habits were used, the overall relative risk was reduced to a marginally significant 1.31 with an elevated risk only really discernible in relation to heavy cigarette smoking by the husband. Even here, it is notable that the elevation in risk was not evident when smoking data were obtained from the subject or her spouse directly, but was only evident when the data were obtained from the daughter or son or another informant, i.e. from those people who were less likely to have known the full smoking history. The lower relative risk may still have arisen wholly or partly as a bias resulting from misclassification of smoking habits.

Fourth, many of the studies are open to specific criticisms. For example, the conclusion of Gillis et al. (1984) that male lung cancer deaths in non-smokers rose from 4 per 10,000 in those not exposed to passive smoke to 13 per 10,000 in those who were exposed was based on a total of only 6(!) deaths

and was not statistically significant. Also the claim by Knoth et al. (1983) of a relationship between passive smoking and lung cancer in non-smoking women was based simply on the observation that the proportion of female non-smoking lung cancer patients living together with a smoker exceeded the proportion of male smokers as reported in the previous microcensus, ignoring inter alia the fact that in many families women live with more than just their husbands.

In the present study no evidence of a relationship of passive smoking to lung cancer incidence in lifelong non-smokers was seen, either in the analyses based on the information collected in hospital or in subsequent inquiry of the spouses or both. It must be pointed out, however, that the number of lung cancer patients who had never smoked was rather small so that, though our findings are consistent with passive smoking having no effect on lung cancer risk at all, they do not exclude the possibility of a small increase in risk, though the upper 95% confidence limit of 1.50 in relation to the spouse smoking during the whole of the marriage is not consistent with some of the larger increases claimed by Hirayama (1981,1984), Trichopoulos et al (1981,1983) and Correa et al (1983).

Though the number of lung cancer patients who had never smoked is small, varying around 30-50 depending on the analysis, this number is not very different from that reported in a number of other studies, e.g. the findings of Correa et al (1983) were

based on only 30, while those of Trichopoulos et al (1981), even when updated (Trichopoulos et al. 1983) were based on only 77. The difficulty of obtaining an adequate sample size is underlined when one considers that in our study the 44 never smoking lung cancer patients who completed passive smoking questionnaires in hospital were extracted from a total of 792 lung cancer patients regardless of smoking habits. It would need a large research effort to increase precision substantially, and even then one would have to take care that the magnitude of any biases did not exceed the magnitude of the effect one was looking for.

The two major prospective studies which have so far reported findings on passive smoking (Hirayama, 1981; Garfinkel, 1981) were not actually designed to investigate this issue and, as a result, could only use spouse's smoking as an index of exposure. Our study, on the other hand, though not able to monitor exposure objectively, as would have been preferable, was able to look at passive smoking in a wider context, by asking about the extent of exposure at home, at work, during travel and at leisure. Although the answers to these questions were subjective, and could have exhibited bias, their inclusion perhaps allows greater confidence in the conclusions.

It was interesting that, of the 59 patients for whom spouse's cigarette smoking habits were obtained from both the spouse and the patients, there were 9 (15%) patients for whom there was disagreement as to whether the spouse had been a

smoker at sometime during the marriage. In 4 cases, it was the patient rather than the spouse who reported the spouse had ever smoked suggesting that a proportion of people deny (or cannot remember) smoking when asked. It was also noteworthy that there was quite a strong correlation in our study between active and passive smoking. As illustrated in Table 26, current smokers were considerably more likely to be exposed to passive smoke exposure at home (from sources other than their own cigarettes) than were never or ex-smokers. As noted above, this correlation, coupled with some misclassification of smokers as non-smokers, may spuriously inflate the estimate of risk related to passive smoking. It is important to carry out further studies to obtain more accurate information on reliability of statements about smoking habits because of this possibility of bias.

Little other evidence is available concerning the relationship between passive smoking and risk of the other smoking-associated diseases in (adult) non-smokers and much of this is open to criticism. In his original paper, Hirayama (1981) presented relative risks of death for non-smoking women according to the husband's smoking habits. Based on a total of 66 deaths, a slight positive trend for emphysema and asthma was not significant, while, based on a total of 406 deaths, no indication of a trend at all was seen for ischaemic heart disease. In a later paper based on only a further 88 ischaemic heart disease deaths, Hirayama (1984) reported a

slight positive trend in risk, but this was not statistically significant. Garland et al. (1985), in a small prospective study, reported a 15-fold higher risk of ischaemic heart disease in non-smoking Californian women whose husbands were current or former smokers compared with those whose husbands were never smokers, but this enormous and implausible relative risk was only significant at the 90% confidence level and had very wide confidence limits, being based on only 2 deaths in women whose husbands were current smokers. Sandler et al. (1985), in a case-control study carried out in North Carolina, reported a strong relationship between risk of cancer of all sites and passive smoking. This study has been criticised by Lee (1985) who notes that it is basically implausible that passive smoking should increase risk of cancers not associated with active smoking. Lee also criticised the method of analysis, showing that no association with cancer risk would be found if a more standard method of analysis was used. Vanderbroucke et al. (1984) , based on a 25 year follow-up of 1070 Amsterdam married couples, recently reported that passive smoking was associated with some decrease in total mortality.

There is evidence indicating that young children whose parents smoke have an excess incidence of respiratory symptoms and some reduction in pulmonary function. Reviewing this evidence, Lee (1984) noted that the interpretation of the association is fraught with difficulties and that other possible explanations, including social class related factors, parental

neglect, nutrition, cross-infection and smoking during pregnancy, had not been taken into account adequately, so that a causal effect of passive smoking could not be inferred. The relevance of these findings to chronic bronchitis or other diseases in adults is in any case not clear.

Our analyses showed no significant effect of passive smoking on lifelong non-smokers as regards risk of chronic bronchitis, ischaemic heart disease or 'stroke'. In all the analyses relating the various indices of passive smoke exposure to these diseases, no significant differences were seen and slight decreases in risk were as common as slight increases. While more data would be desirable for these diseases, lung cancer continues to be the major smoking associated disease for which passive smoking comes under suspicion.

Little attention has so far been given to the possibility of exposure to other people's smoke being a risk factor for smokers. Buffler et al (1984) noted that, when no adjustment for active smoking habits was made, risk of lung cancer was significantly higher in those where a household member smoked regularly than in those where no member did. However after simple adjustment for own smoking habits as yes/no the odds ratio in relation to passive smoking reduced to a non-significant level, from 1.41 to 1.29 in men and from 2.12 to 1.30 in women. She did not attempt to take account of amount smoked or any other feature of the smoking habits. Correa et al

(1983) studied the relationship of maternal and paternal smoking habits to risk of lung cancer. When no adjustment for active smoking was made, a significant odds-ratio of 1.66 in relation to maternal smoking was seen. After adjustment for various features of the smoking habit - age of starting, maximum amount smoked, years of smoking, degree of inhalation, use of hand-rolled cigarettes, tar content of usual brand, this odds-ratio reduced to 1.36, though it still remained significant.

Our results in relation to the possible role of passive smoking in smokers are similar in some ways to these. In male smokers we found that, if no correction was made for active smoking variables, various indices of passive smoking were highly significantly associated with risk of lung cancer and of chronic bronchitis. However there was a strong positive correlation between a person's own smoking habits and his passive exposure to smoke, and adjustment for active smoking habits substantially reduced the strength of the correlation. Indeed, approximately 75% of the variance attributed to passive smoking in the unadjusted analyses was explained in this way. While passive smoking exposure may have some effect on risk in smokers, by increasing the total dose of smoke constituents to which smokers are exposed, it cannot inferred from the fact that a "significant" relationship with passive smoking remains even after "adjustment for active smoking" that any effect of passive smoking actually exists. The reason for this is that such

adjustment is virtually certain to be imcomplete, partly because active smoking cannot be determined precisely, partly because any statistical model for adjustment for active smoking will not be absolutely efficient. That a large part of the original association was removed by adjustment for active smoking suggests to us that all, or virtually all of it, is in fact due to the association of active smoking with both risk of disease and passive smoking and that none, or very little of the association, represents a true association between risk and passive smoking.

While it is clear that all the difficulties of carrying out good research on the passive smoking issue have not yet been overcome, and that further research is certainly needed, our findings appear consistent with the general view, based on all the available evidence, that any effect of passive smoking on risk of lung cancer or other smoking-associated diseases is at most quite small, if it exists at all. The marked increases in risk noted in some studies are more likely to be a result of bias in the study design than of a true effect of passive smoking.

7. VITAMIN A

7.1 Patients included in the analysis

Between November 1979 and the end of 1981, a series of questions on the intake of various foods containing Vitamin A was applied to lung cancer cases (based on provisional diagnosis) and to their controls in the following regions: Cambridge, South Hants., Leicester, Nottingham, Liverpool and London. The questions (see Appendix I) were based on those used to assess intake before admission to hospital in the earlier study supported by TRC at the Brompton and St. Stephen's hospitals carried out in 1976-77 (Gregor et al, 1980). Questions on liking of foods and consumption 20 years ago were not asked this time to avoid an over-long questionnaire.

Following adjustments based on final diagnosis, relevant data were available for:

	Male	Female
Lung cancer cases	613	280
Other cases	78	25
Controls	605	392

7.2 To be completed

At the time of writing the definitive analysis of the Vitamin A data has not been completed. Anyone receiving this report who wishes to receive the final version of section 7 when it is ready (probably towards the end of 1986) should contact P.N. Lee.

8. SUMMARY

In a case control study of over 12,000 inpatients aged 35-74, risk of lung cancer, chronic bronchitis, and, particularly in those aged 35-54, ischaemic heart disease was positively associated with the number of manufactured cigarettes smoked daily and was negatively associated with long term giving up. Risk of 'stroke' was not clearly related to smoking. Among manufactured cigarette smokers, lung cancer risk tended to be lowest in those who had always smoked filter cigarettes. This pattern was, however, evident only in men who additionally smoked pipes, cigars or handrolled cigarettes and in women, not being seen in men who smoked only manufactured cigarettes. Risk of lung cancer was not clearly related to time of switch to filter cigarettes. A markedly lower risk of chronic bronchitis was seen in men, but not women, who smoked filter rather than plain cigarettes. Heart disease risk did not vary by type of cigarette smoked 10 years before admission, but, compared with those who had never smoked filter cigarettes, those who had ever smoked filter cigarettes had a higher risk in men and a lower risk in younger women.

Compared with the general population, markedly more controls were ex-smokers, suggesting incipient disease, whether or not smoking related, may alter smoking habits, thus affecting the interpretability of the findings. Control smokers were also relatively much more likely to report smoking plain cigarettes

than expected. This comparison, not made in other studies relating risk of disease to type of cigarette smoked, indicates that great care must be taken in verifying validity of reported smoking habits. While our findings are compatible with other evidence that risk of lung cancer and chronic bronchitis is probably reduced by switching from plain to filter cigarettes, they underline the difficulties in obtaining valid evidence from epidemiological studies.

In an extension to the original study, almost 4,000 patients answered questions on the smoking habits of their first spouse and on the extent of passive smoke exposure at home, at work, during travel and during leisure. Subsequently, an attempt was made to obtain smoking habit data directly from the spouses of all lifelong non-smoking lung cancer cases and of two lifelong non-smoking matched controls for each case. The attempt was made regardless of whether the patients had answered passive smoking questions in hospital or not.

Amongst lifelong non-smokers, passive smoking was not associated with any significant increase in risk of lung cancer, chronic bronchitis, ischaemic heart disease or 'stroke' in any analysis.

Limitations of available evidence on passive smoking are discussed and the need for further research underlined. At the moment, it does not appear that exposure to passive smoke

results in any material increase in risk of any of the major diseases that have been associated with active smoking.

In a further extension to the original study, Vitamin A data were obtained from a sample of almost 1,000 lung cancer cases and over 1,000 controls. At the time of writing, these data have not been fully assessed.

ACKNOWLEDGEMENTS

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Mr. I. Marks from Research Surveys of Great Britain provided advice in the planning phase and was responsible for the interviewers' vital contribution to the study. We thank the many clinicians at the 46 participating hospitals who permitted us to contact their patients and the twelve thousand patients who answered the questions.

Sir Richard Doll and Mr. Richard Peto advised on the conditions that should be considered smoking related. A number of colleagues have commented on ways of handling the biases from health-related changes in smoking behaviour.

Data on tar, nicotine and carbon monoxide yields of brands smoked where not available from published material were provided by the Tobacco Advisory Council and by Dr. Nicholas Wald.

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Mrs. D.P.Morris and Mrs. E.K. Marlow typed the numerous drafts of this report.

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RISK OF LUNG CANCER, CHRONIC BRONCHITIS, ISCHAEMIC HEART DIESASE, AND STROKE IN RELATION TO TYPE OF CIGARETTE SMOKED, PASSIVE SMOKING AND OTHER FACTORS

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TABLES AND APPENDICES

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TABLE 1

RELATIONSHIP OF TYPE OF CIGARETTE SMOKED TO RISK OF LUNG CANCER

Author	Type of Study	Years	Comparison	Sex	Cases	Risk
	PROSPECTIVE					
Hammond	Volunteers	59-72	Low T/N	M	391	0.81
			v High T/N	F	170	0.60
Hammond	Volunteers	59-72	Med T/N	M	1627	0.95
			v High T/N	F	269	0.80
Hawthorne	Volunteers at screening	68-75	Filter v Plain	M	80	0.84
				F	-	-
Rose	Siblings of migrants and pop.sample	64-77	Filter v Plain	M	99	1.12
				F	21	0.98
Rimington	Volunteers at screening	70-76	Filter v Plain	M	104	0.65
				F	-	-
	CASE-CONTROL					
Bross and Gibson	Hospital Patients	60-66	Filter v Plain	M	265	0.59
				F	-	-
Wynder	Hospital Patients	66-69	Filter v Plain	M	157	0.55
				F	-	-
Dean	Deaths and live controls	66-72	Filter v Plain	M	332	0.54
				F	101	0.68
Wynder	Hospital Patients	69-77	Filter v Plain	M	293	0.76
				F	63	0.75
Vutuc and Kunze	Hospital Patients	76-80	Low T v High T	M	211	0.30
				F	138	0.29
Vutuc and Kunze	Hospital Patients	76-80	Med T v High T	M	245	0.56
				F	184	0.49
Lubin et al	Hospital Patients	76-80	Lifelong Filter v Lifelong Plain	M	2063	0.59
				F	158	0.50

Key: T=Tar, N=Nicotine, M=Male, F=Female.

TABLE 2

RELATIONSHIP OF TYPE OF CIGARETTE SMOKED TO RISK OF ISCHAEMIC HEART DISEASE

Author	Type of Study	Years	Comparison	Sex	Deaths/ Cases	Relative Risk
	PROSPECTIVE					
Hammond	Volunteers	59-72	Low T/N	M	2040	0.90
			v High T/N	F	1067	0.81
Hammond	Volunteers	59-72	Med T/N	M	7422	0.96
			v High T/N	F	1548	0.87
Hawthorne	Volunteers at screening	68-75	Filter v Plain	M F	228 -	1.05 -
Rose	Siblings of migrants and pop.sample	64-77	Filter v Plain	M F	253 76	0.84 0.91
Castelli	Population sample	63-77	Filter v Plain	M F	60 -	0.92 -
	CASE-CONTROL					
Dean	Deaths and live controls	66-72	Filter v Plain	M F	263 -	0.75 -
Kaufman	Hospital Patients	80-81	Low N v High N	M F	242 -	1.58 -
Kaufman	Hospital Patients	80-81	Med N v High N	M F	207 -	1.28 -

Key: T=Tar, N=Nicotine, M=Male, F=Female.

TABLE 3

NUMBER OF INTERVIEWS CARRIED OUT BY ORIGINAL ALLOCATION

Original allocation	Male	Female	Total
Lung cancer	1223	783	2006
Chronic bronchitis	744	605	1349
Ischaemic heart disease	941	842	1783
Stroke	614	576	1190
Total with index diseases	3522	2806	6328
Total with other diseases	3508	2857	6365
Total interviews	7030	5663	12693

TABLE 4

NUMBER OF INTERVIEWS BY ORIGINAL AND FINAL ALLOCATION

Sex	Original Allocation	Final allocation: Lung Cancer	Chronic Bronchitis	IHD	Stroke	Controls
Male	Lung Cancer	1043	23	2	4	151
	Chronic Bronchitis	14	559	18	3	150
	IHD	2	13	796	8	122
	Stroke	4	4	14	543	49
	Controls	88	135	188	60	3037
Female	Lung Cancer	634	9	2	5	133
	Chronic Bronchitis	10	400	10	1	184
	IHD	2	11	615	6	208
	Stroke	3	1	10	492	70
	Controls	27	75	96	51	2608

TABLE 5

NUMBER OF MATCHED PAIRS AFTER REALLOCATION BY CLASS OF CONTROL *

Sex	Index disease	Pairs with class 1 controls	Pairs with class 2 controls	Total
Male	Lung cancer	819	206	1025
	Chronic bronchitis	537	130	667
	Ischaemic heart disease (IHD)	811	139	950
	Stroke	460	118	578
	Total	2627	593	3220
Female	Lung cancer	630	46	676
	Chronic bronchitis	460	36	496
	Ischaemic heart disease (IHD)	712	21	733
	Stroke	521	34	555
	Total	2323	137	2460

* See Volume I Section 2 for definition and Table 6 for diseases involved.

