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Trends in lung cancer, chronic obstructive lung disease, and emphysema death rates for England and Wales 1941–85 and their relation to trends in cigarette smoking

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Abstract

Trends in smoking associated respiratory diseases in England and Wales during 1941–85 have been studied, with careful attention to problems caused by changes in classification of cause of death. Three diseases were selected for analysis: lung cancer, emphysema, and chronic obstructive lung disease. During 1971–85 deaths that would previously have been certified under chronic bronchitis have increasingly tended to be classified under chronic airways obstruction. The definition of chronic obstructive lung disease that was used includes both terms to avoid the artificial decline caused by consideration of chronic bronchitis in isolation. Age specific rates for all three diseases show a pronounced cohort (period of birth) pattern, rates for men rising up to the rates for those born shortly after the turn of the century and then declining, and rates for women peaking in the cohort born 20–25 years later. For chronic obstructive lung disease, but not for lung cancer and emphysema, the cohort peak is superimposed on a sharply declining downward trend. In both sexes cohort patterns of cumulative cigarette consumption peak at a time broadly similar to those seen for the three diseases. Trends in cigarette consumption, however, cannot explain the underlying steeply declining rate of chronic obstructive lung disease. Nor can they fully explain the declining trends in lung cancer and emphysema rates in younger men and women.

Trends in lung cancer death rates in England and Wales have been examined by various authors.[1–7] Some[5,7] have used the method of Osmond and Gardner,[8] which seeks to explain variation in cancer rates in terms of age, period (of death), or cohort (period of birth) effects. (A fuller description of the method is given under "Statistical methods" below.) Age specific lung cancer death rates have been shown to be strongly related to cohort and, given cohort, to be little related to period.[5,7] For men rates rise as far as the cohort born around 1900 and then fall, but for women the peak is reached in the cohort born about 20–25 years later. The rising cohort values in the two sexes correspond broadly with what is known about the increases that occurred in cigarette smoking in the early decades of the century.[5] The decreasing tar content of cigarettes[9,10] may have contributed to the decline,[1] but seemingly cannot explain it all.[5,11–13]

It has been suggested that chronic bronchitis trends show a cohort pattern identical to that for lung cancer and, in addition, a clearly observed period decline.[7] This decline has been attributed to social improvements, cleaner air, decreasing tar delivery from cigarettes, and advances in treatment.[2] More recently[7] it has been attributed to decreasing childhood respiratory infection, though this would seem more likely to cause a cohort effect.[11] The difficulty of separating period and cohort effects in the presence of a general downward drift in rates[14–16] may partly explain this.

In this paper we question whether it is entirely appropriate to include in chronic bronchitis deaths from both bronchitis and emphysema, which often can be separated into clinically distinct categories, and we compare and contrast trends in these diseases with those for lung cancer and study their relation to cigarette smoking. To counter criticisms[4] of previous estimates[1] we have used revised estimates of prewar cigarette consumption by age and sex.

Methods

MORTALITY AND POPULATION DATA

Data by five year age group (up to 85+ years) and sex were obtained for the period 1941–85 from the Registrar General's statistical reviews and the data of the Office of Population Censuses and Surveys.[17,18] Following Case *et al*, data for civilians and non-civilians have been combined for the years 1941–9; subsequently data were for the home population. Where a complete age breakdown was not available, estimates were based on sex specific proportions by age in adjacent years.

DEFINITION OF DISEASES

Changes made at each revision of the International Classification of Diseases (ICD) make it impossible to define diseases that can be studied with complete consistency over the period in question. Preliminary work resulted in the conclusion, however, that lung cancer, chronic obstructive lung disease, and

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Table 1 ICD codes corresponding to disease categories

Disease category*	Year/ICD revision 1941–9 5th	1950–7 6th	1958–67 7th	1968–78 8th	1979–85 9th
Lung cancer (LC)	47(b)	162 163	162 163	162	162
Emphysema (EM)	113	527·1	527·1	492	492
Chronic bronchitis (CB)	106(b)	502	502	491	491
Chronic airways obstruction and other respiratory disease (CAO)	114(e)	527·0 527·2	527·0 527·2	519	496 518 519
Unspecified bronchitis (UB)	106(c)	501	501	490	490
Chronic obstructive pulmonary disease (COPD)	Sum of CB + CAO + UB				
"Barker and Osmond bronchitis"	106(b) 106(c) 113	501 502 527	501 502 527·1	490 491 492	490 491 492

*Abbreviation used.

emphysema could be defined consistently enough to allow useful study of trends, provided that account was taken of information available from "bridge coding" tables (see below).

The ICD codes were used to define the various diseases of interest and the abbreviations we have adopted are summarised in table 1, with further explanation given in the following text:

Lung cancer The totals are dominated throughout by primary cancer of the lung. Inclusion of pleural cancer (ICD 5th and 8th revisions), tracheal cancer (revisions 6–9), or mediastinal cancer (revision 8) has little practical effect.

Emphysema Data are available for emphysema separately except in 1950–7, where only figures for the combined code 527 ("other diseases of lung and pleural cavity") are presented in the source tables. As 527·1 forms the dominant part of 527 for middle and older ages, however, we could estimate data for this category satisfactorily by applying age and sex specific factors based on 1958–67 data.

Bronchitis and emphysema When both chronic bronchitis and emphysema were recorded on the death certificate, emphysema was excluded for the purposes of determining the underlying cause according to the ICD classification rules.

Asthmatic bronchitis From the 7th revision asthma not indicated as allergic with mention of bronchitis was included under bronchitis. Under the 9th revision asthmatic bronchitis was moved to asthma, but asthmatic chronic bronchitis continued to be included under bronchitis.

