

SMOKING AND MORTALITY—A POSTSCRIPT

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In an earlier paper (Benjamin, 1981) on the subject of cigarette smoking and mortality, statistics from a number of national prospective studies were brought together. These studies agreed in the general finding that the smoking of cigarettes doubled the risk of dying before the age of 65; that diseases most likely to intervene to produce this excess mortality were lung cancer, bronchitis, and emphysema, ischaemic heart disease, certain other cancers (notably of buccal cavity, oesophagus, bladder) and cirrhosis of the liver. It was emphasized that the excess mortality from heart and circulatory disease was not restricted to coronary heart disease, though this latter cause provided the most important element. There was for cigarette smokers a 70% higher risk of dying from myocardial infarction (for the same level of smoking that risk was not less for women than for men). A restricted number of international comparisons of mortality were provided. In almost all countries in Europe, ischaemic heart disease mortality was rising. Outside Europe there was a contrast between the less developed countries where the amount of tobacco consumed was low and those developed countries where consumption was higher. Death-rates were much higher in the latter group. The most pronounced association between smoking and disease was that of lung cancer. The recent experience of lung cancer mortality in a number of countries was recorded. In all countries where there was substantial participation in smoking, death-rates had been rising for men. In most countries where a high proportion of women had been smoking for many years the death-rate for cancer of the lung was rising and in most cases quite rapidly. A reminder was given that heart disease and cancer were not the only penalties of smoking. Emphysema, bronchitis, asthma, influenza, pneumonia and respiratory tuberculosis were diseases for which the risk of dying was increased in cigarette smokers.

It was emphasized that countries which have low cigarette consumption tend also to be countries of low economic development, and these are also countries which have either no death registration system or, at best, an inadequate system yielding no mortality statistics by cause of death. World-wide comparisons are for this reason severely restricted. As a result of receiving further mortality statistics from W.H.O. it has now been possible to extend the comparison over a longer period of time. As before a distinction has been made in the tables between those countries (Group A) which either currently or in the recent past have high proportions of adult males who smoke and those countries (Group B) with low proportions.

As an indication of the level of ischaemic heart disease which might be particularly sensitive to the influence of smoking, the mean of the death-rates in

males at ages 45–50 and 50–54, respectively, has again been taken. Death-rates for ischaemic heart disease at higher ages are much higher than at ages below 55 but is impossible at these ages to distinguish environmental effects from the advance of senescence (though environmental influences undoubtedly accelerate the ageing process). Table 1 refers to males. For many countries in Europe shown in Table 1 this rate, after rising steeply, has either levelled out or declined slightly. These are countries where the prevalence of cigarette smoking in males has either declined or ceased to rise. Denmark may appear to be an exception but the 1981 rate was 197.2 so that mortality cannot yet be regarded as having ceased to rise.

Other countries where mortality from ischaemic heart disease is still rising are Poland, Yugoslavia and Hungary where, significantly, smoking rates are high and in the cases of the last two, rising.

In most of these countries the mean death-rate at ages 45–54 is of the order of 200 per 100,000. In England and Wales which experienced a sustained high prevalence of cigarette smoking from the 1920's but has more recently experienced a decline in cigarette smoking among men, the rate has approached 300 but is now declining slightly. The rate for France is exceptionally low. It has to be borne in mind in considering the lower rates of France and also Austria and Germany F.R., that these wine producing countries (together with Italy, Portugal and Spain) are also exceptional in experiencing much higher mortality from cirrhosis of the liver than elsewhere in the world and that is a competing cause of death especially at ages 45–54. Outside Europe there is still a contrast between the less developed countries where the amount of tobacco consumed per smoker is restricted by low per capita income (Hong Kong, Thailand, Guatemala) and mortality from ischaemic heart disease is allegedly low, and those developed countries where there is no such restriction (United States, Australia, New Zealand) and death-rates are high. The latter group have death-rates at ages 45–54 from ischaemic heart disease of the same order as England and Wales; but in all these countries the rate is subsiding. Here again there are competing influences. The risk of early death from ischaemic heart disease though independently and synergistically enhanced by cigarette smoking is also increased by hypertension, obesity, raised blood cholesterol levels and physical activity and in most developed countries which have been affected by the so-called epidemic of coronary heart disease, there have been rigorous health programmes directed against these factors (as well as against smoking). These efforts to reduce ischaemic heart disease have been particularly intense in the U.S.A., Australia and New Zealand. The smoking trend is downward in these three countries and the downturn in mortality is gratifying. There remains this apparent anomaly of Japan with a high prevalence of smoking and a comparatively low mortality from ischaemic heart disease which, moreover, follows a downward trend. In the earlier paper it was suggested that an explanation was provided by the difference in the pattern of mortality in Japan as compared with, for example, the U.S.A. As compared with the U.S.A. a notable deficiency in deaths attributed to heart disease is partly offset by an excess of