TABLE 6

NUMBER OF CONTROLS BY FINAL DIAGNOSIS (among matched pairs) FOLLOWING REALLOCATION CLASSED BY ASSOCIATION WITH SMOKING

Controls	Final diagnosis (ICD code 9th revision)	Male	Female
Class 1A:	Infections excluding TB (001-010,013-139)	48	31
	Neoplasms not related to smoking (152-156, 170-175, 179, 181-187, 190-194, 200-208,210-239)	329	269
	Endocrine,nutritional,metabolic, immunity and blood diseases (240-246,250-289)	247	287
	Other nervous system except Parkinson's disease (320-331,333-389)	107	85
	Rheumatic fever, chronic rheumatic heart disease, other heart disease (390-398, 420-429)	337	300
	Acute respiratory infection, bronchiectasis, asthma, alveolitis, pneumoconiosis, pulmonary collapse (460-466, 470-478, 493, 494, 495,500-508, 518.0)	154	237
	Various diseases of intestines and peritoneum (520-530, 540-543, 555-558, 560-569)	80	88
	Genito-urinary conditions and complications of pregnancy (580-676)	73	42
	Diseases of skin, subcutaneous tissue, musculoskeletal system and connective tissue (680-739)	156	182
	Congenital malformations and perinatal conditions (740-779)	17	16
	Illegal ICD code, likely correct code class 1	1	1
	Total	1549	1538

TABLE 6 (Cont/1)

NUMBER OF CONTROLS BY FINAL DIAGNOSIS (among matched pairs) FOLLOWING REALLOCATION CLASSED BY ASSOCIATION WITH SMOKING

Controls	Final diagnosis (ICD code 9th revision)	Male	Female
Class 1B:	Cancer of stomach, peritoneum, other digestive sites (151,158-159)	43	13
	Mental disorders (290-319)	43	33
	Hypertensive disease (401-415)	81	56
	Pneumonia, influenza, other respiratory disease (480-487,510-519)	319	191
	Other diseases of oesophagus, stomach, duodenum etc. (535-537,570,572-579)	84	65
	Sign, symptoms, ill-defined conditions (780-799)	245	192
	Injury and poisoning (800-959,980-999)	52	38
	Illegal ICD code, likely correct code class 2	8	12
	No diagnosis	203	185
	Total	1078	785
Class 2A:	Cancer of kidney, urinary organs unspecified and ill-defined sites (189,195-199)	54	14
	Subarachnoid haemorrhage, arterio-sclerosis, other diseases of arteries and capillaries (430, 440, 443-448)	34	8
	Bronchitis not specified as acute or chronic (490)	1	2
	Hernia of abdominal cavity	26	7
	Poisoning by drugs etc. (960-979)	18	9
	Illegal ICD code,likely correct code class 3	6	4
	Total	139	44

TABLE 6 (Cont/2)

NUMBER OF CONTROLS BY FINAL DIAGNOSIS (among matched pairs) FOLLOWING REALLOCATION CLASSED BY ASSOCIATION WITH SMOKING

Controls	Final diagnosis (ICD code 9th revision)	Male	Female
Class 2B:	Pulmonary and respiratory tuberculosis (011-012)	42	10
	Smoking-related cancers other than lung (140-150,157,160,161,163-165,180,188)	173	38
	Parkinson's disease	11	3
	Diseases of pulmonary circulation, veins, lymphatics, other circulatory and aortic aneurysm (415-417,441,451-459)	123	20
	Peptic ulcer (531-534)	71	8
	Liver cirrhosis and alcoholism (571)	28	12
	Illegal ICD code,likely correct code class 4	6	2
	Total	454	93

TABLE 7

AGE DISTRIBUTION OF MATCHED PAIRS AGED 35-74 WITH CLASS 1 CONTROLS

Sex	Index disease	Age 35-44	Age 45-54	Age 55-64	Age 65-74	All Ages
Male	Lung cancer	96	279	242	201	818
	Chronic bronchitis	39	158	168	172	537
	IHD	220	192	214	185	811
	Stroke	39	102	171	148	460
	Total	394	731	795	706	2626
Female	Lung cancer	62	142	250	176	630
	Chronic bronchitis	22	103	160	173	458
	IHD	98	211	219	183	711
	Stroke	33	93	205	189	520
	Total	215	549	834	721	2319

N.B. One male and 4 female pairs in Table 3 outside age range 35-74.

TABLE 8

SOME CHARACTERISTICS OF THE SAMPLE USED IN THE ANALYSES

Sex	Index disease	Case/ Control	Subjects	% with final diagnosis	% matched on Hosp. and Time*	% matched on Hosp. Only	% matched on Neither
Male	Lung cancer	Case	818	92	70	14	16
		Control	818	90	70	14	16
	Chronic bronchitis	Case	537	94	80	14	6
		Control	537	92	80	14	6
	Ischaemic heart disease	Case	811	97	79	13	8
		Control	811	95	79	13	8
	'Stroke'	Case	460	92	84	12	4
		control	460	92	84	12	4
Female	Lung cancer	Case	630	94	78	11	11
		Control	630	91	78	11	11
	Chronic bronchitis	Case	458	94	86	10	4
		Control	458	93	86	10	4
	Ischaemic heart disease	Case	711	96	81	13	6
		Control	711	93	81	13	6
	'Stroke'	Case	520	88	85	11	4
		Control	520	90	85	11	4

* Date of interview matched to within one year

TABLE 9

COMPARISON OF SMOKING HABITS REPORTED BY RESPONDENTS IN TOBACCO RESEARCH COUNCIL (TRC) SURVEYS AND BY CLASS 1 CONTROL PATIENTS

Smoking habit	Time	Males		Females	
		TRC	Controls	TRC	Controls
Percentage of total population *					
Never smoked	At admission	18.2	15.5	44.4	43.2
Ex-smokers	At admission	26.9	40.1	17.9	28.1
Current smokers	At admission	54.8	44.5	37.7	28.7
Smoker-not man. cigs.	At admission	17.6	11.8	0.8	0.4
Manufactured cigarettes					
Plain	At admission	5.7	7.8	1.9	3.2
Filter	At admission	31.5	24.9	35.0	25.1

* Standardised for age and year of admission

TABLE 10

COMPARISON OF OBSERVED PERCENTAGE OF MANUFACTURED CIGARETTE SMOKERS SMOKING PLAIN CIGARETTES REPORTED BY CLASS 1 CONTROL PATIENTS WITH THAT EXPECTED FROM TRC SURVEY DATA
(Standardised for age and region)

Sex	Year	Man.cig. smokers	% plain observed	% plain expected	Relative odds *
Male	1969	1406	48.0	36.0	1.65
	1974	1257	35.6	29.2	1.34
	1976	1167	30.9	22.3	1.56
	1979	987	25.6	17.6	1.61
Female	1969	997	26.5	17.2	1.74
	1974	916	19.0	10.4	2.03
	1976	865	15.0	7.2	2.27
	1979	751	12.3	4.8	2.78

* (% plain observed/% filter observed)/(% plain expected/% filter expected)

TABLE 11

COMPARISON OF OBSERVED PERCENTAGES OF MANUFACTURED CIGARETTE SMOKERS SMOKING PLAIN CIGARETTES REPORTED BY CASES IN 1969 WITH THAT EXPECTED FROM TRC DATA (Standardised for age and region)

Sex	Disease	Number of cig. smokers	% plain observed	% plain expected	Relative odds *
Male	Lung Cancer	211	55.0	38.4	2.0
	Chronic Bronchitis	192	57.8	38.8	2.2
	Ischaemic Heart disease	260	44.6	32.9	1.6
	Stroke	125	62.4	39.6	2.5
Female	Lung Cancer	138	34.8	18.6	2.3
	Chronic Bronchitis	115	35.7	17.6	2.6
	Ischaemic Heart disease	151	29.1	17.6	1.9
	Stroke	65	29.2	18.7	1.8

* (% plain observed/% filter observed)/(% plain expected/% filter expected)

TABLE 12

PERCENTAGE OF SUBJECTS SHOWING CHANGE IN NUMBER OF MANUFACTURED CIGARETTES SMOKED ACCORDING TO CHANGE IN NICOTINE YIELD OF CIGARETTES USED BETWEEN 10 AND 5 YEARS BEFORE ADMISSION

Sex	Change in consumption of man. cigarettes	Change in nicotine yield: Decrease %	Change in nicotine yield: No change/increase %
Male	Increase	13	16
	Same	76	70
	Decrease	11	14
	Total (number of subjects)	100 (1906)	100 (105)
Female	Increase	19	23
	Same	73	65
	Decrease	8	12
	Total (number of subjects)	100 (1307)	100 (65)

TABLE 13

ASSOCIATION OF LUNG CANCER WITH MAIN SMOKING VARIABLES

	Males		Females	
	R(N)	P	R(N)	P
13A				
Lifetime history of smoking				
Never smoked	1 (15)		1 (75)	
Pipe and/or cigars no cigarettes	3.82(17)	++		
Pipe and/or cigars and cigarettes	9.09(206)	+++		
Handrolled cigarettes only	18.05(32)	+++		
Handrolled and manufactured cigarettes	12.87(159)	+++		
Manufactured cigarettes only	9.27(385)	+++	4.75(530)	+++
Between group chi-squared(5 or 1 d.f.)	120.3	***	114.3	***
13B				
Time last smoked manufactured cigarettes				
At admission	1 (207)		1 (244)	
1-3 years before	1.81(121)	++	2.08(206)	+++
5-10 years before	0.43(28)	--	0.65(54)	
Earlier	0.32(29)	---	0.28(26)	---
Never smoked	0.10(15)	---	0.22(75)	---
Between group chi-squared(4 d.f.)	138.8	***	175.3	***
13C				
Number of manufactured cigarettes smoked per day at time of heaviest smoking				
0	1 (19)		1 (83)	
1-17	3.55(44)	+++	2.62(151)	+++
18-27	7.96(130)	+++	5.28(222)	+++
28+	8.52(207)	+++	6.90(149)	+++
Between group chi-squared(3 d.f.)	94.4	***	148.8	***
Trend chi-squared(1 d.f.)	78.3	+++	141.7	+++
13D				
Age of starting to smoke				
Up to 14	1 (139)		1 (78)	
15-19	0.85(185)		0.61(248)	
20-24	0.70(47)		0.72(106)	
25+	0.34(11)	--	0.48(97)	-
Between group chi-squared(3 d.f.)	8.94	*	9.58	*
Trend chi-squared(1 d.f.)	8.47	--	7.13	--

..Continued

13E
Time of switch from plain to filter cigarettes

Plain at admission	1 (54)	1 (22)	
Switched to filter <10 years before	1.21(46)	1.62(44)	
Smoked filter since >10 years before	1.04(101)	1.31(157)	
Between group chi-squared(3 d.f.)	0.17	2.33	
Trend chi-squared(1 d.f.)	0.00	0.04	
Plain 5 years before admission	1 (113)	1 (81)	
Switched to filter <15 years before	1.43(92)	1.32(73)	
Smoked filter since >15 years before	1.03(110)	0.96(276)	
Between group chi-squared(2 d.f.)	3.47	2.10	
Trend chi-squared(1 d.f.)	0.00	0.33	
Plain 10 years before admission	1 (161)	1 (112)	
Switched to filter <20 years before	1.11(88)	1.48(103)	
Smoked filter since >20 years before	1.01(83)	0.95(236)	
Between group chi-squared(2 d.f.)	0.25	3.17	
Trend chi-squared(1 d.f.)	0.12	0.29	

13F
Tar band

At admission : 0-16 mg	1 (38)	1 (85)	
17-22 mg	0.91(156)	1.04(145)	
5 years before : 0-22 mg	1 (190)	1 (335)	
23-28 mg	1.23(114)	1.04(82)	
10 years before : 17-22 mg	1 (96)	1 (209)	
23-28 mg	1.11(60)	0.94(86)	
29+ mg	1.21(143)	0.89(91)	
Trend chi-squared	0.48	0.46	

13G
Carbon Monoxide

3 years before : - 15 mg	1 (49)	1 (42)	
> 15 mg	0.52(38)	1.40(79)	
10 years before : - 15 mg	1 (69)	1 (86)	
> 15 mg	0.72(142)	0.78(160)	

13H
Reason for giving up in last 5 years

Still smoking at admission	1 (201)	1 (239)	
Gave up because of symptoms	1.30(50)	2.22(94)	++
general health	1.53(40)	1.20(50)	
other	1.71(36)	1.84(78)	+
Between group chi-squared(3 d.f.)	4.64	17.1	***

See Volume 1 Section 3.3 for key to layout.

TABLE 14

ASSOCIATION OF CHRONIC BRONCHITIS WITH MAIN SMOKING VARIABLES

	Males R(N)	P	Females R(N)	P
14A Lifetime history of smoking				
Never smoked	1 (25)		1 (105)	
Pipe and/or cigars no cigarettes	1.20(8)			
Pipe and/or cigars and cigarettes	2.56(113)	++		
Handrolled cigarettes only	5.74(21)	+++		
Handrolled and manufactured cigarettes	3.23(92)	+++		
Manufactured cigarettes only	2.82(276)	+++	2.79(333)	+++
Between group chi-squared(5 or 1 d.f.)	33.7	***	46.8	***
14B Time last smoked manufactured cigarettes				
At admission	1 (127)		1 (172)	
1-3 years before	1.05(52)		0.85(70)	
5-10 years before	0.89(48)		1.01(51)	
Earlier	0.65(49)		0.51(40)	-
Never smoked	0.33(25)	---	0.29(105)	---
Between group chi-squared(4 d.f.)	20.6	***	55.95	***
14C Number of manufactured cigarettes smoked per day at time of heaviest smoking				
0	1 (31)		1 (111)	
1-17	2.16(50)	+	1.93(98)	
18-27	1.96(72)	+	3.12(125)	
28+	2.75(148)	+++	4.53(104)	
Between group chi-squared(3 d.f.)	18.4	***	63.4	***
Trend chi-squared(1 d.f.)	17.5	+++	62.9	+++
14D Age of starting to smoke				
Up to 14	1 (99)		1 (60)	
15-19	0.84(136)		1.13(160)	
20-24	0.63(35)		0.56(49)	
25+	0.18(6)	--	0.70(62)	
Between group chi-squared(3 d.f.)	7.86	*	9.14	*
Trend chi-squared(1 d.f.)	6.59	-	4.20	-

..Continued

14E
Time of switch from plain to filter cigarettes

Plain at admission	1 (41)		1 (15)
Switched to filter <10 years before	1.32(41)		1.27(33)
Smoked filter since >10 years before	0.45(39)	-	1.04(107)
Between group chi-squared(3 d.f.)	13.6	**	0.36
Trend chi-squared(1 d.f.)	8.79	--	0.03
Plain 5 years before admission	1 (93)		1 (47)
Switched to filter <15 years before	0.63(48)		1.42(56)
Smoked filter since >15 years before	0.39(37)	--	0.77(129)
Between group chi-squared(2 d.f.)	12.1	**	3.86
Trend chi-squared(1 d.f.)	12.0	---	1.69
Plain 10 years before admission	1 (137)		1 (81)
Switched to filter <20 years before	0.45(41)	--	1.60(55)
Smoked filter since >20 years before	0.53(33)	-	0.79(116)
Between group chi-squared(2 d.f.)	10.4	**	4.78
Trend chi-squared(1 d.f.)	7.09	--	1.27

14F
Tar band

At admission :	0-16 mg	1 (22)		1 (60)
	17-22 mg	1.51(92)		0.81(96)
5 years before :	0-22 mg	1 (88)		1 (190)
	23-28 mg	2.02(92)	++	0.78(46)
10 years before :	17-22 mg	1 (49)		1 (119)
	23-28 mg	2.09(37)		0.81(42)
	29+ mg	1.82(127)	+	0.97(69)
Trend chi-squared		5.71	+	0.11

14G
Carbon Monoxide

3 years before :	- 15 mg	1 (12)		1 (20)
	> 15 mg	0.21(8)		0.85(24)
10 years before :	- 15 mg	1 (42)		1 (52)
	> 15 mg	0.85(112)		0.79(108)

14H
Reason for giving up in last 5 years

Still smoking at admission	1 (123)		1 (166)
Gave up because of symptoms	1.31(39)		1.57(49)
general health	1.07(18)		1.34(27)
other	0.54(8)		0.58(16)
Between group chi-squared(3 d.f.)	3.45		6.45

See Volume 1 Section 3.3 for key to layout.