Chronic airways obstruction and other respiratory disease As a result of changes in belief about the role of chronic sputum production and chronic bronchitis the term chronic airways obstruction was introduced into the 8th revision of the ICD as code 519·9. It became increasingly fashionable during the 1970s and a full code, 496, was assigned to it in the 9th revision. Table 2 shows clearly that trends in chronic bronchitis or chronic airways obstruction individually will be misleading in recent years and that the combination of the two is the only stable entity worth studying. "Other respiratory disease" has been included in our definition of chronic airways obstruction (and chronic obstructive lung disease) because data from chronic airways obstruction were not presented separately until 1976. Although consisting of a variable mixture of diseases in earlier ICD revisions, numbers of deaths were

*Table 2 Numbers of deaths (all ages) from chronic bronchitis, chronic airways obstruction, and other respiratory disease, 1972–84**

Disease	1972	1974	1976	1978	1980	1982	1984
MEN							
Chronc bronchitis	19 939	17 479	16 731	15 382	12 786	10 966	8 391
Chronic airways obstruction	—	—	950*	1 613	2 931	5 103	7 846
Other respiratory disease	—	—	473	561	362	490	540
Combined	574	712	1 423	2 174	3 293	5 603	8 386
Total	20 513	18 191	18 154	17 556	16 079	16 559	16 777
WOMEN							
Chronic bronchitis	6 184	5 555	7 031	5 106	4 417	4 147	3 402
Chronic airways obstruction	—	—	321†	565	1 055	1 907	3 047
Other respiratory disease	—	—	484	499	434	612	620
Combined	382	495	805	1 064	1 489	2 519	3 667
Total	6 566	6 050	7 836	6 170	5 906	6 666	7 069

*Unavailable data indicated by —. †For 1976 deaths from chronic airways obstruction were not given directly by the Office of Population Censuses and Surveys and were estimated by subtraction.

Table 3 Numbers of deaths (age 40 or over) from acute, chronic, and unspecified bronchitis; chronic airways obstruction; and emphysema in 1941, 1950, 1970, and 1985

Disease	1941	1950	1970	1985
MEN				
Bronchitis				
Acute	2 995	1 693	796	298
Chronic	10 974	14 115	19 882	8 092
Unspecified	3 165	1 265	591	173
Chronic airways obstruction and "other" respiratory disease	164	51	293	10 330
Emphysema	354	531	1 009	700
WOMEN				
Bronchitis				
Acute	3 999	2 294	797	463
Chronic	6 869	6 832	5 862	3 559
Unspecified	2 974	1 210	600	257
Chronic airways obstruction and "other" respiratory disease	56	25	718	4 977
Emphysema	96	89	287	1 028

always small.

Acute, chronic, and unspecified bronchitis Our classification of chronic obstructive lung disease has excluded acute bronchitis (ICD 5th revision 106(a), 6th and 7th revisions 500, 8th and 9th revision 466), which is believed to be aetiologically distinct from chronic bronchitis. It has, however, included deaths from bronchitis not specified as acute or chronic. As shown in table 3, numbers of deaths from unspecified bronchitis in recent years have been relatively low, and any upward bias by inclusion of some true acute bronchitis deaths among them would be very small indeed. Although such bias was larger from 1941 to 1950 it probably never exceeded 10% and no attempt has been made to adjust for it.

Barker and Osmond bronchitis There are two main differences between the definition of bronchitis used by Barker and Osmond[7] and our definition of chronic obstructive lung disease. The most serious difference arises from their omission of deaths from chronic airways obstruction, which, as noted above, may have a major effect in the last 10 years or so. The other main difference is that their definition included emphysema as well as chronic bronchitis. As is evident from table 3, deaths from emphysema were fewer than those from chronic bronchitis and chronic airways obstruction combined, so that inclusion of emphysema deaths would have little effect on our conclusions for chronic obstructive lung disease. Separation of emphysema, however, as we will show, allows distinct differences in the trends for emphysema and chronic obstructive lung disease to be detected.

BRIDGE CODE ADJUSTMENT

Tables published by the Office of Population Censuses and Surveys[20–23] gave the results, by age and sex, of "bridge coding" exercises, in which at each change to a new revision of the ICD deaths from the last year of the old revision are recoded according to the new revision. The Office of Population Censuses and Surveys also provided an unpublished table relating to the change from the 8th to the 9th revision. These tables were used to adjust rates to give estimates of the numbers of deaths that would have been recorded had the 9th revision of the ICD been in force throughout the period. The adjustment factors used, which affected lung cancer very little, are available on request.

CIGARETTE SMOKING

Annual data on cigarette smoking by the population of the United Kingdom were taken from Wald *et al*[24] and from Lee.[9] Estimates of age and sex specific cigarette consumption for the years before 1946 were made by backward extrapolation (appendix A). These estimates were preferred to those given by Lee,[9] which depend on a probably unjustified assumption that the age distribution of smoking was invariant by year before 1946, the date of the earliest survey of smoking habits.

STATISTICAL METHODS

Mortality data for a given cause of death for one sex were displayed as a rectangular array of death rates with nine time periods of death horizontally (left 1941–5 to right 1981–5) and nine age groups (top 40–44 to bottom 80–84). Diagonals of this table running from top left to bottom right represent people in the same birth cohort. Thus there is information on people born around 1900 (40–44 in 1941–5, 45–49 in 1946–50, etc) for the whole age range, with lesser information for people born earlier and later. There is at least some information for people in 17 birth cohorts.

Trends in mortality can often be characterised by one or more of three types of effect: age, period, and cohort. Age effects are present for virtually every cause of death. Period effects typically occur as a result of changes affecting all age groups—for example, changes in diagnostic standards and cure rates, and introduction of an aetiological agent with a rapid effect. Cohort effects typically occur when people born at a given time are more exposed to an agent than people born at another time.

In the method of Osmond and Gardner[6] rates are fitted by a product of age, period, and cohort effects. Results are usually presented graphically, fitted period and cohort values being relative to an average of 1. Where no pronounced period effects are evident (that is, all values are close to 1), cohort effects have a simple interpretation. For example, a value of 1·2 would mean that in all age groups people in that birth cohort are 20% more likely to die from the disease of interest than average and 100% more likely to die from it than people in a cohort with the value 0·6. Similarly, where no substantial cohort effects are evident, period effects have a simple interpretation. It should be noted that, whereas all the fitted period values are relatively stable as there are full data on each age group for every period, this is not so for all the fitted cohort values, those for the earliest and latest cohorts being less stable. In particular, the estimate for the very latest cohort will be based only on a single data point for the youngest age group, where numbers of deaths may be small.

Further discussion of the Osmond and Gardner method is given in several

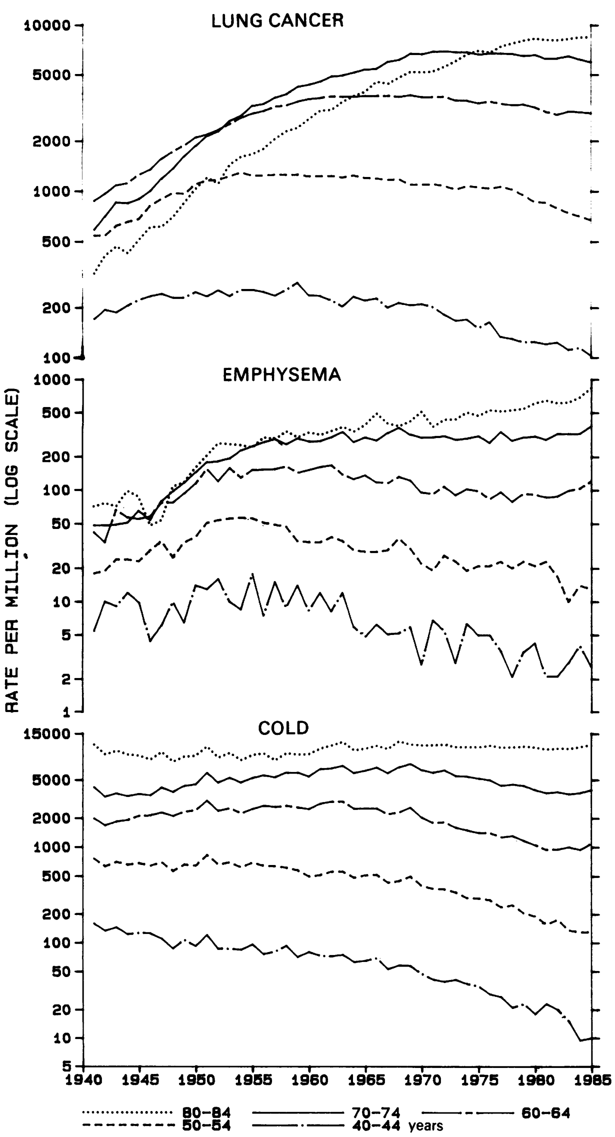

Figure 1 Trends in age specific male mortality rates (bridge code adjusted), 1941–85. COLD—chronic obstructive lung disease. The scales differ for the three diseases.

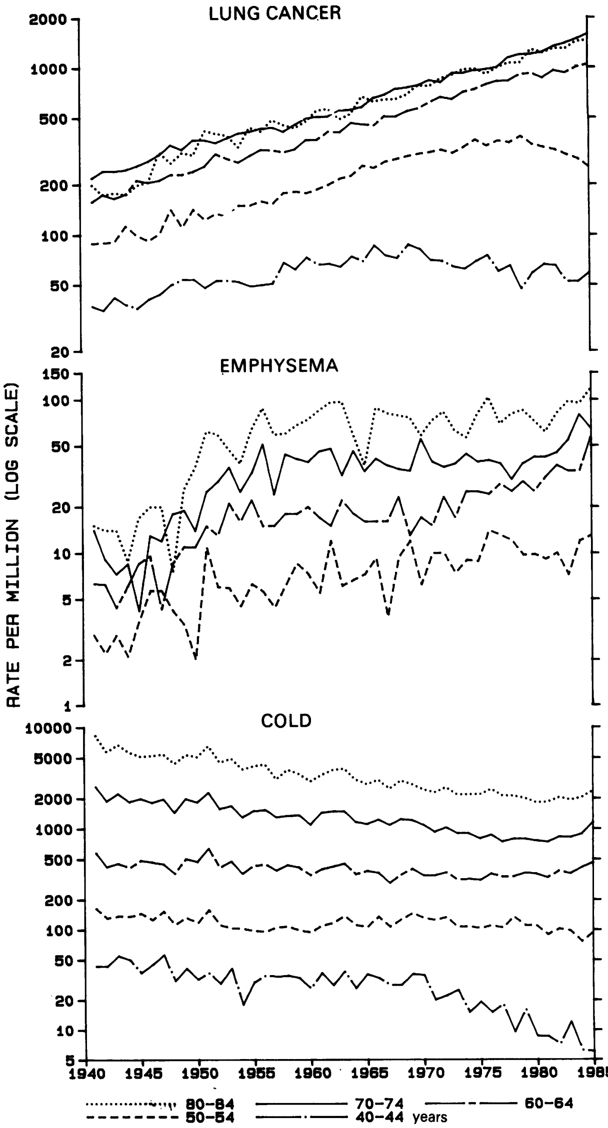

Figure 2 Trends in age specific female mortality rates (bridge code adjusted), 1941–85. COLD—chronic obstructive lung disease. The scales differ from those of figure 1.