TABLE 15

ASSOCIATION OF ISCHAEMIC HEART DISEASE - AGE 35-54
WITH MAIN SMOKING VARIABLES

	Males R(N)	P	Females R(N)	P
15A				
Lifetime history of smoking				
Never smoked	1 (46)		1 (69)	
Pipe and/or cigars no cigarettes	0.73(4)			
Pipe and/or cigars and cigarettes	2.42(122)	+++		
Handrolled cigarettes only	2.56(12)			
Handrolled and manufactured cigarettes	2.42(58)	++		
Manufactured cigarettes only	1.63(161)	+	2.13(231)	+++
Between group chi-squared(5 or 1 d.f.)	19.1	***	16.7	***
15B				
Time last smoked manufactured cigarettes				
At admission	1 (94)		1 (166)	
1-3 years before	1.27(40)		0.84(41)	
5-10 years before	0.68(14)		0.56(16)	
Earlier	0.50(13)		0.41(8)	
Never smoked	0.56(46)	-	0.41(69)	---
Between group chi-squared(4 d.f.)	10.9	*	23.6	***
15C				
Number of manufactured cigarettes smoked per day at time of heaviest smoking				
0	1 (50)		1 (70)	
1-17	0.79(15)		1.28(51)	
18-27	1.51(49)		2.55(92)	+++
28+	1.96(93)	++	3.02(87)	+++
Between group chi-squared(3 d.f.)	13.0	**	31.2	***
Trend chi-squared(1 d.f.)	10.6	++	29.2	+++
15D				
Age of starting to smoke				
Up to 14	1 (34)		1 (46)	
15-19	0.99(100)		0.69(115)	
20-24	0.94(22)		0.54(36)	
25+	0.63(5)		0.63(34)	
Between group chi-squared(3 d.f.)	0.93		2.04	
Trend chi-squared(1 d.f.)	0.51		0.15	

..Continued

15E
Time of switch from plain to filter cigarettes

Plain at admission	1 (9)		1 (13)	
Switched to filter <10 years before	6.40(20)	++	0.22(22)	
Smoked filter since >10 years before	2.78(64)	+	0.23(128)	
Between group chi-squared(3 d.f.)	11.7	**	6.05	*
Trend chi-squared(1 d.f.)	4.83	+	0.20	
Plain 5 years before admission	1 (31)		1 (29)	
Switched to filter <15 years before	1.56(46)		0.54(50)	
Smoked filter since >15 years before	1.27(57)		0.54(119)	
Between group chi-squared(2 d.f.)	1.13		2.95	
Trend chi-squared(1 d.f.)	1.09		1.83	
Plain 10 years before admission	1 (49)		1 (41)	
Switched to filter <20 years before	1.02(51)		1.12(59)	
Smoked filter since >20 years before	1.01(43)		0.89(103)	
Between group chi-squared(2 d.f.)	0.02		0.45	
Trend chi-squared(1 d.f.)	0.01		0.22	

15F
Tar band

At admission : 0-16 mg	1 (20)	1 (51)	
17-22 mg	0.66(71)	1.55(103)	
5 years before : 0-22 mg	1 (90)	1 (156)	
23-28 mg	1.01(33)	1.38(33)	
10 years before : 17-22 mg	1 (49)	1 (87)	
23-28 mg	1.37(28)	1.07(43)	
29+ mg	1.07(58)	1.11(40)	
Trend chi-squared	0.01	0.21	

15G
Carbon Monoxide

3 years before : - 15 mg	1 (2)	1 (15)	
> 15 mg	0.58(4)	1.01(28)	
10 years before : - 15 mg	1 (23)	1 (39)	
> 15 mg	1.01(51)	0.98(75)	

15H
Reason for giving up in last 5 years

Still smoking at admission	1 (91)	1 (159)	
Gave up because of symptoms	1.88(15)	0.73(14)	
general health	1.82(21)	1.34(19)	
other	0.75(9)	0.51(12)	
Between group chi-squared(3 d.f.)	3.98	2.97	

See Volume 1 Section 3.3 for key to layout.

TABLE 16

ASSOCIATION OF ISCHAEMIC HEART DISEASE - AGE 55-74
WITH MAIN SMOKING VARIABLES

	Males R(N)	P	Females R(N)	P
16A				
Lifetime history of smoking				
Never smoked	1 (51)		1 (156)	
Pipe and/or cigars no cigarettes	0.83(21)			
Pipe and/or cigars and cigarettes	0.83(112)			
Handrolled cigarettes only	1.00(6)			
Handrolled and manufactured cigarettes	1.30(31)			
Manufactured cigarettes only	0.91(168)		1.30(232)	
Between group chi-squared(5 or 1 d.f.)	2.11		2.78	
16B				
Time last smoked manufactured cigarettes				
At admission	1 (69)		1 (121)	
1-3 years before	1.80(30)		0.73(37)	
5-10 years before	1.14(19)		0.74(38)	
Earlier	1.55(50)		0.55(36)	-
Never smoked	1.37(51)		0.60(156)	--
Between group chi-squared(4 d.f.)	4.84		9.71	*
16C				
Number of manufactured cigarettes smoked per day at time of heaviest smoking				
0	1 (54)		1 (159)	
1-17	0.86(40)		1.03(98)	
18-27	0.90(51)		1.65(77)	+
28+	1.11(74)		2.82(54)	+++
Between group chi-squared(3 d.f.)	1.41		16.0	**
Trend chi-squared(1 d.f.)	0.35		13.5	+++
16D				
Age of starting to smoke				
Up to 14	1 (51)		1 (29)	
15-19	0.73(73)		1.36(94)	
20-24	0.71(24)		0.83(49)	
25+	0.98(20)		1.26(60)	
Between group chi-squared(3 d.f.)	2.41		2.12	
Trend chi-squared(1 d.f.)	0.03		0.03	

..Continued

16E
Time of switch from plain to filter cigarettes

Plain at admission		1 (11)		1 (12)
Switched to filter	<10 years before	4.30(16)		1.35(28)
Smoked filter since	>10 years before	3.16(40)		1.32(73)
Between group chi-squared(3 d.f.)		9.07	*	0.53
Trend chi-squared(1 d.f.)		5.86	+	0.07
Plain 5 years before admission		1 (27)		1 (31)
Switched to filter	<15 years before	2.07(30)		0.86(33)
Smoked filter since	>15 years before	2.10(42)	+	1.42(98)
Between group chi-squared(2 d.f.)		6.12	*	1.70
Trend chi-squared(1 d.f.)		4.61	+	1.11
Plain 10 years before admission		1 (49)		1 (56)
Switched to filter	<20 years before	1.25(30)		0.83(35)
Smoked filter since	>20 years before	1.29(30)		0.98(89)
Between group chi-squared(2 d.f.)		0.98		0.30
Trend chi-squared(1 d.f.)		0.92		0.00

16F
Tar band

At admission :	0-16 mg	1 (18)		1 (42)
	17-22 mg	0.37(47)	-	0.76(69)
5 years before :	0-22 mg	1 (64)		1 (124)
	23-28 mg	0.62(28)		0.68(31)
10 years before :	17-22 mg	1 (39)		1 (70)
	23-28 mg	0.16(10)	---	0.83(38)
	29+ mg	0.86(48)		0.75(53)
Trend chi-squared		12.6	**	0.98

16G
Carbon Monoxide

3 years before :	- 15 mg	1 (2)		1 (3)
	> 15 mg	7.65(5)		3.17(7)
10 years before :	- 15 mg	1 (15)		1 (34)
	> 15 mg	1.67(49)		1.35(57)

16H
Reason for giving up in last 5 years

Still smoking at admission		1 (67)		1 (117)
Gave up because of	symptoms	0.82(5)		0.91(17)
	general health	2.16(23)		0.70(17)
	other	0.98(7)		0.71(17)
Between group chi-squared(3 d.f.)		4.39		1.59

See Volume 1 Section 3.3 for key to layout.

TABLE 17

ASSOCIATION OF 'STROKE' WITH MAIN SMOKING VARIABLES

	Males R(N)	P	Females R(N)	P
17A				
Lifetime history of smoking				
Never smoked	1 (60)		1 (231)	
Pipe and/or cigars no cigarettes	1.13(23)			
Pipe and/or cigars and cigarettes	1.48(112)			
Handrolled cigarettes only	1.03(12)			
Handrolled and manufactured cigarettes	1.06(48)			
Manufactured cigarettes only	1.05(201)		1.10(272)	
Between group chi-squared(5 or 1 d.f.)	5.56		0.41	
17B				
Time last smoked manufactured cigarettes				
At admission	1 (112)		1 (184)	
1-3 years before	0.66(31)		0.46(30)	--
5-10 years before	0.52(18)		0.49(28)	-
Earlier	0.76(40)		0.37(30)	---
Never smoked	0.80(60)		0.65(231)	--
Between group chi-squared(4 d.f.)	5.22		20.2	***
17C				
Number of manufactured cigarettes smoked per day at time of heaviest smoking				
0	1 (64)		1 (238)	
1-17	0.83(39)		0.88(111)	
18-27	0.88(61)		1.40(112)	
28+	1.23(97)		0.90(42)	
Between group chi-squared(3 d.f.)	2.62		6.09	
Trend chi-squared(1 d.f.)	0.88		0.63	
17D				
Age of starting to smoke				
Up to 14	1 (62)		1 (36)	
15-19	0.92(101)		1.03(125)	
20-24	0.56(21)		0.68(56)	
25+	0.95(14)		0.52(53)	
Between group chi-squared(3 d.f.)	3.47		9.22	*
Trend chi-squared(1 d.f.)	1.13		8.03	--

..Continued

17E
Time of switch from plain to filter cigarettes

Plain at admission	1 (33)	1 (21)	
Switched to filter <10 years before	0.74(23)	1.93(30)	
Smoked filter since >10 years before	0.73(51)	1.32(124)	
Between group chi-squared(3 d.f.)	2.28	2.63	
Trend chi-squared(1 d.f.)	1.39	0.08	
Plain 5 years before admission	1 (61)	1 (39)	
Switched to filter <15 years before	0.72(33)	1.15(44)	
Smoked filter since >15 years before	0.68(44)	1.08(125)	
Between group chi-squared(2 d.f.)	3.10	0.44	
Trend chi-squared(1 d.f.)	3.10	0.08	
Plain 10 years before admission	1 (81)	1 (60)	
Switched to filter <20 years before	0.72(33)	1.11(42)	
Smoked filter since >20 years before	0.82(32)	1.15(121)	
Between group chi-squared(2 d.f.)	1.68	0.66	
Trend chi-squared(1 d.f.)	1.25	0.65	

17F
Tar band

At admission : 0-16 mg	1 (12)	1 (44)		
17-22 mg	1.43(87)	1.67(119)		
5 years before : 0-22 mg	1 (72)	1 (153)		
23-28 mg	1.36(57)	1.20(44)		
10 years before : 17-22 mg	1 (36)	1 (95)		
23-28 mg	1.33(25)	1.25(50)		
29+ mg	1.88(76)	1.00(50)		
Trend chi-squared	4.99	+	0.00	

17G
Carbon Monoxide

3 years before : - 15 mg	1 (10)	1 (14)		
> 15 mg	0.55(11)	1.42(21)		
10 years before : - 15 mg	1 (31)	1 (42)		
> 15 mg	0.77(60)	0.78(74)		

17H
Reason for giving up in last 5 years

Still smoking at admission	1 (108)	1 (179)	
Gave up because of symptoms	0.89(12)	0.29(10)	--
general health	0.61(16)	0.71(13)	
other	0.45(9)	0.46(15)	-
Between group chi-squared(3 d.f.)	4.77	11.3	*

See Volume 1 Section 3.3 for key to layout.

TABLE 18

RELATIVE RISK (R) OF INDEX DISEASES FOR FILTER COMPARED WITH PLAIN MANUFACTURED CIGARETTE SMOKERS FOR SMOKING HABITS AS DETERMINED AT VARIOUS TIME POINTS (standardised for age and number of cigarettes smoked at relevant time point) TOGETHER WITH NUMBER OF PLAIN AND FILTER CASES (NP1, NF1) AND CONTROLS (NP2, NF2)

Sex	Years before admission		Index Disease: Lung Cancer	Chronic Bronchitis	IHD 35-54	IHD 55-74	Stroke
				--			
Male	3 years	R	1.20	0.50	1.83	1.90	0.64
		NP1	105	70	22	23	47
		NF1	207	93	105	69	85
		NP2	73	36	33	42	37
		NF2	140	102	86	65	93
				--		+	
	5 years	R	1.19	0.49	1.37	1.99	0.67
		NP1	112	92	30	27	61
		NF1	202	84	102	71	77
		NP2	87	51	35	49	52
		NF2	143	101	93	64	94
				--			
	10 years	R	1.09	0.51	1.03	1.29	0.73
		NP1	161	135	48	49	81
		NF1	171	74	92	60	65
		NP2	123	80	46	62	75
		NF2	132	96	92	58	85
					-		
Female	3 years	R	1.09	1.04	0.27	1.41	1.14
		NP1	62	33	23	21	35
		NF1	348	174	175	125	165
		NP2	37	23	4	21	32
		NF2	192	117	138	93	137
	5 years	R	1.02	0.91	0.51	1.18	1.15
		NP1	81	45	29	31	39
		NF1	349	184	169	130	168
		NP2	48	26	11	27	38
		NF2	200	120	141	102	140
	10 years	R	1.07	0.95	0.96	0.93	1.16
		NP1	111	79	41	55	60
		NF1	339	170	162	124	162
		NP2	67	47	29	42	58
		NF2	202	113	125	105	139

N.B. Subjects who have ever smoked pipes, cigars or handrolled cigarettes excluded.

Key: +++,--- $p<0.001$; ++,-- $p<0.01$; +,- $p<0.05$
Plus signs indicate plain > filter, minus signs the reverse.

TABLE 19

RELATIVE RISK (R) OF INDEX DISEASES BY LIFETIME FILTER/PLAIN SMOKING HABITS FOR THOSE SMOKING MANUFACTURED CIGARETTES 3 YEARS BEFORE ADMISSION REGARDLESS OF WHETHER THEY SUBSEQUENTLY GAVE UP (standardised for age and number of cigarettes smoked 3 years before admission) TOGETHER WITH NUMBER OF CASES (N1) AND CONTROLS (N2)

Sex	Lifetime filter/plain smoking habits		Lung Cancer	Chronic Bronchitis	Index Disease IHD 35-54	IHD 55-74	Stroke
Male	Always plain *	R	1.00	1.00	1.00	1.00	1.00
		N1	105	70	22	23	47
		N2	73	36	33	42	37
	Switched to filter up to 10 years before admission	R	1.13	0.80	2.96 +	2.02	0.47
		N1	47	36	21	16	22
		N2	28	22	10	14	24
	Switched to filter more than 10 years before admission	R	1.09	0.43 --	1.69	1.68	0.56
		N1	125	49	65	42	40
		N2	88	64	57	44	54
	Always filter	R	1.48	0.25 --	1.78	2.67	1.60
		N1	35	8	19	11	23
		N2	24	16	19	7	15
	Never filter *	R	1.00	1.00	1.00	1.00	1.00
	Ever filter	R	1.20	0.50 --	1.83	1.90	0.64
	Ever plain	R	1.00	1.00	1.00	1.00	1.00
	Never plain	R	1.48	0.45	1.05	1.85	1.62

* Smoking habits less than 3 years before admission in which interview occurred ignored so that always plain and never filter include some subjects who switched to filter in this period.

N.B. Subjects who have ever smoked pipes, cigars or handrolled cigarettes excluded.

Key: +++,--- $p<0.001$; ++,-- $p<0.01$; +,- $p<0.05$

TABLE 19 (cont/d)

RELATIVE RISK (R) OF INDEX DISEASES BY LIFETIME FILTER/PLAIN SMOKING HABITS FOR THOSE SMOKING MANUFACTURED CIGARETTES 3 YEARS BEFORE ADMISSION REGARDLESS OF WHETHER THEY SUBSEQUENTLY GAVE UP (standardised for age and number of cigarettes smoked 3 years before admission) TOGETHER WITH NUMBER OF CASES (N1) AND CONTROLS (N2)

Sex	Lifetime filter/plain smoking habits		Index Disease: Lung Cancer	Chronic Bronchitis	IHD 35-54	IHD 55-74	Stroke
Female	Always plain *	R	1.00	1.00	1.00	1.00	1.00
		N1	62	33	23	21	35
		N2	37	23	4	21	32
	Switched to filter up to 10 years before admission	R	1.04	1.47	0.18 -	1.02	1.32
		N1	44	30	17	22	22
		N2	23	14	23	14	15
	Switched to filter more than 10 years before admission	R	1.41	1.16	0.39 -	1.55	1.14
		N1	170	83	85	52	65
		N2	69	40	54	36	51
	Always filter	R	0.85	0.75	0.24 -	1.32	0.95
		N1	134	61	73	51	78
		N2	100	63	61	43	71
	Never filter *	R	1.00	1.00	1.00	1.00	1.00
	Ever filter	R	1.09	1.04	0.27 -	1.41	1.14
	Ever plain	R	1.00	1.00	1.00	1.00	1.00
	Never plain	R	0.66 -	0.64	0.77	0.98	0.91

* Smoking habits less than 3 years before admission in which interview occurred ignored so that always plain and never filter include some subjects who switched to filter in this period.

N.B. Subjects who have ever smoked pipes, cigars or handrolled cigarettes excluded.