papers.[5 8 14–16] For our analyses we used either the method directly or log linear models equivalent to it derived by the GLIM system.[25]

Results

MORTALITY RATES

For men (fig 1) lung cancer rates in each age group rise to a peak and then (with the exception of the highest age group, 80–84) show a subsequent decline. Emphysema rates show a similar pattern, though the trends in the youngest age groups are less stable owing to small numbers of deaths. Peaks occur for cohorts of people born around the turn of the century in both diseases, though they do not exactly coincide. For chronic obstructive lung disease quite a different pattern is seen, with stronger downward trends in the younger age groups and peaks occurring earlier.

In women (fig 2) lung cancer rates have risen continuously in the older age groups, but evidence from the younger age groups, though the absolute values are smaller, is consistent with the peak occurring for the cohort born about 1925. As in men, trends for emphysema are not dissimilar to those for lung cancer, though greater fluctuations are evident. (Rates for 40–44 year olds were omitted from figure 2, often being based on only one or two deaths.) Again as in men, trends in chronic obstructive lung disease show a different pattern, with a general decline in rates.

ANALYSIS OF OSMOND AND GARDNER

Figures 3 (men) and 4 (women) show some of the results of fitting the method of Osmond and Gardner to the bridge code adjusted mortality data for five year age groups from 40–44 to 80–84 for five year periods from 1941–5 to 1981–5. Age values are not shown in the figures but mortality increased smoothly with age for all three diseases and both sexes. The model generally fitted the data well, particularly for lung cancer and emphysema. Even for chronic obstructive lung disease, where the misfit was

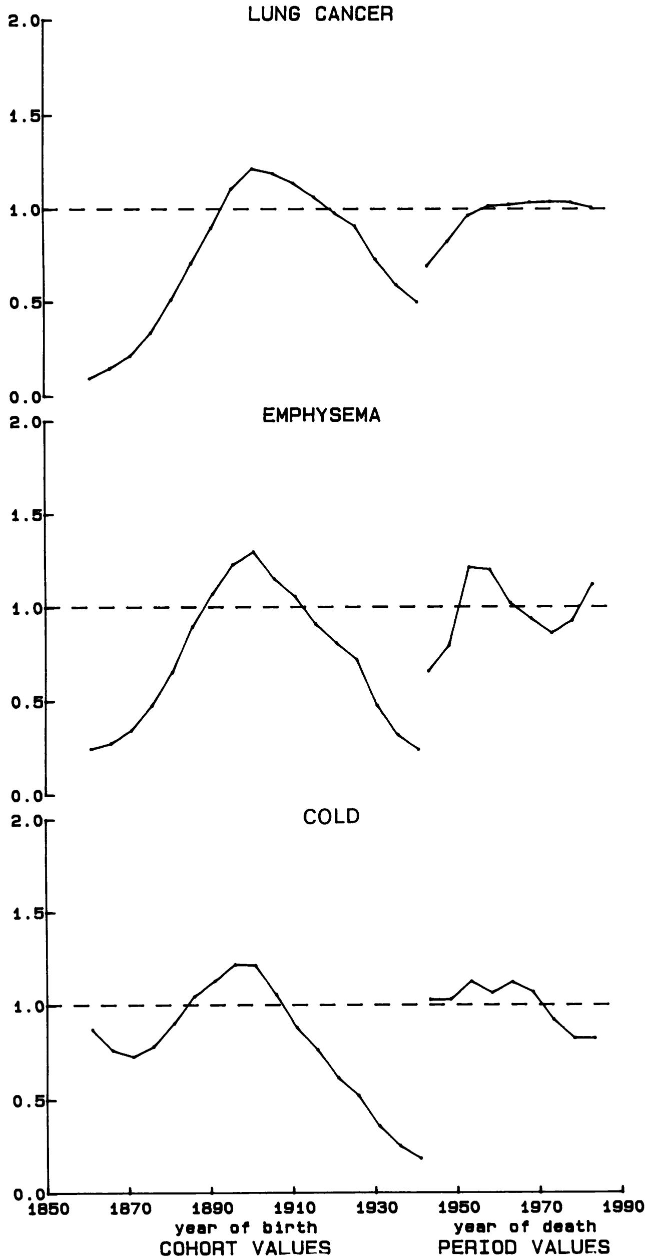

Figure 3 Cohort and period values, based on the analysis of Osmond and Gardner, for men. COLD—chronic obstructive lung disease.