Key: +++,--- $p<0.001$; ++,-- $p<0.01$; +,- $p<0.05$

TABLE 20

RELATIVE RISK (R) OF LUNG CANCER BY LIFETIME FILTER/PLAIN SMOKING HABITS AS IN TABLE 19 EXCEPT (a) EXCLUDING THOSE PREVIOUSLY HOSPITALIZED OR WITH SYMPTOMS OF CHRONIC BRONCHITIS OR (b) INCLUDING SMOKERS OF PRODUCTS OTHER THAN MANUFACTURED CIGARETTES

Lifetime filter/plain smoking habits		Analysis (a) Male	Analysis (a) Female	Analysis (b) Male
Always plain	R	1.00	1.00	1.00
	N1	27	12	178
	N2	18	7	97
Switched to filter up to 10 years before admission	R	0.56	N.E.	0.87
	N1	12	6	88
	N2	6	1	50
Switched to filter more than 10 years before admission	R	0.87	1.69	0.79
	N1	32	31	200
	N2	22	9	135
Always filter	R	1.40	1.53	0.83
	N1	15	29	53
	N2	10	16	40
Never filter	R	1.00	1.00	1.00
Ever filter	R	0.96	1.35	0.85
Ever plain	R	1.00	1.00	1.00
Never plain	R	1.87	0.58	1.03

N.E. Not estimated due to small numbers

TABLE 21

NUMBERS OF MARRIED HOSPITAL IN-PATIENTS COMPLETING PASSIVE SMOKING QUESTIONNAIRE

	Male	Female	Total
Lung Cancer	547	245	792
Chronic Bronchitis	182	84	266
Ischaemic Heart Disease	286	221	507
Stroke	161	137	298
Controls			
Class 1A and 1B +	839	713	1552
Class 2A and 2B +	268	149	417
Total	2283	1549	3832

+ Other diseases were classified by degree of smoking association - class 1A: definitely not, class 1B: probably not, class 2A: probably, class 2B: definitely; the detail is described on page 11.

TABLE 22

RELATIONSHIP BETWEEN SPOUSE'S MANUFACTURED CIGARETTE SMOKING AND RISK OF LUNG CANCER AMONG NEVER SMOKERS (STANDARDIZED FOR AGE)

Sex of Patient	Source of data	Spouse did not smoke		Spouse smoked		Relative risk (95% limits)
		Cases	Controls*	Cases	Controls*	
Smoking during whole of marriage						
Male	Follow-up(a)	5	13	5	13	1.01(0.23-4.41)
Female	"	5	16	19	38	1.60(0.44-5.78)
Combined	"	10	29	24	51	1.33(0.50-3.48)
Male	Hospital(b)	7	15	5	7	1.53(0.37-6.34)
Female	"	9	17	8	20	0.75(0.24-2.40)
Combined	"	16	32	13	27	1.00(0.41-2.44)
Male	Both(c)	7	16	8	14	1.30(0.38-4.39)
Female	"	10	21	22	45	1.00(0.37-2.71)
Combined	"	17	37	30	59	1.11(0.51-2.39)
Smoking during year of hospital interview						
Male	Follow-up(a)	8	15	2	11	0.36(0.06-2.19)
Female	"	18	43	6	11	1.32(0.40-4.34)
Combined	"	26	58	8	22	0.87(0.33-2.27)
Male	Hospital(b)	10	16	2	6	0.59(0.10-3.62)
Female	"	13	31	4	6	1.48(0.37-5.89)
Combined	"	23	47	6	12	1.03(0.35-3.05)
Male	Both(c)	12	19	3	11	0.44(0.10-3.05)
Female	"	24	53	8	13	1.36(0.50-3.73)
Combined	"	36	72	11	24	0.93(0.41-2.09)

* Only controls included in follow-up study considered.

(a) Based on interviews of the spouse in follow-up study (114 patients).

(b) Based on interviews of the index patient in hospital (88 patients).

(c) Based on both sources of information (143 patients) counting the spouse as a smoker if reported to be so by the spouse or the index patient. The 59 patients for whom information on spouse smoking was available from both sources are incuded in all 3 analyses.

TABLE 23

CONCORDANCE BETWEEN SPOUSE'S MANUFACTURED CIGARETTE SMOKING HABITS AS REPORTED DIRECTLY AND INDIRECTLY

	Sex of patient/case control status				
	Male Cases	Male Controls	Female Cases	Female Controls	Total
Spouse a smoker sometime in marriage according to:					
Subject and spouse	2	6	5	13	26
Only subject	1	0	0	3	4
Only spouse	1	1	3	0	5
Neither	3	11	1	9	24
% subject/spouse agreement	71%	94%	67%	88%	85%
Spouse a smoker during year of hospital interview according to:					
Subject and spouse	1	6	2	4	13
Only subject	0	0	0	1	1
Only spouse	1	0	0	0	1
Neither	5	12	7	20	44
% subject/spouse agreement	86%	100%	100%	96%	97%

TABLE 24

RELATIONSHIP BETWEEN VARIOUS INDICES OF PASSIVE SMOKE EXPOSURE AND RISK OF LUNG CANCER AMONG NEVER SMOKERS (STANDARDISED FOR AGE AND, FOR SPOUSE SMOKING, WHETHER THE MARRIAGE WAS ONGOING OR ENDED)

Passive smoke exposure index /level	Male patients			Female patients			Sexes combined		
	Cases	Controls	R	Cases	Controls	R	Cases	Controls	R
At home									
Not at all	9	101	1	21	192	1	30	293	1
Little	2	21	1.22	6	65	0.92	8	86	0.98
Average/a lot	1	11	1.11	5	61	0.81	6	72	0.86
At work									
Not at all	3	40	1	12	113	1	15	153	1
Little	6	29	3.24	3	26	1.18	9	55	1.82
Average/a lot	1	29	0.46	0	19	0.0	1	48	0.19
During travel									
Not at all	8	101	1	28	238	1	36	339	1
Little	3	16	2.06	2	51	0.33	5	67	0.64
Average/a lot	0	13	0.00	0	13	0.00	0	26	0.00
						Trend (negative) $p<0.05$			
During leisure									
Not at all	3	45	1	15	116	1	18	161	1
Little	4	48	1.12	14	107	1.05	18	155	1.06
Average/a lot	5	39	3.18	2	95	0.18	7	134	0.59
						Trend (negative) $p<0.05$			
Combined index*									
Score 0-1	1	27	1	10	75	1	11	102	1
Score 2-4	7	55	4.34	5	61	0.63	12	116	1.08
Score 5-12	2	15	3.20	0	21	0.00	2	36	0.50
Spouse smoked man.cigs. in last 12 months									
No	10	105	1	20	193	1	30	298	1
Yes	2	29	0.96	11	122	0.76	13	151	0.79
Spouse smoked man.cigs. in whole of marriage									
No	7	93	1	13	89	1	20	182	1
Yes	5	40	2.47	19	229	0.55	24	269	0.80

* Based on sum of 0 = not at all, 1 = little, 2 = average, 3 = a lot for at home, at work, during travel, during leisure.

TABLE 25

RELATIONSHIP BETWEEN TWO INDICES OF PASSIVE SMOKE EXPOSURE AND RISK OF CHRONIC BRONCHITIS, ISCHAEMIC HEART DISEASE AND STROKE AMONG NEVER SMOKERS (STANDARDISED FOR AGE AND, FOR SPOUSE SMOKING, WHETHER THE MARRIAGE WAS ONGOING OR ENDED)

Passive smoke exposure index /level	Male patients			Female patients			Sexes combined		
	Cases	Controls	R	Cases	Controls	R	Cases	Controls	R
Chronic bronchitis									
Combined index*									
Score 0-1	1	27	1	7	75	1	8	102	1
Score 2-4	2	55	0.83	4	61	1.05	6	116	1.00
Score 5-12	1	15	1.90	1	21	1.03	2	36	1.30
Spouse smoked man.cigs. in whole of marriage									
No	8	93	1	4	89	1	12	182	1
Yes	1	40	0.34	13	229	1.22	14	269	0.83
Ischaemic heart disease									
Combined index*									
Score 0-1	15	27	1	23	75	1	38	102	1
Score 2-4	12	55	0.43	9	61	0.59	21	116	0.52
Score 5-12	3	15	0.43	4	21	0.81	7	36	0.61
Spouse smoked man.cigs. in whole of marriage									
No	26	93	1	22	89	1	48	182	1
Yes	15	40	1.24	55	229	0.93	70	269	1.03
Stroke									
Combined index*									
Score 0-1	5	27	1	19	75	1	24	102	1
Score 2-4	10	55	1.24	10	61	0.86	20	116	0.97
Score 5-12	4	15	1.77	7	21	2.44	11	36	2.18
Spouse smoked man.cigs. in whole of marriage									
No	18	93	1	19	89	1	37	182	1
Yes	6	40	0.84	49	229	0.92	55	269	0.90

* Based on sum of 0 = not at all, 1 = little, 2 = average, 3 = a lot for at home, at work, during travel, during leisure.

TABLE 26

RELATIVE ODDS OF HAVING PASSIVE SMOKE EXPOSURE AT HOME ACCORDING TO PATIENT'S OWN MANUFACTURED CIGARETTE SMOKING HABITS (STANDARDISED FOR AGE: BASE - COMBINED CLASS 1 AND 2 CONTROLS)

Own smoking habits	Relative odds (95% confidence limits) Male	Female
Never	1	1
Ex	1.25(0.86-1.81)	1.26(0.86-1.85)
Current	4.00(2.67-5.98)	2.51(1.74-3.62)
Chi-squared for trend (2 d.f.)	57.81	25.34
p	<0.001	<0.001

TABLE 27

VARIATION IN STRENGTH OF ASSOCIATION BETWEEN 3 INDICES OF PASSIVE SMOKE EXPOSURE AND RISK OF LUNG CANCER (LC) AND CHRONIC BRONCHITIS (CB) IN MALES AFTER ADJUSTMENT FOR VARIOUS CONFOUNDING FACTORS (ADDITIONAL TO AGE)

Chi-squared statistic +

Additional confounding factors included (see section 6.3 for definition)	Combined index		Spouse current smoker ++		Spouse ever smoked ++	
	LC	CB	LC	CB	LC	CB
None	37.3	23.7	33.2	20.4	31.8	9.6
D	35.3	21.9	30.7	16.8	31.0	7.2
S	36.2	24.4	32.9	19.7	31.5	9.2
D,S	34.2	21.7	30.8	15.8	30.9	6.7
SM	24.9	20.2	22.5	16.2	20.6	6.2
SM,HR	24.0	19.1	21.9	15.2	19.6	5.4
SM,MC	21.9	17.0	15.3	13.0	14.9	4.7
SM,HR,MC	21.6	15.6	15.5	12.5	14.6	4.2
SM,NC	19.9	15.7	17.9	14.0	17.2	5.3
SM,MC,NC	18.0	11.0	10.4	10.1	9.7	3.3
SM,HR,MC,NC	16.4	9.6	9.0	6.9	7.8	1.5
SM,MC,NC,ST	17.0	8.6	9.5	8.1	9.3	3.1
SM,HR,MC,NC,ST	17.0	8.5	7.6	5.5	6.5	1.1

+ For combined exposure index, chi-squared for trend on 3 d.f., for other indices on 1 d.f.

++ Smoker of manufactured cigarettes - ever smoked is during marriage.

APPENDIX I

A copy of the questionnaire used can be found in the following pages.

RSGB LIMITED, CROWN HOUSE, LONDON ROAD, MORDEN, SURREY. SM4 5DT. TEL: 01.540.8991

HOSPITAL INPATIENTS STUDY

"CASE" PATIENTS

J.N. | 5 | 3 | 3 | 2 | (1-4)

(5-8) | 0 | (9)

| 1 | 4 | (10-11)

SKIP COLS 12-40

(a) UNIT NUMBER (i.e. PATIENT'S NO. AT THE HOSPITAL) ..... (41-50)

(b) DATE OF ADMISSION

DAY		MONTH		YEAR		(51-56)

(c) NAME OF HOSPITAL .....

.....

OFFICE USE ONLY

					(57-61)

(d) NAME OF WARD ..... (62-66)

(e) SEX OF PATIENT → MALE 1, FEMALE 2 (67)

(f) PATIENT'S DATE OF BIRTH

DAY		MONTH		YEAR		(68-73)

(g) PATIENT'S AGE GROUP → 35-44: 1, 45-54: 2, 55-64: 3, 65-74: 4 (74)

(h) PROVISIONAL .....

DIAGNOSIS .....

OFFICE USE ONLY

		(75-76)

(i) PATIENT'S "CASE" CODE → ..... (77-78)

(j) CLASSIFICATION OF NURSING DEPENDENCY OF PATIENT

1	2	3	4	(79)

(k) ALSO ASK NURSING STAFF TO INDICATE WHETHER THE PATIENT IS IN NORMAL CIRCUMSTANCES (i.e. PRIOR TO PRESENT ADMISSION) DISABLED FROM WALKING BY ANY CONDITION OTHER THAN HEART OR LUNG DISEASE. IF YES, CODE 1.

1	(80)

(l) UNIT NUMBER OF "CONTROL" PATIENT PAIRED WITH THIS "CASE".

.....

FOR USE BY PUNCH CARD OPERATOR ONLY	COLS 1-4 PUNCH 5332 COLS 5-9 PUNCH FROM COLS 5-9 OVERLEAF COL 10 PUNCH X

"CASE" PATIENTS - ADDITIONAL CHECKS

1. CHECK ON DIAGNOSIS

(a) *Main Diagnosis (11 - 14)

..... | | | | |

(b) *Other Significant Diseases Present (15 - 18)

..... | | | | |

..... (19 - 22) | | | | |

..... (23 - 26) | | | | |

..... (27 - 30) | | | | |

* Complication(s) should not be inserted, but the 'underlying' disease(s) should be specified.

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(c) Final Allocation (31)

'Case' patient .....

Remains as originally entered	1
Transfer to 'Control'	3
Transfer to Lung Cancer	6
Transfer to Chronic Bronchitis	7
Transfer to Ischaemic Heart Disease	8
Transfer to Stroke	9

2. AMENDMENTS TO MEDICAL RECORD DETAILS SHOWN OVERLEAF

If any of the following details have been entered incorrectly overleaf, please write in correct information below:

UNIT NUMBER ..... (32-41)
(i.e. PATIENT'S NUMBER AT THE HOSPITAL)

DATE OF ADMISSION (42-47)

DAY		MONTH		YEAR	

PATIENT'S DATE OF BIRTH (48-53)

DAY		MONTH		YEAR	

SKIP COLS. 54 - 59

3. HISTOLOGY - LUNG CANCER PATIENTS ONLY

Was diagnosis confirmed by histology? YES / NO (Delete as appropriate)

IF YES: Summarise report: ..... (60-64)

..... | | | | | |

.....

.....

Source of specimen: (Histology code allows for 4 digit M Code of ICD-O and differentiation code)

(65)

Cytology	1
Biopsy	2
Resection	3
Autopsy	4

FOR USE BY PUNCH CARD OPERATOR ONLY	COLS 66-76 SKIP COLS 77-78 PUNCH FROM COLS 77-78 OVER-LEAF

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HOSPITAL INPATIENTS STUDY

"CONTROL" PATIENTS

J.N. 5 3 3 2 (1-4)

(5-8) 0 (9)

6 5 (10-11)

SKIP COLS 12-40

(a) UNIT NUMBER (i.e. PATIENT'S NO. AT THE HOSPITAL) ..... (41-50)

(b) DATE OF ADMISSION

DAY		MONTH		YEAR		
						(51-56)

(c) NAME OF HOSPITAL .....

.....

OFFICE USE ONLY

(57-61)

(d) NAME OF WARD ..... (62-66)

(e) SEX OF PATIENT → MALE 1, FEMALE 2 (67)

(f) PATIENT'S DATE OF BIRTH

DAY		MONTH		YEAR		
						(68-73)

(g) PATIENT'S AGE GROUP → 35-44: 1, 45-54: 2, 55-64: 3, 65-74: 4 (74)

(h) PROVISIONAL .....

DIAGNOSIS .....

OFFICE USE ONLY (75-76)

(i) CODE FOR PAIRED "CASE" → ..... (77-78)

(j) CLASSIFICATION OF NURSING DEPENDENCY OF PATIENT 1 2 3 4 (79)

(k) ALSO ASK NURSING STAFF TO INDICATE WHETHER THE PATIENT IS IN NORMAL CIRCUMSTANCES (i.e. PRIOR TO PRESENT ADMISSION) DISABLED FROM WALKING BY ANY CONDITION OTHER THAN HEART OR LUNG DISEASE. IF "YES", CODE 1. 1 (80)

(l) UNIT NUMBER OF "CASE" PATIENT FOR WHOM THE PRESENT PATIENT IS A "CONTROL" .....

FOR USE BY PUNCH CARD OPERATOR ONLY	COLS. 1-4 PUNCH 5332 COLS. 5-9 PUNCH FROM COLS. 5-9 OVERLEAF COL. 10 PUNCH Y

"CONTROL" PATIENTS - ADDITIONAL CHECKS

1. CHECK ON DIAGNOSIS

(a) *Main Diagnosis

..... (11 - 14) [ ][ ][ ][ ]

(b) *Other Significant Diseases Present

..... (15 - 18) [ ][ ][ ][ ]

..... (19 - 22) [ ][ ][ ][ ]

..... (23 - 26) [ ][ ][ ][ ]

..... (27 - 30) [ ][ ][ ][ ]

* Complication(s) should not be inserted, but the 'underlying' disease(s) should be specified.

OFFICE USE ONLY

(c) Final Allocation

'Control' patient ..... (31)

Remains as originally allocated	4
Transfer to Lung Cancer	6
Transfer to Chronic Bronchitis	7
Transfer to Ischaemic Heart Disease	8
Transfer to Stroke	9

2. AMENDMENTS TO MEDICAL RECORD DETAILS SHOWN OVERLEAF

If any of the following details have been entered incorrectly overleaf, please write in correct information below:

	DATE OF ADMISSION			PATIENT'S DATE OF BIRTH		
	DAY	MONTH	YEAR	DAY	MONTH	YEAR
UNIT NUMBER ..... (32-41)	[ ][ ]	[ ][ ]	[ ][ ] (42-47)	[ ][ ]	[ ][ ]	[ ][ ] (48-53)

(i.e. PATIENT'S NUMBER AT THE HOSPITAL)

SKIP COLS. 54 - 59

3. HISTOLOGY - LUNG CANCER PATIENTS ONLY

Was diagnosis confirmed by histology? YES / NO (Delete as appropriate)

IF YES: Summarise report:.....

..... (60-64) [ ][ ][ ][ ][ ]

.....

.....

(Histology code allows for 4 digit M Code of ICD-O and differentiation code)

Source of Specimen: (65)

Cytology	1
Biopsy	2
Resection	3
Autopsy	4

FOR USE BY PUNCH CARD OPERATOR ONLY	COLS 66-76 SKIP COLS 77-78 PUNCH FROM COLS 77-78 OVERLEAF COLS 79-80 SKIP

"CASE" QUESTIONNAIRE

UNIT NUMBER (i.e. PATIENT'S NO. AT THE HOSPITAL) .....

INTRODUCTION

I work for Research Surveys of Great Britain Limited. I am helping a leading medical investigator to carry out a survey on hospital patients, to find out how health is related to various living conditions and other factors such as environment, smoking and drinking. We would be grateful for your help in our survey.

First of all I would like to ask you some questions about yourself and your family.

DUP COLS 1-9
COL. 10 = 2

CODE

Q.1 Are you .....

READ OUT

	CODE (11)
SINGLE	1
MARRIED	2
WIDOWED	3
DIVORCED OR SEPARATED	4

Q.2 How tall are you ?

(DISREGARD FRACTIONS OF AN INCH)

WRITE IN EXACT HEIGHT → (12) (13-14)

.....ft ....ins

Q.3(a) How much did you weigh just before your present admission to hospital ? WRITE IN → (15-16) (17-18)

.....st ....lbs

(b) And what was your weight at the age of 20 ? WRITE IN → (19-20) (21-22)

.....st ....lbs

(c) And what is the most you have ever weighed ? WRITE IN → (23-24) (25-26)

.....st ....lbs

Q.4 BY OBSERVATION ONLY

CODE ETHNIC GROUP OF RESPONDENT (SEE INSTRUCTIONS) (27)

WHITE	1
NON-WHITE	2
NOT SURE	3

Q.5 Now some questions about the different places you have lived in throughout your life.

(a) Firstly, what is your present home address?

(b) And at which address were you born?
(IF BORN IN HOSPITAL, RECORD ADDRESS OF PARENTS AT THAT TIME)

(c) At which address did you live for most of your childhood, that is up to the age of 15?

(d) Considering now the whole of your life, at which address have you lived longest altogether?

PERIOD OF LIFE	FULL POSTAL ADDRESS	OFFICE USE ONLY
(a) Present home address		
(b) Place of birth		(28-29)
(c) Childhood		(30-33)
(d) Longest altogether		(34-37)

Q.6 Is your mother alive?

IF YES - (a) How old is she now?

IF NO - (b) How old was she when she died?

(c) Could you tell me what she died from?

Q.7 Is your father alive?

IF YES - (a) How old is he now?

IF NO - (b) How old was he when he died?

(c) Could you tell me what he died from?

RECORD ANSWERS IN GRID BELOW

	ALIVE	DEAD	IF ALIVE - AGE NOW IF DEAD - AGE AT DEATH (Write in)	IF DEAD - CAUSE OF DEATH (Write in)	OFFICE USE ONLY
Q.6 - MOTHER (38)	1	2	(39-40)..... years		(41)
Q.7 - FATHER (42)	1	2	(43-44)..... years		(45)

Q.8 How many brothers and sisters do you have, including any now alive and any that may have died ? Please exclude any step-brothers or sisters, and any half-brothers or sisters.

(46)

ENTER NUMBER ⟶ ☐
(IF NIL, WRITE '0' AND GO TO Q11)

LIST BROTHER(S)/SISTER(S) IN GRID BELOW, STARTING WITH THE ELDEST ON THE FIRST LINE AND WORKING DOWN TO THE YOUNGEST (EXCLUDING THE RESPONDENT, OF COURSE).

THEN ASK

Q.9 Are you (i.e. THE RESPONDENT) a twin/triplet etc ?

IF YES - Which of your brothers or sisters, living or deceased, are you a twin/triplet of ?

FOR EACH BROTHER AND SISTER IN TURN, ASK:

Q.10 Is ..... (NAME) alive ?

IF YES - (a) How old is he/she now ?

IF NO - (b) How old was he/she at death ?

(c) Could you tell me what he/she died from ?

} RECORD ANSWERS IN GRID BELOW

SIBLING NUMBER (ENTER FIRST NAME FOR EASE OF REFERENCE)	BROTHER OR SISTER ? B R O T H E R / S I S T E R	Q.9 - CODE 3 IF RESPONDENT IS TWIN/TRIPLET OF THIS BROTHER OR SISTER.	Q.10- ALIVE OR DEAD ? A L I V E / D E A D	(a) IF ALIVE - AGE NOW (b) IF DEAD - AGE AT DEATH (write in)	(c) IF DEAD - CAUSE OF DEATH (write in)	OFFICE USE ONLY
1 (Eldest)	(47) 1 2	(48) 3	(49) 4 5	(50-51) ..... years		(52) ☐
2	(53) 1 2	(54) 3	(55) 4 5	(56-57) ..... years		(58) ☐
3	(59) 1 2	(60) 3	(61) 4 5	(62-63) ..... years		(64) ☐
4	(65) 1 2	(66) 3	(67) 4 5	(68-69) ..... years		(70) ☐
5	(71) 1 2	(72) 3	(73) 4 5	(74-75) ..... years		(76) ☐
6	A B	C	D E	..... years		
7	A B	C	D E	..... years		
8	A B	C	D E	..... years		
9	A B	C	D E	..... years		
10	A B	C	D E	..... years		
11	A B	C	D E	..... years		

☐☐☐☐ (77-80)

INTERVIEWER NOTES FOR Q's 11 - 20

GENERAL INSTRUCTIONS

Before starting to ask questions an interviewer should instruct subjects to answer simply 'yes' or 'no' to the questions. The actual printed wording should be used for each question. In most cases this should lead to a simple 'yes' or 'no' answer, which should be accepted and recorded. Occasionally the respondent will express doubt about the meaning of the question or the appropriate reply. When this happens further probing will be needed. Repetition of the question is usually sufficient. Some guidance for dealing with the commoner difficulties is given below. When, after a brief explanation, doubt remains about whether the answer is 'yes' or 'no', the answer should be recorded as 'no'. An exception should be be made to this rule only if the respondent gives an equivocal answer to the initial question - e.g. Q.18(a): "Still thinking about the past 3 years, have you had any pain or discomfort in your chest ?" Answer: "No, only indigestion." This answer should be recorded as "Yes"; in other words, the respondent's interpretation of his symptoms should be disregarded. Answers such as "occasionally" or "sometimes" should be probed by a question of the type "Does this happen on most occasions?", and the answer then coded.

COMMENTS ON INDIVIDUAL ITEMS

Cough and phlegm

Question 11(a). Count a cough with first smoke or on first going out of doors. Exclude clearing the throat or a single cough.

Question 12(a). Count phlegm with first smoke or on first going out of doors. Exclude phlegm from the nose, count phlegm swallowed.

When night shift workers are interviewed, the words 'on getting up' should be used instead of 'first thing in the morning' in questions 11(a) and 12(a).

With regard to coughing during the day, in question 11(b) an 'occasional' cough may be considered normal and the answer should then be recorded as 'no'. It is impossible to define the limits of 'occasional' accurately, but to provide a rough guide it is suggested that single coughs of a frequency of less than six per day are 'occasional'. On the other hand, in question 12(b) 'occasional' phlegm production from the chest is considered abnormal if it occurs twice or more per day. The interviewer may use any suitable word that accords with local usage provided that it distinguishes phlegm from the chest or throat from pure nasal discharge. Some subjects admit to bringing up phlegm without admitting to coughing. This should be accepted without changing the replies to the questions about cough. A claim that phlegm is coughed from the chest but swallowed counts as a positive reply.

In questions 11(a)/(b) and 12(a)/(b), the word 'usually' should be emphasized. If one of the first two questions about cough (11a,b) or one of those on phlegm (12a,b) is answered clearly 'yes', questions 11(c) and 12(c) should be asked as confirmatory questions, and they should be asked at the point at which they are printed in the questionnaire (as in Example 1, questions 12(a) and 12(b).

Example 1

Q.12(a)	Interviewer:	Do you usually bring up any phlegm from your chest first thing in the morning in the winter ?
	Respondent:	Yes.
Q.12(b)	Interviewer:	Do you usually bring up any phlegm from your chest during the day, or at night, in the winter ?
	Respondent:	Yes, but only a little bit.
Q.12(c)	Interviewer:	Do you bring up phlegm like this on most days for as much as three months each year ?
	Respondent:	No, not as often as that.

The interviewer should record these answers as follows: Question 12(a) Yes, Question 12(b) Yes, Question 12(c) No. If, however, a doubtful answer to question 11(a) or 11(b) or to question 12(a) or 12(b) is obtained (eg. 'yes, sometimes') question 11(c) or 12(c) should be asked immediately as a probing question. If the answer to the probing question is 'no' the answer to the basic question should be recorded as if it had been 'no'. If a subsequent question in the same set receives a definite 'yes' the probing question should be repeated (see Example 2).

Example 2

Q.11(a)	Interviewer:	Do you usually cough first thing in the morning in the winter ?
	Respondent:	Yes, sometimes.
Q.11(c)	Interviewer:	Do you cough like this on most days for as much as three months each year ?
	Respondent:	Oh no, most days.
Q.11(b)	Interviewer:	Do you usually cough during the day or at night, in the winter ?
	Respondent:	Well, from time to time.
	Interviewer:	Do you cough as much as six times a day ?
	Respondent:	Yes, more than that I'd say.
Q.11(c)	Interviewer:	Do you cough like this on most days for as much as three months each year ?
	Respondent:	Well, not every day.
	Interviewer:	More often than not ?
	Respondent:	Yes, I'd say so.

The interviewer should record these answers as follows: Question 11(a) no, Question 11(b) Yes, Question 11(c) Yes. In question 13(a) the word 'increased' should be used only for subjects who have already admitted to some habitual cough and phlegm.

Breathlessness: In order to increase uniformity between surveys carried out at different seasons, it is suggested that the question on breathlessness should refer to the time of the year when breathlessness is at its worst. 'Hurrying' implies walking quickly. If the respondent is disabled from walking by any condition other than heart or lung disease this should be recorded.

Wheezing: If this question is not understood, vocal demonstration of wheezing by the interviewer is often helpful. No distinction is made between those who only wheeze during the day and those who only wheeze at night. The word 'asthma' should not be used.

INTERVIEWER: READ THROUGH THE NOTES ON PAGE 4 VERY CAREFULLY PRIOR TO ASKING Q.11-20.

PREAMBLE: I am going to ask you some questions, mainly about your chest. I should like you to answer YES or NO whenever possible, thinking about what your health was generally like in the past 3 years.

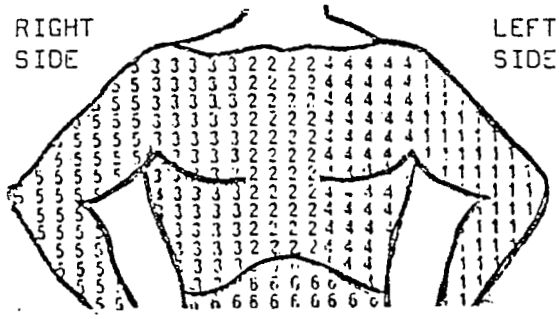
DUP. COLS. 1-9 | COL. 10 = 3

		CODE	ROUTE
	COUGH		
Q.11(a)	Did you usually cough first thing in the morning in the winter ?	(11)	
	YES	1	(b)
	NO	2	
(b)	Did you usually cough during the day - or at night - in the winter ?	(12)	
	YES	1	*
	NO	2	
	* IF YES TO Q.11(a) AND/OR Q.11(b), GO TO Q.11(c) IF NO TO BOTH, GO TO Q.12		
(c)	Did you cough like this on most days for as much as three months each year ?	(13)	
	YES	1	Q.12
	NO	2	
	PHLEGM		
Q.12(a)	Did you usually bring up any phlegm from your chest first thing in the morning in the winter ?	(14)	
	YES	1	(b)
	NO	2	
(b)	Did you usually bring up any phlegm from your chest during the day - or at night - in the winter ?	(15)	
	YES	1	*
	NO	2	
	* IF YES TO Q.12(a) AND/OR Q.12(b), GO TO Q.12(c) IF NO TO BOTH, GO TO Q.13		
(c)	Did you bring up phlegm like this on most days for as much as three months each year ?	(16)	
	YES	1	Q.13
	NO	2	
	PERIODS OF COUGH AND PHLEGM (N8. ONLY INCLUDE THE WORD "INCREASED" IF SUBJECT HAS ANSWERED YES TO BOTH Q's 12(a) AND 12(b))		
Q.13(a)	In the past three years, have you had a period of (increased) cough and phlegm lasting for three weeks or more ?	(17)	
	YES	1	(b)
	IF YES NO	2	Q.14
(b)	Have you had more than one such period ?	(18)	
	YES	1	Q.14
	NO	2	

BREATHLESSNESS

DO NOT ASK Q.14(a) - (c) IF PATIENT IS DISABLED FROM WALKING BY ANY CONDITION OTHER THAN HEART OR LUNG DISEASE - CHECK FRONT PAGE, ITEM (k)

			CODE	ROUTE
Q.14(a)	Still thinking about your health in the past three years, have you been troubled by shortness of breath when hurrying on level ground or walking up a slight hill ?		(19)	
		YES	1	(b)
		NO	2	Q.15
	IF YES			
(b)	Did you get short of breath walking with other people of your own age on level ground ?		(20)	
		YES	1	(c)
		NO	2	Q.15
	IF YES			
(c)	Did you have to stop for breath when walking at your own pace on level ground ?		(21)	
		YES	1	Q.15
		NO	2	
	WHEEZING			
Q.15(a)	In the past three years, has your chest ever sounded wheezing or whistling ?		(22)	
		YES	1	(b)
		NO	2	Q.16
	IF YES		(23)	
(b)	Did you get this on most days or nights ?	YES	1	Q.16
		NO	2	
Q.16(a)	Did you ever have attacks of shortness of breath with wheezing ?		(24)	
		YES	1	(b)
		NO	2	Q.17
	IF YES		(25)	
(b)	Was your breathing absolutely normal between attacks ?	YES	1	Q.17
		NO	2	
	CHEST ILLNESSES			
Q.17(a)	In the past three years, have you had any chest illness which kept you from your usual activities for as much as a week ?		(26)	
		YES	1	(b)
		NO	2	Q.18
	IF YES		(27)	
(b)	Did you bring up more phlegm than usual in any of these illnesses ?	YES	1	(c)
		NO	2	Q.18
	IF YES		(28)	
(c)	Did you have more than one illness like this in those three years ?	YES	1	Q.18
		NO	2	

		CODE	ROUTE
Q.18(a)	Still thinking about the past three years, have you had any pain or discomfort in your chest ?	(29)	
	YES	1	(b)
	NO	2	Q.20
(b)	Did you get it when you walked uphill or hurried ?	(30)	
	YES	1	(c)
	NO	2	Q.19
	NEVER HURRIED OR WALKED UPHILL	3	(c)
(c)	Did you get it when you walked at an ordinary pace on the level ?	(31)	
	YES	1	(d)
	NO	2	
(d)	What did you do if you got it while you were walking ?	(32)	
	STOPPED OR SLOWED DOWN	1	(e)
	CARRIED ON	2	Q.19
	(CODE "STOPPED OR SLOWED DOWN" IF RESPONDENT CARRIED ON AFTER TAKING NITROGLYCERINE OR OTHER INHALANT)		
(e)	If you stood still, what happened to it ?	(33)	
	RELIEVED	1	(f)
	NOT RELIEVED	2	Q.19
(f)	How soon ? Did it go in	(34)	
	READ OUT — 10 MINUTES OR LESS	1	(g)
	MORE THAN 10 MINUTES	2	Q.19
(g)	Will you show me where it was ? PROBE: Did you feel it anywhere else ?		
			