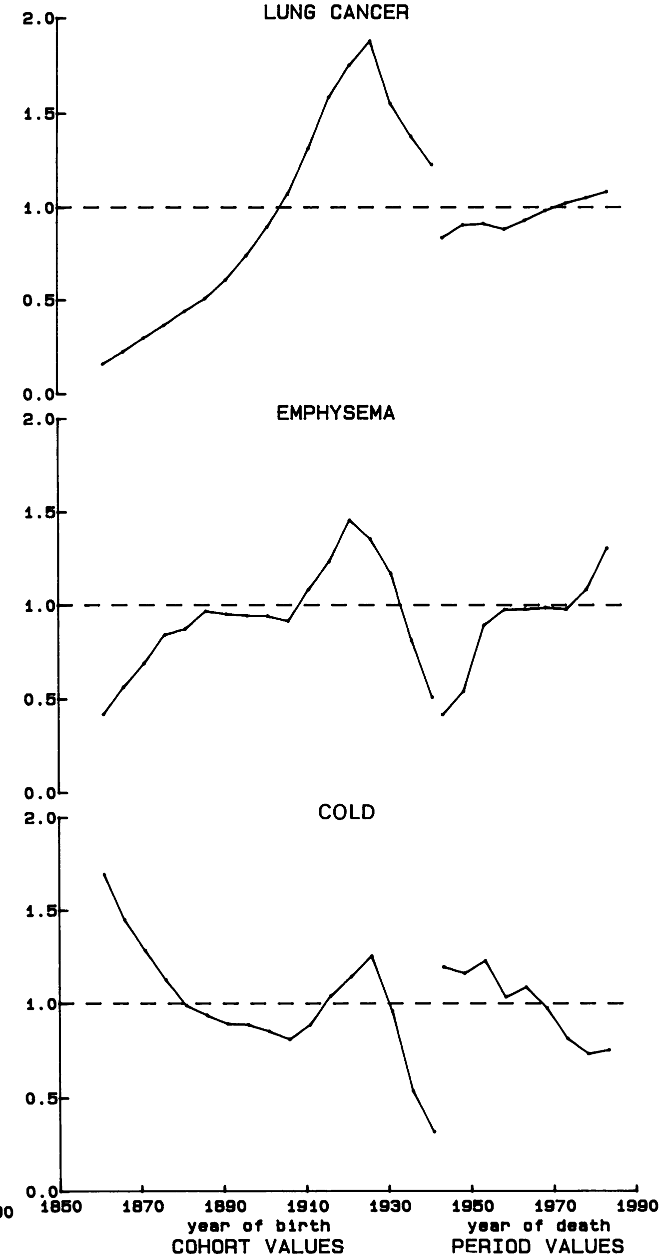

Figure 4 Cohort and period values, based on the analysis of Osmond and Gardner, for women. COLD—chronic obstructive lung disease.

somewhat greater, the model explained about 99% of the variance unexplained simply by age.

With the exception of emphysema in women, the figures clearly show that cohort effects are much larger than period effects. This is also evident from results (not shown in detail) showing that the age-cohort model fitted the data considerably better than the age-period model. Some of the period pattern for emphysema may partly be an artefact due to the difficulties of accurately adjusting for the change from the 5th to the 6th ICD revision and the limited data available.

The cohort patterns seen in figures 3 and 4 have two striking features. The first is the clear peak for each disease, occurring earlier (about 1900) for men and later (about 1925) for women. The second is the fact that for chronic obstructive lung disease the peaks in both sexes are superimposed on an underlying downward trend. All these diseases appear to have been affected by one agent but different birth cohorts were exposed differently, men being exposed earlier than women. For chronic obstructive lung disease there appears to be a second agent, which results in a continuing decline in mortality rates.

RELATION OF TRENDS IN MORTALITY AND SMOKING HABITS

Cumulative constant tar (CCT) cigarette consumption, estimated as described in the appendix, is plotted by age and sex against calendar year (fig 5) and year of birth (fig 6). Figure 5 may be compared with figures 1 and 2, and figure 6 may be compared with the cohort patterns in figures 3 and 4.

There are several obvious similarities between the CCT cigarette consumption and

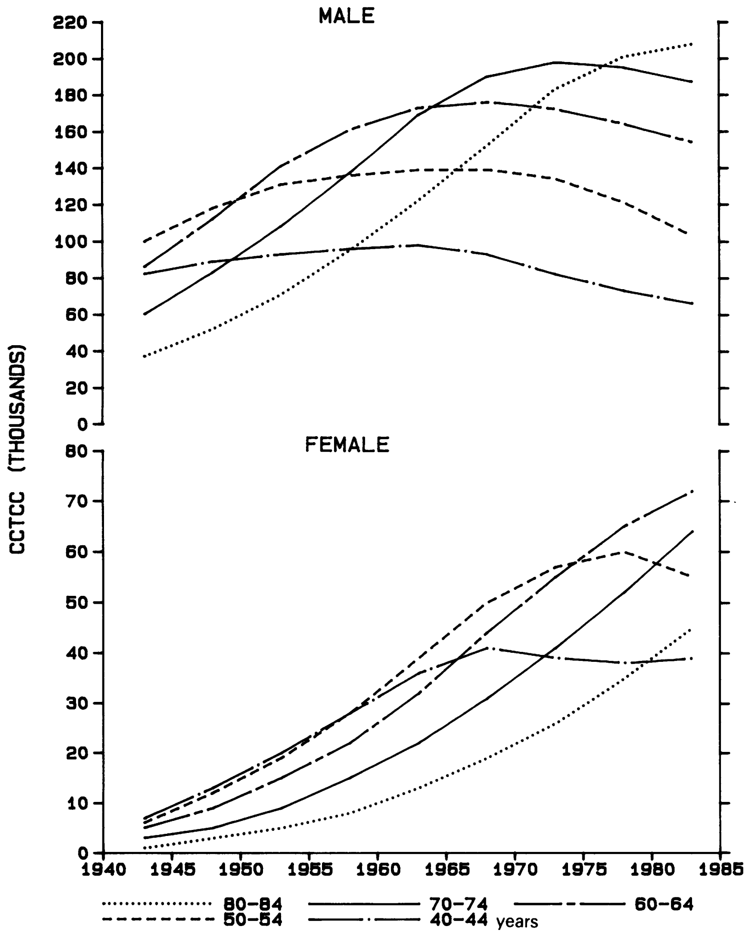

Figure 5 Cumulative constant tar cigarette consumption (CCTCC) by age and year, 1926–85. The scales differ for the two sexes.

mortality trends. For men the CCT cigarette consumption in each age group has risen with time and has now, except in the 80–84 year old age group, fallen from a peak (fig 5) corresponding closely to the lung cancer trends (fig 1). For women the fact that the CCT cigarette consumption is still rising in the age groups 60–64, 70–74, and 80–84 (fig 5) corresponds to the continuing upward trends in lung cancer (fig 2). Furthermore, it is evident from figure 6 that the cohorts showing peak CCT cigarette consumption are earlier for men than for women, and that the difference is similar to the difference between figures 3 and 4.