	(i) IF RESPONDENT POINTS TO AN AREA CORRESPONDING TO NO 2 IN THE DIAGRAM CODE 2 HERE →	(35) 2	Q.19
	(ii) IF RESPONDENT POINTS TO BOTH AREA 1 AND AREA 4 CODE 14 HERE →	(36-37) 14	
Q.19	Have you ever had a severe pain across the front of your chest lasting for half an hour or more ?	(38)	
	YES	1	Q.20
	NO	2	

		CODE	ROUTE
Q.20(a)	In the past 3 years, have you had pain in either leg, on walking ?	(39)	
	YES	1	(b)
	NO	2	Q.21
	IF YES		
(b)	Did this pain ever begin when you were standing still or sitting ?	(40)	
	YES	1	Q.21
	NO	2	(c)
(c)	In what part of your leg did you feel it ? (IF CALVES NOT MENTIONED INITIALLY, ASK: "Anywhere else ?")	(41)	
	PAIN INCLUDED CALF/CALVES	1	(d)
	PAIN DID NOT INCLUDE CALF/CALVES	2	Q.21
(d)	Did you get it when you walked uphill or hurried ?	(42)	
	YES	1	(e)
	NO	2	Q.21
	NEVER HURRIED OR WALKED UPHILL	3	(e)
(e)	Did you get it when you walked at an ordinary pace on the level ?	(43)	
	YES	1	(f)
	NO	2	
(f)	Did the pain ever disappear while you were still walking ?	(44)	
	YES	1	Q.21
	NO	2	(g)
(g)	What did you do if you got it when you were walking ?	(45)	
	STOPPED OR SLOWED DOWN	1	(h)
	CARRIED ON	2	Q.21
(h)	What happened to it if you stood still ?	(46)	
	RELIEVED	1	(i)
	NOT RELIEVED	2	Q.21
(i)	How soon ? Did it go in	(47)	
	READ OUT		
	10 MINUTES OR LESS	1	Q.21
	MORE THAN 10 MINUTES	2	

Q.21 Excluding your present illness, have you ever had .....

READ OUT EACH ILLNESS SEPARATELY

	CODE YES	CODE NO		ROUTE
An injury or operation affecting your chest	1	2	(48)	
Heart trouble	1	2	(49)	
Hypertension, that is high blood pressure	1	2	(50)	
Bronchitis	1	2	(51)	
Pneumonia	1	2	(52)	
Pleurisy	1	2	(53)	
Pulmonary tuberculosis, that is TB of the chest	1	2	(54)	
Bronchial asthma	1	2	(55)	
Hay fever	1	2	(56)	
Peptic Ulcer (inc. Gastric or Duodenal Ulcer)	1	2	(57)	
Hernia (in groin)	1	2	(58)	
Diabetes	1	2	(59)	

ASK ALL WOMEN AGED UNDER 60:

Q.22 (a) Have you ever been on the contraceptive pill ?

	(60)	
YES	1	(b)
NO	2	Q.23

IF YES

(b) For approximately how long altogether have you taken the pill ? If there has been any interval when you were off the pill, please do not include that time in the figure you give me.

	(61)	
LESS THAN 6 MONTHS	1	
6 MONTHS, BUT LESS THAN 1 YEAR	2	
1 YEAR	3	
2 YEARS	4	
3 YEARS	5	
4 YEARS	6	
5 YEARS	7	
6 YEARS	8	
7 YEARS	9	
8 YEARS	0	
9 YEARS	X	
10 YEARS +	A	

ASK ALL WOMEN AGED UNDER 60

Q.23 (a) I would now like to ask you about the menopause. (GIVE RESPONDENT CARD 'A'). Using this card, please tell me which phrase best describes yourself.

	(62)	
PAST	1	(b)
GOING THROUGH	2	(b)
STARTING	3	(b)
NOT YET STARTING	4	Q.24
OTHER MEDICAL CONDITIONS INFLUENCING THE MENOPAUSE (Code and specify)	5	Q.24
.....		

IF PAST/GOING THROUGH/STARTING, ASK:

(b) Have you had any hormone treatment prescribed in relation to the menopause ?

	(63)	
YES	1	
NO	2	

PUNCHER: GO TO PAGE 10

OFFICE USE ONLY	COLS. 1 - 9	DUPLICATE FROM CARD 1
	COL. 10 =	3
	COLS. 11-14 =	PNKL

QUESTIONS A - L ON PAGES 9(a) AND 9(b) ARE TO BE ASKED OF CASE PATIENTS AND THEIR MATCHING CONTROL PATIENTS IN THE FOLLOWING CATEGORIES ONLY:

(REFER TO ITEM (i) ON FRONT YELLOW/GREEN PAGE)

1, 5, 8, 10, 12, 23, 24, 27

PLEASE ENTER ANSWERS IN THE BOXES PROVIDED, USING BOTH DIGITS (e.g. 4 = 04)
IF 'NONE' OR 'NEVER', ENTER '00'.

ROUND ANSWERS TO THE NEAREST WHOLE NUMBER (e.g. $2\frac{1}{4}$ = 02, $2\frac{3}{4}$ = 03) BUT ROUND UP FOR $\frac{1}{2}$ (e.g. $2\frac{1}{2}$ = 03).

CODE

A. Now some questions about various items of food and drink. Firstly, before your present admission to hospital, how many pints of milk did you drink on average each day, including milk taken with tea or coffee or with breakfast cereals as well as the amount you drink?

(ENTER '00' IF LESS THAN HALF A PINT PER DAY) → (15 - 16) [ ][ ]

B. Before your present admission to hospital, how many times a week did you eat cheese?

(ENTER '00' IF LESS OFTEN THAN ONCE A WEEK) → (17 - 18) [ ][ ]

C. Before your present admission to hospital, how many eggs (excluding eggs used in baking) did you eat per week?

(ENTER '00' IF LESS OFTEN THAN ONE A WEEK) → (19 - 20) [ ][ ]

D. Before your present admission to hospital, how many ounces of butter and margarine (in total) did you eat per week, excluding that used in cooking?

(ENTER '00' IF LESS THAN ONE OUNCE PER WEEK) → (21 - 22) [ ][ ]

E. (i) Before your present admission to hospital, how many times a month did you eat liver, excluding liver pate and liver sausage?

(ENTER '00' IF LESS THAN ONCE A MONTH) → (23 - 24) [ ][ ]

(ii) IF ATE LIVER AT LEAST ONCE A MONTH BEFORE PRESENT ADMISSION TO HOSPITAL.

What sort did you normally eat? (25)

CALVES	1
LAMBS	2
OX	3
PIGS	4
OTHER	5

	CODE	ROUTE
F. Before your present admission to hospital, how many times a month did you eat liver pate or liver sausage? (ENTER '00' IF LESS THAN ONCE A MONTH) →	(26 - 27)	
G. Before your present admission to hospital, how many times a week did you eat carrots? (ENTER '00' IF LESS THAN ONCE A WEEK) →	(28 - 29)	
H. Before your present admission to hospital, how many times a week did you eat green vegetables? (ENTER '00' IF LESS THAN ONCE A WEEK) →	(30 - 31)	
I. Before your present admission to hospital, did you take vitamin pills or fish liver oil tablets?	(32)	
YES	1	ASK J - L
NO	2	Q.24
IF YES		
J. What was your main brand of vitamin pills or fish liver oil tablets? WRITE IN:- ..... ,,.....	(33 - 35)	
K. How many did you take per day? (ENTER '00' IF LESS THAN ONCE A DAY) →	(36 - 37)	
L. How long had you been taking them? WRITE IN →	(38-39) YRS. (40-41) MTHS.	

PUNCHER - RE-COMMENCE AT COL. 42 ON PAGE 26

ASK ALL

Q.24 Now some questions about your drinking of tea, coffee or alcohol.

(a) Before your present admission to hospital, how many cups of tea did you drink per day as a rule ?

(b) And how many cups of coffee did you drink per day as a rule ?

	TEA	COFFEE
	(64)	(65)
NONE	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6 - 7	6	6
8 - 12	7	7
13 - 17	8	8
18 - 22	9	9
23 - 27	X	X
28+	A	A

Q.25 Before your present admission to hospital, about how often did you take an alcoholic drink ? Would you say it was .....

READ OUT

	CODE	ROUTE
	(66)	
MOST DAYS	1	Q.26
3 OR 4 DAYS A WEEK	2	
ONCE OR TWICE A WEEK	3	
LESS OFTEN THAN THAT	4	Q.27
NOT AT ALL	5	

IF ONCE A WEEK OR MORE, ASK:

Q.26 During an average week, before your present admission to hospital,

(a) How many single measures of whisky, gin, brandy or other spirits did you have ?

(b) How many glasses of wine, sherry, port or similar drinks did you have ?

(c) How many half-pints of beer, lager, stout or cider did you have ?

AMOUNTS PER WEEK	(a) SINGLE MEASURES Spirits	(b) GLASSES Wine/Sherry/ Port/Other	(c) HALF-PINTS Beer/Lager/ Stout/Cider
	(67)	(68)	(69)
NONE	0	0	0
1 - 2	1	1	1
3 - 7	2	2	2
8 - 12	3	3	3
13 - 17	4	4	4
18 - 22	5	5	5
23 - 27	6	6	6
28 - 32	7	7	7
33 - 37	8	8	8
38 - 42	9	9	9
43 - 82	X	X	X
83+	A	A	A

ASK ALL

Q.27 Now some questions about your working life and the different jobs you have had.

		CODE
		(70)
(a) At what age did you leave school ?	13 OR UNDER	1
	14	2
	15	3
FULL-TIME EDUCATION DOES NOT INCLUDE APPRENTICESHIPS OR ARTICLED CLERKSHIPS	16	4
	17	5
	18	6
	19	7
	20	8
	21	9
	22 OR OVER	0

(b) Did you receive any other full-time education after this ?

(tick box)

YES ☐ ⟶ ASK (c)

NO ☐ ⟶ Q.28

IF YES

(c) At what age did you finish this full-time education ?		(71)
	13 OR UNDER	1
	14	2
	15	3
	16	4
	17	5
	18	6
	19	7
	20	8
	21	9
	22 OR OVER	0

Q.28 Did you have a paid job, just prior to your present admission to hospital ?

		(72)
CODE AS UNEMPLOYED IF LOST JOB BECAUSE OF GOING INTO HOSPITAL THIS TIME	YES, FULL-TIME JOB (30 hrs +)	1
	YES, PART-TIME JOB (5-29 hrs)	2
	NO, RETIRED	3
	NO, UNEMPLOYED	4
	NO, OTHERS (STUDENTS, HOUSEWIVES, ETC)	5

Q.29(a) For how many years in total have you worked/did you work since you finished your full-time education? Please include any periods of military service.

WRITE IN NUMBER OF YEARS ⟶

(b) How many of these have been in a full-time job (30 hrs+ per week)?

WRITE IN NUMBER OF YEARS FULL-TIME ⟶

(c) And how many in a part-time job (5-29 hrs per week)?

WRITE IN NUMBER OF YEARS PART-TIME ⟶

IF NIL, WRITE IN '00' AT (a)/(b)/(c) AS APPROPRIATE. EXCLUDE ANY YEARS IN PART-TIME JOBS IF RESPONDENT ALSO HELD FULL-TIME JOB SIMULTANEOUSLY.

ASK ALL WHO HAVE EVER WORKED FULL-TIME/PART-TIME

Q.30 What kind of work have you done for the longest time, not necessarily with the same employer?

OBTAIN FULL DETAILS OF JOB THAT RESPONDENT HAS DONE LONGEST, TYPE OF ORGANISATION(S) AND END-PRODUCTS, AND HIGHEST POSITION REACHED. ALSO ASCERTAIN WHETHER RESPONDENT WAS SELF-EMPLOYED AT ANY TIME IN THIS "LONGEST" JOB (TICK APPROPRIATE BOX).

(NOTE THERE MAY BE MORE THAN ONE KIND OF ORGANISATION/INDUSTRY IN WHICH RESPONDENT HAS WORKED IN THIS KIND OF JOB)

(a) OCCUPATION (Job title and brief description)

.....

.....

(b) INDUSTRY/ORGANISATION (Type(s) and end-products)

.....

.....

(c) HIGHEST POSITION REACHED (Manager, foreman, etc.)

.....

.....

(d) TICK BOX IF RESPONDENT WAS SELF-EMPLOYED AT ANY TIME IN THIS "LONGEST" JOB

☐

CODE
(73-74)
(75-76)
(77-78)
SKIP COLS. 79-80
DUP. COLS. 1-9
COL. 10=4

(11) (12) (13

(14)

☐

	CODE	ROUTE
Q.31 Have you ever worked in a dusty job ?	(15)	
YES	1	Q.32
NO	2	

Q.32 Have you ever worked in any of the following ?
(READ OUT EACH IN TURN AND CODE IN GRID BELOW - ASK "For how many years altogether ?" WHERE APPROPRIATE)

	NO	YES							
		UNDER 1 YEAR	1-2 YEARS	3-5 YEARS	6-10 YEARS	11-15 YEARS	16-20 YEARS	21+ YEARS	
IN A COALMINE	0	1	2	3	4	5	6	7	(16)
IN ANY OTHER MINE	0	1	2	3	4	5	6	7	(17)
IN A QUARRY	0	1	2	3	4	5	6	7	(18)
IN A FOUNDRY	0	1	2	3	4	5	6	7	(19)
IN A POTTERY	0	1	2	3	4	5	6	7	(20)
IN A COTTON, FLAX OR HEMP MILL	0	1	2	3	4	5	6	7	(21)
WITH ASBESTOS	0	1	2	3	4	5	6	7	(22)
IN ANY OTHER DUSTY JOB (SPECIFY).....	0	1	2	3	4	5	6	7	(23)

Q.33(a) During your work, have you ever been exposed regularly to irritating gas or chemical fumes ? (24)

YES	1	(b)
NO	2	Q.34

IF YES

(b) Approximately for how many years ? (25)

UNDER 1 YEAR	1
1 - 2 YEARS	2
3 - 5 YEARS	3
6 - 10 YEARS	4
11 - 15 YEARS	5
16 - 20 YEARS	6
21+ YEARS	7

ASK ALL

Q.34 IS RESPONDENT THE HEAD OF HOUSEHOLD ? (26)

YES	1
NO	2

Q.35 CURRENT OCCUPATION OF HEAD OF HOUSEHOLD

(if retired, give details of last occupation prior to retirement; if widow/separated/divorced give details of last known occupation of deceased/ex husband; if unemployed, give details of last occupation).

(a) OCCUPATION (Job title and brief description) (27-29)

.....

.....

(b) INDUSTRY/ORGANISATION (Type(s) and end-products) (30)

.....

.....

(c) TICK APPROPRIATE BOX IF HEAD OF HOUSEHOLD IS:

SELF-EMPLOYED	MANAGER	FOREMAN/SUPERVISOR
☐	☐	☐

		CODE	ROUTE
	ASK ALL		
	Finally, I would like to ask you some questions about smoking.		
Q.36(a)	Do you smoke a pipe ?	(31)	
	YES	1	(b)
	NO	2	(b)
(b)	Have you ever smoked a pipe at least once a day, for as long as a year ?	(32)	
	YES	1	(c)
	NO	2	Q.37
	IF YES		
(c)	At what age did you first smoke a pipe regularly ? By "regularly" I mean at least one pipe a day for as long as a year.	(33)	
	14 YEARS OF AGE, OR UNDER	1	
	15 - 19 YEARS OF AGE	2	
	20 - 24 YEARS OF AGE	3	
	25 - 29 YEARS OF AGE	4	
	30 - 39 YEARS OF AGE	5	
	40 YEARS OF AGE, OR OVER	6	
(d)	Were you still smoking a pipe regularly before your present admission to hospital ?	(34)	
	YES	1	(f)
	NO	2	(e)
(e)	What age were you when you last smoked a pipe regularly ?	(35)	
	19 YEARS OF AGE, OR UNDER	1	
	20 - 24 YEARS OF AGE	2	
	25 - 29 YEARS OF AGE	3	
	30 - 34 YEARS OF AGE	4	
	35 - 39 YEARS OF AGE	5	
	40 - 44 YEARS OF AGE	6	
	45 - 49 YEARS OF AGE	7	
	50 - 54 YEARS OF AGE	8	
	55 - 59 YEARS OF AGE	9	
	60 - 64 YEARS OF AGE	0	
	65 - 69 YEARS OF AGE	X	
	70 YEARS OF AGE, OR OVER	A	
(f)	How many ounces of tobacco did you smoke in a pipe in an average week then ?	(35)	
	LESS THAN ½ OZ	1	
	½ OZ, BUT LESS THAN 1 OZ	2	
	1 OZ, BUT LESS THAN 1½ OZS	3	
	1½ OZS, BUT LESS THAN 2 OZS	4	
	2 OZS, BUT LESS THAN 2½ OZS	5	
	2½ OZS, BUT LESS THAN 3 OZS	6	
	3 OZS, BUT LESS THAN 4 OZS	7	
	4 OZS, BUT LESS THAN 5 OZS	8	
	5 OZS, BUT LESS THAN 6 OZS.	9	
	6 OZS, BUT LESS THAN 7 OZS	0	
	7 OZS, BUT LESS THAN 8 OZS	X	
	8 OZS OR MORE	A	
(g)	Using this card (GIVE RESPONDENT CARD '8') please tell me which one of the phrases best describes the way you then smoked a pipe.	(37)	
	HOLD THE SMOKE IN YOUR MOUTH ONLY	1	
	TAKE THE SMOKE TO THE BACK OF YOUR THROAT	2	
	TAKE THE SMOKE PARTLY INTO YOUR CHEST	3	
	OR TAKE THE SMOKE RIGHT INTO YOUR CHEST	4	