Where recent reductions in mortality rates are considered, however, particularly in the younger age groups, the correspondence with CCT cigarette consumption is much less good. This is seen more clearly for women than for men, though it can be seen in both sexes. This anomaly emerges from comparison of figures 4 and 6. Figure 4 suggests that cohort values are similar for women born around 1910 and around 1940, whereas figure 6 shows that the later born group of women have smoked very much more. The anomaly is also evident from a direct comparison of trends in women of a given age (figs 2 and 5). This is shown more clearly in figure 7 for 40–44 year olds: from 1950 to 1985 CCT cigarette consumption rose about threefold but lung cancer rates hardly changed. In particular, the fall in lung cancer from 1970 to 1985 is not explained by changes in CCT cigarette consumption. This anomaly persists when we use alternative estimates of CCT cigarette consumption based on different tar estimates or backward extrapolation procedures, and would be even greater if allowance were made for "compensation" (that is, smoking cigarettes with a reduced machine yield of tar and nicotine more intensely), which may be substantial.[26] To allow closer correspondence between changes in lung cancer and changes in CCT cigarette consumption one would have to assume that there had been a decline in the "background" lung cancer rate (that is, unrelated to CCT cigarette consumption). The dashed line in fig 7 illustrates the order of magnitude of background rate that would have to be subtracted from the observed lung cancer rate to leave the residual rate reasonably well correlated with CCT cigarette consumption trends.

Discussion

Our analyses have clearly shown differences in mortality trends for chronic obstructive lung disease and emphysema. Whereas both show cohort patterns that peak at around the same birth year, the peaks for chronic obstructive lung disease are superimposed on a strong declining downward trend that is not present for emphysema. In the past, research workers have restricted attention to study of chronic bronchitis and emphysema combined (with or without asthma) and have not attempted to separate the diseases. Although perfect separation cannot be achieved (inevitably some deaths due to emphysema in which chronic bronchitis was also present will have been inappropriately coded as chronic bronchitis), and although problems due to ICD changes and the switch to use of the term chronic airways obstruction have had to be overcome, we believe that our results are relevant. Different diseases with different causes are present and our analysis suggests that the relative importance of the different causes is not the same.

Our analyses also show that trends in emphysema show a close correlation with trends in lung cancer, though the latter disease is much more frequent. The cohort patterns, peaking around 1990 in men and around 20–25 years later in women (figs 3 and 4) are similar in many respects to the trends in cumulative constant tar cigarette consumption shown in figures 5 and 6. This is consistent with the considerable epidemiological evidence linking cigarette smoking closely to both diseases.[2 27 28]

We have shown that chronic obstructive lung disease, though showing cohort peaks similar to those of lung cancer, has an additional sharp decline not evident for lung cancer. Barker and Osmond[7] considered this decline to be period related rather than cohort related, but this was mainly because their mathematical method constrained the cohort trends for the two diseases to be the same. Their analysis, which excluded chronic airways obstruction, included emphysema, failed to take account of

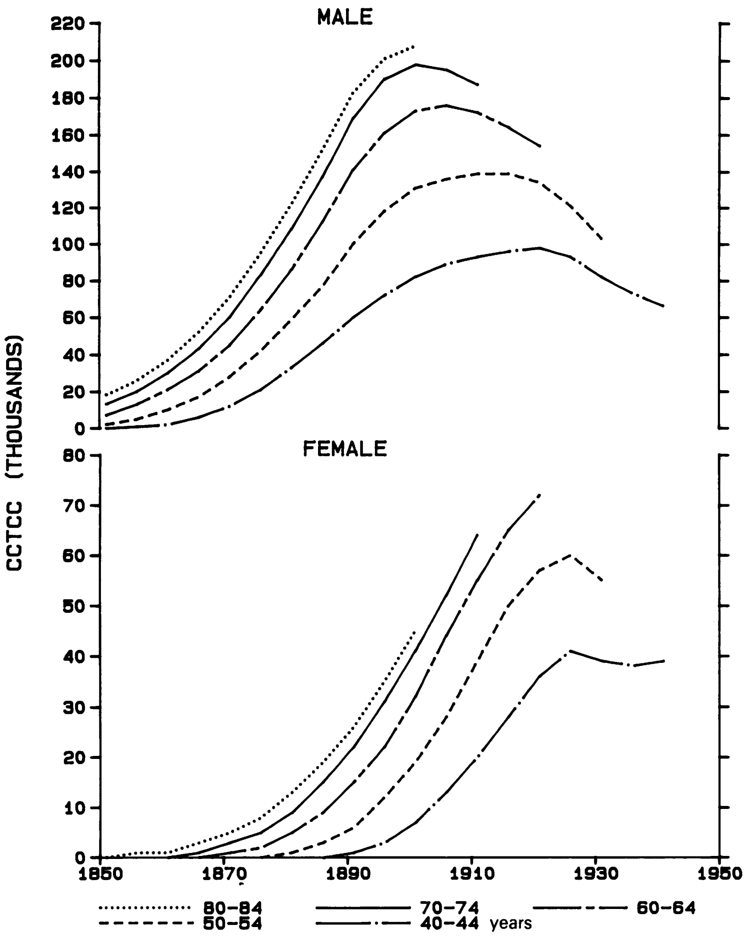

Figure 6 Cumulative constant tar cigarette consumption (CCTCC) by age and central year of birth, 1851–1966. The scales differ for the two sexes.

ICD change effects, and used somewhat different age groups, led to the conclusion that the decline in chronic bronchitis was due to a reduction in childhood respiratory infection. While noting the difficulties of discriminating period and cohort effects,[5 14–16] we would point out that a reduction in childhood respiratory infection would more logically appear as a cohort effect. Though our analysis is therefore more consistent with their theory than their analysis, we believe that it is premature to conclude that childhood respiratory infection is necessarily the agent responsible for the decline. We agree with Barker and Osmond that the Clean Air Act, which came into force only in 1956, cannot be a major explanation as the decline is too longstanding, being evident in cohorts born from 1863 onward.

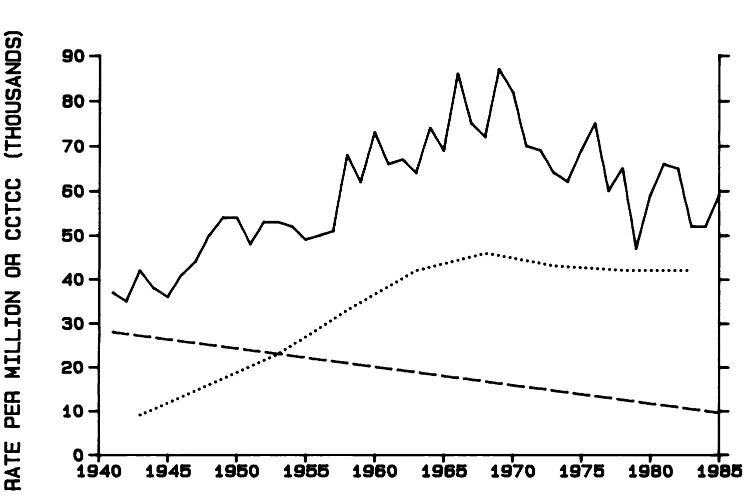

Figure 7 Lung cancer rate (——), cumulative constant tar cigarette consumption (CCTCC .....), and hypothesised "background" rate of lung cancer unrelated to cigarette consumption (– – –), for women aged 40–44, 1941–85. For comparisons with figures 1 and 2 note that this scale is arithmetic.

Whatever the factor responsible for the decline in chronic obstructive lung disease (and this paper is not intended as a detailed discussion of possible causal factors in the aetiology of the three diseases considered), we suspect that it is also responsible for the huge social class gradient in death rates for chronic bronchitis, which was evident well before there was any real gradient in smoking by social class.[29]

Although the fact that the rise in lung cancer rates since 1940 can largely be explained by a rise in lifetime exposure to cigarettes is scarcely new,[2 5 7] our analyses also highlight one striking anomaly, which has been given much less attention in published papers[11–13] and which some have claimed does not exist.[30] This anomaly, the failure of cigarette consumption trends to explain fully the trends in lung cancer rates in younger age groups from 1950 onwards, is evident in both sexes, and is particularly clear in women. As shown in figure 7, women of age 40–44 have dramatically increased their cigarette smoking over the period 1941–85, but their lung cancer rate has increased only slightly. Although cumulative constant tar cigarette consumption is only one of several possible indices of exposure that might be used, this anomaly can hardly depend on the precise choice of index because smoking by women was so rare before the war. The fact that prewar cigarette consumption was so low does, of course, suggest a possible explanation of the anomaly—namely, that there is some factor other than smoking that was responsible for most of the lung cancers occurring in these women in the early 1940s and that the effect of this factor has declined over time. Several considerations suggest that this explanation is a plausible one. Firstly, numerous epidemiological studies have shown that some lung cancer deaths occur among lifelong never smokers and that the proportion is particularly high among women and in studies carried out many years ago.[27] Secondly, young women today are likely to have less exposure to occupational hazards and to air pollution than were young women 40 years ago. Thirdly, bronchitis may have a role in lung cancer and the decline may at least in part result from the same factor that caused the sharp decline in bronchitis rates. As trends in emphysema rates in younger men and women are similar to those for lung cancer clearly they too cannot easily be explained by trends in cigarette consumption.

In summary, though major features of the trends of the diseases studied correlate very well with trends in cumulative exposure to cigarettes, there is good reason to believe that other factors contribute to the aetiology of all three diseases. This is particularly so for chronic obstructive lung disease, where the declining effects of another factor are clearly evident at all ages; but it is also the case for lung cancer and emphysema, where downward trends in the younger age groups are too large and too early to be explained in terms of changes in the frequency or type of cigarettes smoked.

We thank Mr C D Gooch, who was involved in the early stages of this study, as well as Drs T Higenbottam and F J C Roe, the late Dr M R Alderson, and the late Mr G F Todd for their helpful advice. Mrs E K Marlow, Mrs D Morris, and Mrs A Pearson assisted in the preparation of the manuscript.