		CODE	ROUTE
Q.37(a)	Do you smoke as much as one cigar or miniature cigar a week ?	(38)	
	YES	1	(b)
	NO	2	(b)
(b)	Have you ever smoked a cigar or miniature cigar at least once a week, for as long as a year ?	(39)	
	YES	1	(c)
	NO	2	Q.38
	IF YES		
(c)	At what age did you first smoke cigars regularly ? By "regularly" I mean at least one cigar or miniature cigar a week for as long as a year.	(40)	
	14 YEARS OF AGE, OR UNDER	1	
	15 - 19 YEARS OF AGE	2	
	20 - 24 YEARS OF AGE	3	
	25 - 29 YEARS OF AGE	4	
	30 - 39 YEARS OF AGE	5	
	40 YEARS OF AGE, OR OVER	6	
(d)	Were you still smoking cigars or miniature cigars <u>regularly</u> before your present admission to hospital ?	(41)	
	YES	1	(f)
	NO	2	(e)
(e)	What age were you when you last smoked cigars or miniature cigars <u>regularly</u> ?	(42)	
	19 YEARS OF AGE, OR UNDER	1	
	20 - 24 YEARS OF AGE	2	
	25 - 29 YEARS OF AGE	3	
	30 - 34 YEARS OF AGE	4	
	35 - 39 YEARS OF AGE	5	
	40 - 44 YEARS OF AGE	6	
	45 - 49 YEARS OF AGE	7	
	50 - 54 YEARS OF AGE	8	
	55 - 59 YEARS OF AGE	9	
	60 - 64 YEARS OF AGE	0	
	65 - 69 YEARS OF AGE	X	
	70 YEARS OF AGE, OR OVER	A	
(f)	How many cigars or miniature cigars were you smoking in a average week then ?	(43)	
	1	1	
	2	2	
	3 - 7	3	
	8 - 12	4	
	13 - 17	5	
	18 - 22	6	
	23 - 27	7	
	28 - 42	8	
	43 - 57	9	
	58 - 82	0	
	83 - 117	X	
	118+	A	
(g)	Using this card (GIVE RESPONDENT CARD 'B') please tell me which one of the phrases best describes the way you then smoked cigars.	(44)	
	HOLD THE SMOKE IN YOUR MOUTH ONLY	1	
	TAKE THE SMOKE TO THE BACK OF YOUR THROAT	2	
	TAKE THE SMOKE PARTLY INTO YOUR CHEST	3	
	OR TAKE THE SMOKE RIGHT INTO YOUR CHEST	4	

		CODE	ROUTE
Q.39(a)	Do you smoke hand-rolled cigarettes ?	(45)	
	YES	1	(b)
	NO	2	(b)
(b)	Have you ever smoked at least one hand-rolled cigarette a day, for as long as a year ?	(46)	
	YES	1	(c)
	NO	2	Q.39
	IF YES		
(c)	At what age did you first smoke hand-rolled cigarettes regularly ? By "regularly" I mean at least one hand-rolled cigarette a day for as long as a year.	(47)	
	14 YEARS OF AGE, OR UNDER	1	
	15 - 19 YEARS OF AGE	2	
	20 - 24 YEARS OF AGE	3	
	25 - 29 YEARS OF AGE	4	
	30 - 39 YEARS OF AGE	5	
	40 YEARS OF AGE, OR OVER	6	
(d)	Were you still smoking hand-rolled cigarettes <u>regularly</u> before your present admission to hospital ?	(48)	
	YES	1	(f)
	NO	2	(e)
(e)	What age were you when you last smoked hand-rolled cigarettes <u>regularly</u> ?	(49)	
	19 YEARS OF AGE, OR UNDER	1	
	20 - 24 YEARS OF AGE	2	
	25 - 29 YEARS OF AGE	3	
	30 - 34 YEARS OF AGE	4	
	35 - 39 YEARS OF AGE	5	
	40 - 44 YEARS OF AGE	6	
	45 - 49 YEARS OF AGE	7	
	50 - 54 YEARS OF AGE	8	
	55 - 59 YEARS OF AGE	9	
	60 - 64 YEARS OF AGE	0	
	65 - 69 YEARS OF AGE	X	
	70 YEARS OF AGE, OR OVER	A	
(f)	How many hand-rolled cigarettes were you smoking in an average day then ?	(50)	
	1 - 2	1	
	3 - 7	2	
	8 - 12	3	
	13 - 17	4	
	18 - 22	5	
	23 - 27	6	
	28 - 32	7	
	33 - 37	8	
	38 - 42	9	
	43 - 47	0	
	48 OR MORE	X	
(g)	Using this card (GIVE RESPONDENT CARD '8'), please tell me which one of the phrases best describes the way you then smoked hand-rolled cigarettes.	(51)	
	HOLD THE SMOKE IN YOUR MOUTH ONLY	1	
	TAKE THE SMOKE TO THE BACK OF YOUR THROAT	2	
	TAKE THE SMOKE PARTLY INTO YOUR CHEST	3	
	OR TAKE THE SMOKE RIGHT INTO YOUR CHEST	4	

	CODE	ROUTE
Q.39(a) Do you smoke manufactured cigarettes ?	(52)	
YES	1	(b)
NO	2	(b)
(b) Have you ever smoked at least one manufactured cigarette a day for as long as a year ?	(53)	
YES	1	(c)
NO	2	Q.51
IF YES		
(c) At what age did you first smoke manufactured cigarettes regularly ? By "regularly" I mean at least one cigarette a day for as long as a year.	(54-55)	
WRITE IN EXACT AGE ——→		
(d) Were you still smoking manufactured cigarettes regularly before your present admission to hospital ?	(56)	
YES	1	Q.40
NO	2	(e)
(e) What age were you when you last smoked manufactured cigarettes regularly ?	(57-58)	
WRITE IN EXACT AGE ——→		
(f) Why did you give up smoking manufactured cigarettes regularly ? PROBE: Any other reasons ?	(59)	
DO NOT PROMPT		
BECAUSE OF PRICE/TOO EXPENSIVE	1	
BECAUSE OF SYMPTOMS THAT RESPONDENT THINKS ARE ASSOCIATED WITH SMOKING, SUCH AS SMOKER'S COUGH, PHLEGM OR SHORTNESS OF BREATH	2	
FOR GENERAL REASONS OF HEALTH, BUT RESPONDENT NOT APPARENTLY UNHEALTHY AT THE TIME	3	
ON DOCTOR'S ADVICE	4	
DIDN'T ENJOY THEM ANY MORE/LOST TASTE FOR THEM	5	
PREFERRED A PIPE/CIGARS/HAND-ROLLED CIGARETTES	6	
FOR SOCIAL REASONS/ON ADVICE OF FAMILY OR FRIENDS	7	
BECAUSE OF ANTI-SMOKING PUBLICITY	8	
BECAUSE THEY WERE IN SHORT SUPPLY (e.g DURING THE WAR)	9	
OTHER REASONS (WRITE IN AND CODE)	0	
.....	(60)(61)	
.....		
.....	(62)(63)	
.....		

		CODE	ROUTE
Q.40(a)	Has there ever been a time when the manufactured cigarettes you smoked were <u>mainly</u> PLAIN?	(64)	
	YES	1	(b)
	NO	2	Q.41
	<u>IF YES</u>:		
(b)	Were you smoking <u>mainly</u> PLAIN cigarette brands before your present admission to hospital (at the time you last smoked regularly - IF "NO" AT Q.39(d))?	(65)	
	YES	1	Q.41
	<u>IF NO</u>: NO	2	(c)
(c)	At what age did you change from smoking <u>mainly</u> PLAIN to <u>mainly</u> FILTER cigarettes?	(66-67)	
	WRITE IN EXACT AGE ——→	.....	
	(IF CHANGED MORE THAN ONCE, TAKE THE MOST RECENT CHANGE)		
(d)	And how did it come about that you changed from smoking <u>mainly</u> PLAIN to <u>mainly</u> FILTER? PROBE: Any other reasons?	(68)	
	DO NOT PROMPT — BECAUSE OF PRICE OR COUPONS	1	
	BECAUSE OF TRYING TO REDUCE SYMPTOMS THAT RESPONDENT THINKS ARE ASSOCIATED WITH SMOKING, SUCH AS SMOKER'S COUGH, PHLEGM OR SHORTNESS OF BREATH	2	
	FOR GENERAL REASONS OF HEALTH, BUT RESPONDENT NOT APPARENTLY UNHEALTHY AT THE TIME	3	
	TRIED THEM AND LIKED THEM	4	
	MILDER TASTE/LESS BITTER	5	
	'CLEAN SMOKE'/ENDS STAYED FIRM/DIDN'T GET SOGGY/DIDN'T BURN LIPS/DIDN'T LEAVE BITS OF TOBACCO IN MOUTH	6	
	THEY WERE POPULAR/FASHIONABLE/EVERYONE WAS CHANGING	7	
	BECAUSE OF THEIR LOWER TAR LEVEL/LESS HARMFUL	8	
	THOUGHT IT WOULD HELP ME TO STOP SMOKING/CUT DOWN	9	
	BECAUSE OF PUBLICITY AGAINST PLAIN CIGARETTES/ANTI-SMOKING PUBLICITY	0	
	BECAUSE OF THEIR AVAILABILITY/DIFFICULT TO GET PLAIN CIGARETTES	X	
	OTHER REASONS (WRITE IN AND CODE)	A	
	.....	(69)(70)	
	.....	(71)(72)	
	.....		
	.....	SKIP 73-80	

QUESTIONS 41 AND 42 ARE ASKED ONLY OF CURRENT SMOKERS (i.e. Q.39d = 'YES') OF MANUFACTURED CIGARETTES.

EX-SMOKERS (i.e. Q.39d = 'NO') GO TO Q.43 AND 44.

I am now going to ask you some questions about a number of aspects of the way you smoked manufactured cigarettes. I am trying to build up a history to cover your whole smoking life, that is the period when you started smoking up until your present admission to hospital. To do this, I am going to ask you to cast your mind back to try to remember what you were doing at various ages in your life.

Q.41(a) First of all, how many manufactured cigarettes were you smoking a day on average about the time you came into hospital ?

(b) And how many a day on average about 1 year before your present admission to hospital ?

(c) ..... about 3 years before ?

(d) ..... about 5 years before ?

(e) ..... about 10 years before ?

(f) IF AGED 45 OR OVER ..... about 15 years before ?

(g) IF AGED 50 OR OVER ..... about 20 years before ?

(h) IF AGED 40 OR OVER ..... when you were aged 25 ?

(i) ..... when you were aged 20 ?

(j) ..... when you were aged 16 ?

(k) ..... at that time in your life when your cigarette smoking was at its heaviest ?

Q.42 And now I would like you to tell me for some of the years we have been talking about, what was the <u>single</u> brand you then smoked <u>most often</u>.

GO THROUGH THE SEQUENCE OF YEARS AS FOR Q.41, BUT ONLY GOING BACK TO THE TIME 10 YEARS BEFORE THE RESPONDENT CAME INTO HOSPITAL.

(a) What was the brand you smoked <u>most often</u> about the time you came into hospital ?

LOOK UP THE NAME MENTIONED BY RESPONDENT ON YOUR "BRAND LIST". IF THERE IS MORE THAN ONE BRAND OF THIS NAME ON THE LIST, YOU <u>MUST</u> IDENTIFY THE PRECISE BRAND - IF NECESSARY READ OUT THE VARIOUS NAMES (INCLUDING DESCRIPTIONS OF PLAIN/FILTER AND KING SIZE/LARGE/MEDIUM/SMALL) TO ESTABLISH WHICH ONE THE RESPONDENT MEANS.

WRITE IN CODE NUMBERS OF BRANDS ON GRID OPPOSITE (SEE BRAND LIST FOR CODE NUMBERS). WRITE IN NAME OF BRAND IF IT DOES NOT APPEAR ON THE BRAND LIST.

IF RESPONDENT CANNOT IDENTIFY THE <u>PRECISE</u> BRAND, WRITE DOWN AS MANY DETAILS OF THE BRAND AS YOU CAN OBTAIN.

REPEAT FOR (b), (c), (d) and (e) AS APPROPRIATE.

CURRENT SMOKERS ONLY

	NUMBER SMOKED PER DAY, ON AVERAGE	BRAND SMOKED MOST OFTEN
	IF NIL, WRITE "00" IF 100 OR MORE, WRITE "99"	(CODE OR NAME)
(a) ABOUT THE TIME OF PRESENT ADMISSION TO HOSPITAL	..... (11-12)	..... (13-15
(b) 1 YEAR PREVIOUSLY	..... (16-17)	..... (18-20
(c) 3 YEARS PREVIOUSLY	..... (21-22)	..... (23-25
(d) 5 YEARS PREVIOUSLY	..... (26-27)	..... (28-30
(e) 10 YEARS PREVIOUSLY	..... (31-32)	..... (33-35
(f) 15 YEARS PREVIOUSLY (IF AGED 45 OR OVER)	..... (36-37)	
(g) 20 YEARS PREVIOUSLY (IF AGED 50 OR OVER)	..... (38-39)	
(h) AT AGE 25 (IF AGED 40 OR OVER)	..... (40-41)	
(i) AT AGE 20	..... (42-43)	
(j) AT AGE 16	..... (44-45)	
(k) AT TIME OF HEAVIEST SMOKING	..... (46-47)	

PUNCHER: DUP COLS 1-9
COL 10 = 5

NOTE: IF INSUFFICIENT DETAILS TO CODE THE BRAND, WRITE IN AS MUCH INFORMATION AS POSSIBLE IN SPACE PROVIDED. (inc. PLAIN or FILTER; KING SIZE or LARGE or MEDIUM or SMALL)

NOW GO TO Q.45(a)

QUESTIONS 43 AND 44 ARE ASKED ONLY OF EX-SMOKERS (i.e. Q.39d = 'NO') OF MANUFACTURED CIGARETTES.

CURRENT SMOKERS (i.e. Q.39d = 'YES') GO TO Q.45

I am now going to ask you some questions about a number of aspects of the way you used to smoke manufactured cigarettes. I am trying to build up a history to cover your whole smoking life, that is the period when you started smoking up until the time you last smoked regularly. To do this, I am going to ask you to cast your mind back to try to remember what you were doing at various ages in your life.

Q.43(a) First of all, how many manufactured cigarettes were you smoking a day on average about the time you last smoked regularly ?

(b) How long ago was it, *prior to your present admission to hospital*, that you last smoked manufactured cigarettes regularly ?

ASK QUESTIONS (c) - (k) IF RESPONDENT WAS SMOKING REGULARLY AT THAT TIME.
E.g. IF RESPONDENT CEASED SMOKING REGULARLY 6 MONTHS PRIOR TO CURRENT ADMISSION TO HOSPITAL, (c) - (k) WILL ALL APPLY. IF RESPONDENT CEASED 7 YEARS EARLIER, THEN ONLY (f)-(k) WILL APPLY, ETC.
NOTE - (l) MUST <u>ALWAYS</u> BE ASKED.

(c) And how many were you smoking a day on average, about 1 year before your present admission to hospital ?

(d) ..... about 3 years before ?

(e) ..... about 5 years before ?

(f) ..... about 10 years before ?

(g) IF AGED 45 OR OVER ..... about 15 years before ?

(h) IF AGED 50 OR OVER ..... about 20 years before ?

(i) IF AGED 40 OR OVER ..... when you were aged 25 ?

(j) ..... when you were aged 20 ?

(k) ..... when you were aged 16 ?

(l) ..... at that time in your life when your cigarette smoking was at its heaviest ?

Q.44 And now I would like you to tell me for some of the years we have been talking about, what was the <u>single</u> brand you then smoked <u>most often</u> ?

GO THROUGH THE SEQUENCE OF YEARS AS FOR Q.43, BUT ONLY GOING BACK TO THE TIME <u>10 YEARS BEFORE THE RESPONDENT CAME INTO HOSPITAL</u>.

(a) What was the brand you smoked <u>most often</u> when you last smoked regularly ?

LOOK UP THE NAME MENTIONED BY RESPONDENT ON YOUR "BRAND LIST". IF THERE IS MORE THAN ONE BRAND OF THIS NAME ON THE LIST, YOU <u>MUST</u> IDENTIFY THE PRECISE BRAND - IF NECESSARY READ OUT THE VARIOUS NAMES (INCLUDING DESCRIPTIONS OF PLAIN/FILTER AND KING SIZE/LARGE/MEDIUM/SMALL) TO ESTABLISH WHICH ONE THE RESPONDENT MEANS.

WRITE IN CODE NUMBERS OF BRANDS ON GRID OPPOSITE (SEE BRAND LIST FOR CODE NUMBERS).
WRITE IN NAME OF BRAND IF IT DOES NOT APPEAR ON THE BRAND LIST.