Appendix: Estimating age and sex specific cigarette consumption in the United Kingdom by backward extrapolation

Survey data are available[9,24] on manufactured cigarette consumption per adult by sex, five year age group, and five year period from 1946–50 onward. Earlier, data are available only for total sales of manufactured cigarettes by sex but not age. Estimates of age specific manufactured cigarette consumption per adult before 1946 have been presented,[1] but these were calculated on the assumption that the age distribution of smoking is invariant before 1946, which is rather implausible.[4] Here a more plausible assumption, based on relative consistency of cigarette consumption in different cohorts, has been used. The method may be summarised as follows:

1 Fit an age-cohort model to the known data from 1946, to give a set of age and cohort estimates.
2 Extrapolate the cohort estimates to obtain values for earlier cohorts not represented in the data from 1946.
3 Use the age and cohort estimates to obtain preliminary consumption per adult figures for the earlier five year periods.
4 Using the preliminary consumption values and population figures for each earlier five year period, compute the implied all ages total cigarette consumption and compare with the actual figure to obtain a period correction factor.
5 Adjust the consumption figures for each earlier five year period using the appropriate correction factor.
6 Finally, adjust consumption estimates for each age group in each period by forming a weighted average of the unadjusted consumption estimate (weight 4) and those in the two adjacent cohorts (each weight 1). This makes it possible to relate consumption estimates more directly to specific cohorts because consumption in a specific five year period, for people whose age falls within a five year interval, relates to people born over a 10 year interval.

The resulting (adjusted) consumption estimates are shown in table A.

To convert these estimates to constant tar consumption estimates, we used factors of 0·477 for 1981–5, 0·544 for 1976–80, 0·613 for 1971–5, 0·804 for 1966–70, and 1 for 1961–5 or earlier, on the basis of data provided by the Tobacco Advisory Council.[9,24] Using alternative data on tar yields[10] would not have affected our conclusions.

Given the consumption estimates and the tar factors, cumulative constant tar cigarette consumption in 1000s was then calculated in a straightforward manner. Thus cumulative constant tar cigarette consumption for the male cohort born in 1941–5 for the age group 25–9 is calculated by summing five years at an average consumption of 921 (age 15–19, years 1956–60), five years at 3170 (age 20–24, years 1961–5), and two and a half years at 4267 × 0·804 (age 25–29, years 1966–70), to yield 29 032 or a plotted value of 29.

Table A Estimated annual manufactured cigarette consumption per adult by age, sex, and period

	Age (y)													
Period	*15–19*	*20–24*	*25–29*	*30–34*	*35–39*	*40–44*	*45–49*	*50–54*	*55–59*	*60–64*	*65–69*	*70–74*	*75–79*	*80–84*
MEN														
1891–	20	45	49	45	42	39	33	29	23	18	12	9	6	4
1896–	85	208	239	214	200	184	160	137	111	86	61	41	30	21
1901–	205	521	620	559	505	468	410	351	285	221	157	105	77	54
1906–	357	923	1117	1026	928	832	735	634	517	400	286	191	139	98
1911–	500	1385	1681	1547	1422	1279	1093	949	779	603	432	289	210	148
1916–	699	1955	2512	2320	2138	1954	1672	1403	1160	905	647	433	315	221
1921–	733	2218	2960	2907	2680	2459	2141	1798	1445	1136	822	548	398	281
1926–	762	2284	3154	3180	3129	2875	2508	2143	1722	1307	951	639	464	327
1931–	811	2445	3406	3592	3626	3546	3103	2656	2170	1651	1163	786	575	405
1936–	927	2733	3778	4005	4235	4248	3959	3404	2782	2153	1517	992	731	518
1941–	1070	3146	4306	4551	4838	5075	4850	4439	3645	2824	2025	1327	945	675
1946–	918	3033	4324	4494	4716	4972	4955	4721	4226	3249	2248	1491	1085	764
1951–	761	2637	4048	4365	4425	4587	4603	4527	4233	3502	2380	1557	1183	840
1956–	921	2727	3940	4312	4582	4725	4737	4643	4338	3752	2717	1823	1387	985
1961–	1133	3170	4080	4130	4383	4660	4670	4588	4285	3747	3007	2135	1633	1150
1966–	1200	3333	4267	4115	4240	4470	4372	4238	3987	3532	2980	2278	1737	1228
1971–	1289	3460	4315	4248	4272	4362	4418	4223	3847	3480	3022	2353	1720	1273
1976–	1228	3317	4130	4067	4077	4080	4020	4155	3737	3333	2862	2193	1748	1295
1981–	1000	2690	3388	3373	3423	3365	3323	3253	3190	2720	2347	1798	1458	1165
WOMEN														
1921–	13	30	37	37	35	35	34	28	24	18	13	9	5	3
1926–	38	100	130	134	123	120	118	101	83	66	46	32	20	12
1931–	75	205	266	274	260	247	241	206	171	132	95	66	41	25
1936–	133	367	486	497	470	458	437	371	305	240	168	120	75	44
1941–	274	751	998	1040	978	953	929	769	628	490	348	242	152	92
1946–	287	993	1406	1506	1385	1331	1331	1122	892	736	534	373	230	137
1951–	253	920	1512	1688	1588	1515	1550	1302	1038	812	592	410	255	150
1956–	336	1007	1598	1990	1983	1982	2035	1685	1330	1027	700	488	298	180
1961–	497	1385	1915	2137	2307	2420	2493	2125	1685	1300	893	630	385	223
1966–	719	1882	2388	2368	2403	2633	2705	2408	2053	1568	1073	770	463	260
1971–	947	2358	2878	2807	2720	2893	3075	2830	2395	1922	1312	902	578	330
1976–	983	2553	3055	3077	3095	3010	3180	3222	2805	2182	1570	1070	683	428
1981–	724	2147	2713	2722	2835	2887	2797	2822	2725	2263	1615	1087	762	475

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