IF RESPONDENT CANNOT IDENTIFY THE <u>PRECISE</u> BRAND, WRITE DOWN AS MANY DETAILS OF THE BRAND AS YOU CAN OBTAIN.

REPEAT FOR (c), (d), (e) and (f) AS APPROPRIATE.

EX-SMOKERS ONLY

PUNCHER: DUP COLS 1-9
COL 10 = 5
(ie REPLACES PAGE 20)

	NUMBER SMOKED PER DAY, ON AVERAGE	BRAND SMOKED MOST OFTEN
	IF NIL, WRITE "00" IF 100 OR MORE, WRITE "99"	(CODE OR NAME)
(a) ABOUT THE TIME YOU LAST SMOKED REGULARLY	..... (11-12)	..... (13-15)
(b) HOW LONG AGO, PRIOR TO PRESENT HOSPITALISATION, DID RESPONDENT LAST SMOKE MANUFACTURED CIGARETTES REGULARLY? ..... years ..... months		
ASK (c) - (k) WHEREVER APPLICABLE		
(c) 1 YEAR PRIOR TO PRESENT HOSPITAL ENTRY	..... (16-17)	..... (18-20)
(d) 3 YEARS PRIOR TO PRESENT HOSPITAL ENTRY	..... (21-22)	..... (23-25)
(e) 5 YEARS PRIOR TO PRESENT HOSPITAL ENTRY	..... (26-27)	..... (28-30)
(f) 10 YEARS PRIOR TO PRESENT HOSPITAL ENTRY	..... (31-32)	..... (33-35)
(g) 15 YEARS PRIOR TO PRESENT HOSPITAL ENTRY (IF AGED 45 OR OVER)	..... (36-37)	
(h) 20 YEARS PRIOR TO PRESENT HOSPITAL ENTRY (IF AGED 50 OR OVER)	..... (38-39)	
(i) AT AGE 25 (IF AGED 40 OR OVER)	..... (40-41)	
(j) AT AGE 20	..... (42-43)	
(k) AT AGE 16	..... (44-45)	
(l) AT TIME OF HEAVIEST SMOKING	..... (46-47)	

NOTE: IF INSUFFICIENT DETAILS TO CODE THE BRAND, WRITE IN AS MUCH INFORMATION AS POSSIBLE IN SPACE PROVIDED. (inc. PLAIN or FILTER; KING SIZE or LARGE or MEDIUM or SMALL.

NOW GO TO Q.50

ASK CURRENT SMOKERS ('YES' AT Q.39d)
EX-SMOKERS GO TO Q.50

		CODE	ROUTE
Q.45(a)	Using this card (GIVE RESPONDENT CARD 'B'), please tell me which of the phrases best describes the way you smoke manufactured cigarettes.	(48)	
	HOLD THE SMOKE IN YOUR MOUTH ONLY	1	
	TAKE THE SMOKE TO THE BACK OF YOUR THROAT	2	
	TAKE THE SMOKE PARTLY INTO YOUR CHEST	3	
	OR TAKE THE SMOKE RIGHT INTO YOUR CHEST	4	
(b)	Have you always done this ?	(49)	
	YES	1	Q.46 (c)
	NO	2	
	IF NO		
(c)	Again using the card (CARD 'B'), which phrase best describes the way you previously smoked manufactured cigarettes.	(50)	
	HOLD THE SMOKE IN YOUR MOUTH ONLY	1	
	TAKE THE SMOKE TO THE BACK OF YOUR THROAT	2	
	TAKE THE SMOKE PARTLY INTO YOUR CHEST	3	
	OR TAKE THE SMOKE RIGHT INTO YOUR CHEST	4	
Q.46	Do you generally re-light any of the manufactured cigarettes you smoke ?	(51)	
	YES	1	Q.47
	NO	2	
Q.47	(GIVE RESPONDENT CARD 'C'). Which of the phrases on this card best describes how you normally smoke manufactured cigarettes ?	(52)	
	CIGARETTE IN MOUTH ALL THE TIME	1	
	CIGARETTE IN MOUTH MOST OF THE TIME	2	
	CIGARETTE IN MOUTH SOME OF THE TIME	3	
	REMOVE CIGARETTE AFTER EACH PUFF	4	
Q.48	Would you now look at this card (GIVE RESPONDENT CARD 'D') and tell me which position you would normally smoke a manufactured cigarette down to before stubbing it out.		
	REFER TO Q.42(a) FOR BRAND CURRENTLY SMOKED "MOST OFTEN". USE YOUR BRAND LIST TO DETERMINE WHETHER THIS BRAND IS KING SIZE, LARGE, MEDIUM OR SMALL AND THEN POINT OUT THIS CATEGORY TO RESPONDENT ON CARD 'D'.	(53-54)	
	RECORD CODE FOR STUB LENGTH WHICH RESPONDENT THEN SHOWS ⟶	.....	

ASK Q.49 ONLY OF CURRENT SMOKERS WHO SMOKED A DIFFERENT BRAND IN Q.42(a) COMPARED WITH Q.42(d) OTHERWISE GO TO Q.51

Q.49(a) I see that the brand you smoked just before your present admission to hospital is different from the one you smoked 5 years earlier. Using this card (GIVE RESPONDENT CARD 'E'), please tell me how you think the tar levels of the 2 brands compare.

	CODE	ROUTE
	(55)	
PRESENT BRAND HIGHER	1	Q.51
BOTH ABOUT THE SAME	2	Q.51
PRESENT BRAND LOWER	3	(b)

IF LOWER

(b) How did it come about that you are smoking a brand with a lower tar level ?

DO NOT PROMPT

	CODE
	(56)
BECAUSE OF PRICE OR COUPONS	1
BECAUSE OF TRYING TO REDUCE SYMPTOMS THAT THAT RESPONDENT THINKS ARE ASSOCIATED WITH SMOKING, SUCH AS SMOKER'S COUGH, PHLEGM OR SHORTAGE OF BREATH	2
FOR GENERAL REASONS OF HEALTH, BUT RESPONDENT NOT APPARENTLY UNHEALTHY AT THE TIME	3
TRIED THEM AND LIKED THEM	4
MILDER TASTE	5
FOR SOCIAL REASONS/ON ADVICE OF FAMILY OR FRIENDS	6
ON DOCTOR'S ADVICE	7
BECAUSE OF ANTI-SMOKING PUBLICITY/LOW-TAR PUBLICITY	8
THOUGHT IT WOULD HELP ME TO STOP SMOKING/CUT DOWN	9
OTHER REASONS (WRITE IN AND CODE)	0
.....	
.....	(57)(58)
	(59)(60)

ASK EX-SMOKERS ('NO' AT Q.39d)

CURRENT SMOKERS GO TO Q.51

	CODE
GIVE RESPONDENT CARD 'B'	
Q.50 Which of these phrases best describes the way you smoked when you last smoked manufactured cigarettes regularly ?	(61)
HOLD THE SMOKE IN YOUR MOUTH ONLY	1
TAKE THE SMOKE TO THE BACK OF YOUR THROAT	2
TAKE THE SMOKE PARTLY INTO YOUR CHEST	3
OR TAKE THE SMOKE RIGHT INTO YOUR CHEST	4
ASK ALL	
Q.51 How many times have you stayed in hospital for any illness on any other occasion in the last 10 years, including any previous stays for your present illness ?	(62-63)
WRITE IN NUMBER OF TIMES (EXCLUDING PRESENT STAY) ⟶ (IF NONE, WRITE IN '00')	
Q.52 How long was your longest stay ?	(64)
LESS THAN 2 WEEKS	1
2 WEEKS BUT UNDER 1 MONTH	2
1 MONTH BUT UNDER 3 MONTHS	3
3 MONTHS BUT UNDER 6 MONTHS	4
6 MONTHS BUT UNDER 1 YEAR	5
1 YEAR OR MORE	6

NAME OF INTERVIEWER .....

INTERVIEWER NUMBER ⟶ [ ][ ][ ][ ] (65-68)

DATE OF INTERVIEW ⟶

DAY		MONTH		YEAR	

(69-74)

PUNCHER: GO TO PINK PAGE 9(a)

DO NOT FORGET TO CHECK RESPONDENT'S UNIT NUMBER WITH WARD STAFF NOW

QUESTIONS 53-75 ARE TO BE ASKED OF ALL MARRIED, WIDOWED, DIVORCED OR SEPARATED PEOPLE - CODES 2, 3 OR 4 AT Q.1 ON THE FRONT (WHITE) PAGE OF THE QUESTIONNAIRE.

SINGLE PEOPLE (CODE 1 AT Q.1) - GO TO Q.76

	CODE	ROUTE
Q.53 Have you been married more than once?	(42)	
YES, MORE THAN ONCE	1	Q.54
NO, ONLY ONCE	2	SEE NOTE AT TOP OF NEXT PAGE
ASK ALL THOSE MARRIED MORE THAN ONCE		
Q.54 I should now like to ask you a few questions about your first husband (wife). Firstly, in what year was he (she) born?	(43-44)	
ENTER LAST 2 DIGITS OF YEAR → 18 / 19	.....	
Q.55 And in what year did you and your first husband (wife) get married?	(45-46)	
ENTER LAST 2 DIGITS OF YEAR → 19	.....	
Q.56 Is your first husband (wife) still alive?	(47)	
YES	1	Q.60
NO	2	Q.57
DON'T KNOW	3	Q.60
IF FIRST HUSBAND (WIFE) NO LONGER ALIVE		
Q.57 How old was he (she) when he (she) died?	(48-49)	
ENTER AGE →	.....	
Q.58 Could you tell me what he (she) died from?	(50)	
.....	[ ]	
Q.59 Was it your husband's (wife's) death that ended your first marriage, or were you divorced or separated or re-married at that time?	(51)	
MARRIAGE ENDED DUE TO FIRST SPOUSE'S DEATH	1	Q.71
DIVORCED/SEPARATED/RE-MARRIED AT TIME OF FIRST SPOUSE'S DEATH	2	Q.60
IF FIRST HUSBAND (WIFE) STILL ALIVE, OR IF MARRIAGE HAD ENDED PRIOR TO FIRST SPOUSE'S DEATH		
Q.60 In what year were you divorced or separated from your first husband (wife)?	(52-53)	
ENTER LAST 2 DIGITS OF YEAR → 19	.....	NOW GO TO Q.71

IF SEPARATION TOOK PLACE PRIOR TO DIVORCE, RECORD THE EARLIER YEAR (I.E. YEAR WHEN SEPARATION BECAME FINAL)

THE QUESTIONS ON THIS PAGE ARE TO BE ASKED OF ALL WHO ONLY EVER HAD ONE HUSBAND (WIFE)- CODE 2 AT Q.53 ON PREVIOUS PAGE.

DIVORCED OR SEPARATED PEOPLE - CODE 4 at Q.1 - START AT Q.61

WIDOWED PEOPLE - CODE 3 AT Q.1 - START AT Q.63

MARRIED PEOPLE - CODE 2 AT Q.1 - START AT Q.65

		CODE	ROUTE
Q.61	In what year were you divorced or separated from your husband (wife)?	(54-55)	
	ENTER LAST 2 DIGITS OF YEAR → 19	.....	Q.62
	IF SEPARATION TOOK PLACE PRIOR TO DIVORCE, RECORD THE EARLIER YEAR (I.E. YEAR WHEN SEPARATION BECAME FINAL)	(56)	
Q.62	Is your husband (wife) still alive? YES	1	Q.65
	NO	2	Q.63
	DON'T KNOW	3	Q.65
Q.63	How old was your husband (wife) when he (she) died?	(57-58)	
	ENTER AGE →	.....	Q.64
Q.64	Could you tell me what he (she) died from?	(59)	
	.....	[ ]	Q.65
Q.65	In what year was your husband (wife) born?	(60-61)	
	ENTER LAST 2 DIGITS OF YEAR → 18 / 19	.....	Q.66
Q.66	And in what year did you get married?	(62-63)	
	ENTER LAST 2 DIGITS OF YEAR → 19	.....	SEE NOTE ABOVE Q.67

FOR THOSE WHO HAVE DESCRIBED THEMSELVES AS MARRIED (CODE 2 AT Q.1) AND WHO HAVE ALSO BEEN MARRIED ONLY ONCE (CODE 2 AT Q.53), CONTINUE AT Q.67.

ALL OTHERS CONTINUE AT Q.71

		CODE	ROUTE
Q.67	During the last 12 months, has your husband(wife) smoked manufactured cigarettes ?	(64)	
	YES	1	Q.68
	NO	2	Q.69
	DON'T KNOW	3	
Q.68	About how many manufactured cigarettes on average has he(she) smoked per day during these 12 months ?	(65-66)	
	ENTER NUMBER →	.....	Q.70
Q.69	Has he(she) ever smoked manufactured cigarettes ?	(67)	
	YES	1	Q.70
	NO	2	Q.70(a)
Q.70	During the whole of your marriage, can you think of the year when he(she) smoked most ? In that year, about how many manufactured cigarettes did he(she) smoke in an average day ?	(68-69)	
	ENTER NUMBER →	.....	Q.70(a)

Q.70(a) During the whole of your marriage, was he(she) ever a regular smoker of hand-rolled cigarettes, cigars or a pipe ?

(Tick box)

YES ☐

NO ☐

NOW GO TO Q.75

ASK ALL WHO HAVE BEEN MARRIED MORE THAN ONCE, AND THOSE NOW WIDOWED, DIVORCED OR SEPARATED

(NOTE: FOR THOSE MARRIED MORE THAN ONCE,
THE QUESTIONS ON THIS PAGE CONTINUE TO REFER TO THE FIRST HUSBAND/WIFE).

		CODE	ROUTE
Q.71	During the last 12 months of your marriage did your husband(wife) smoke manufactured cigarettes ?	(70)	
	YES	1	Q.72
	NO	2	Q.73
	DON'T KNOW	3	Q.73
Q.72	About how many manufactured cigarettes on average did he(she) smoke per day during those 12 months ?	(71-72)	
	ENTER NUMBER →	.....	Q.74
Q.73	Did he(she) ever smoke manufactured cigarettes ?	(73)	
	YES	1	Q.74
	NO	2	Q.74(a)
Q.74	During the whole of your marriage, can you think of the year when he(she) smoked most ?		
	In that year, about how many manufactured cigarettes did he(she) smoke in an average day ?	(74-75)	
	ENTER NUMBER →	.....	Q.74(a)

Q.74(a) During the whole of your marriage, was he(she) ever a regular smoker of hand-rolled cigarettes, cigars or a pipe ?

(Tick box)

YES ☐

NO ☐

} NOW GO TO Q.7

ASK ALL WHO HAVE EVER BEEN MARRIED

Q. 75 GIVE RESPONDENT CARD F

Which of the phrases on this card best describes the extent to which you were regularly exposed to tobacco smoke from other people, prior to your coming into hospital?

	A LOT	AVERAGE	A LITTLE	NOT AT ALL	
(a) Firstly when you are at home	1	2	3	4	(76)
(b) And at work (IF RESPONDENT HAS A JOB)	1	2	3	4	(77)
(c) During daily travel	1	2	3	4	(78)
(d) During leisure time, such as at the cinema, when visiting friends, etc.	1	2	3	4	(79)

ASK ALL

Q.76 Are there any other comments you would like to make?

.....

.....

.....

OFFICE USE ONLY

Q.70(a)/ Q.74(a) (80)

YES 1

NO 2

NOT ANSWERED (but applicable) 3

NOT APPLICABLE 4

THANK RESPONDENT FOR CO-CPERATION AND CLOSE INTERVIEW.

YOU MUST ENSURE YOUR NAME, INTERVIEWER NUMBER AND DATE OF INTERVIEW ARE ENTERED AT THE BOTTOM OF PAGE 25

DO NOT FORGET TO CHECK RESPONDENT'S UNIT NUMBER WITH WARD STAFF NOW.

APPENDIX II

APPENDIX II

Hospitals participating in study

BIRMINGHAM Locality
- Birmingham general
- Dudley Road
- East Birmingham
- Good Hope
- Queen Elizabeth
- St. Chads
- Selly Oak

BRISTOL Locality
- Bristol General
- Ham Green
- Radiotherapy Centre
- Royal Infirmary
- Southmead

EAST ANGLIA Locality
- Addenbrookes
- Papworth
- West Suffolk

LEEDS Locality
- Chapel Allerton
- Cookridge
- Killingbeck
- Leeds General
- St.James
- Wharfedale

LEICESTER Locality
- General
- Groby Road
- Royal Infirmary

LIVERPOOL Locality
- Clatterbridge
- Fazakerly
- Walton

MANCHESTER Locality
- Christie
- Hope
- Ladywell
- Salford Royal
- Stepping Hill
- Withington
- Wythenshawe

NEWCASTLE Locality
- General (Newcastle)
- Preston
- South Shields General
- Tynemouth Victoria Jubilee Infirmary
- Royal Victoria Infirmary (Newcastle)

NOTTINGHAM Locality
- City
- General

SOUTH HAMPSHIRE Locality
- Queen Alexandra (Portsmouth)
- Royal South Hants.
- St. Marys (Portsmouth)
- Southampton General
- Western (Southampton)