Table 1. *Smoking levels and mortality from ischaemic heart disease and lung cancer. Males*

Country	Year	Proportion of adult males smoking (8)	Trend	Death rates in males (per 100,000) from:												
				Ischaemic heart disease, mean of rates at ages 45-49 and 50-54 (9)						Cancer of lung, trachea and bronchus, mean of rates at ages 60-64 and 65-69 (3) (10)						
A	Denmark	1972	68	Upward	1955-59	1960-64	1965-69	1970-74	1975-79	1980	1955-59	1960-64	1965-69	1970-74	1975-79	1980
	France	1975	70	Level	138.3	164.6	173.5	185.6	193.0	181.9	147.4	203.7	257.7	289.6	292.1	305.9
	Germany F.R.	1973	60	Downward	55.7	67.8	72.4	75.5	81.5	73.1	106.8	147.4	179.3	190.9	218.9	223.3
	Netherlands	1972	57	Downward	146.1	168.2	171.9	161.1	161.7	152.2	193.6	261.7	285.3	280.8	273.2	262.5
	Poland	1973	83	n.a.	120.0	154.0	186.0	201.6	188.2	167.4	204.1	299.7	374.1	427.1	452.5	438.9
England & Wales	1975	47	Downward	n.a.	89.5	104.0	126.0	172.5	204.3	n.a.	139.8	201.2	241.7	280.6	303.6	
	1974	57	n.a.	194.3	226.0	251.4	280.2	276.9	262.0	346.7	416.1	450.5	440.5	417.6	399.8	
B	Austria	1972	46	Level	n.a.	n.a.	73.8	90.6	112.5	126.9	n.a.	145.0	147.9	173.4	194.8	215.7
	Hungary	1975	45	Upward	n.a.	144.8	153.2	151.1	162.7	159.9	287.3	337.7	348.9	314.8	270.6	266.0
A	Japan	1975	73	Downward	115.3	132.3	160.2	165.5	213.9	264.4	151.2	201.8	251.4	259.8	272.3	286.8
	Hong Kong	1975	42	Upward	113.0	121.9	132.6	150.1	156.8	157.8	76.5	100.1	116.9	123.4	130.2	127.9
	Singapore	1973	42	Upward	59.4	52.7	45.3	33.3	30.1	30.3	45.9	66.8	87.4	104.1	117.3	127.1
	Thailand	1978	54	Upward	n.a.	n.a.	38.7	35.7	38.0	34.2	n.a.	118.4	180.7	244.4	293.8	332.5
	Chile	1975	45	n.a.	n.a.	n.a.	150.6	182.4	203.3	244.1	n.a.	n.a.	n.a.	263.3	295.8	341.8
B	Costa Rica	1975	40	Upward	n.a.	n.a.	n.a.	n.a.	2.6	4.4	n.a.	8.2	12.4	19.0	23.7	28.8
	Guatemala	1975	39	Downward	113.7	116.9	99.2	77.1	64.7	67.5	61.0	71.0	95.1	108.1	109.7	121.9
	U.S.A.	1975	39	Downward	n.a.	n.a.	n.a.	65.9	65.3	62.8	n.a.	n.a.	n.a.	44.4	61.4	62.4
	Australia	1977	43	Downward	n.a.	n.a.	n.a.	15.1	15.2	17.3	n.a.	n.a.	n.a.	n.a.	5.7	12.6
	New Zealand	1976	38	Level	356.4	363.1	358.1	326.3	266.9	n.a.	163.1	205.4	246.0	278.2	299.6	n.a.

deaths attributed to cerebrovascular disease, nephritis and nephrosis. As a competing cause of death tuberculosis is also a significant factor in Japan. It is possible that because of other factors in the environment, arteriosclerosis expresses itself in Japan less in coronary heart attacks and more in strokes. However, though the absolute level of ischaemic heart disease may be low in the Japanese population, it is still true that it is raised in those who smoke in the same proportion (a doubling of the mortality risk) as for smokers elsewhere.

Females in developed countries increasingly since they entered the labour market in large numbers at the beginning of World War II have been emulating the smoking practices of men. Table 2 shows figures for a few selected countries.

For females aged 45–54 mortality from ischaemic heart disease has been rising in England and Wales, Denmark, Netherlands, Yugoslavia, Singapore and New Zealand, although for most of these countries the 1980 figures show some easing.

Though not rising, mortality is comparatively high in Hungary, the U.S.A. and Australia. Austria, Germany F.R., Japan, Chile and the U.S.A. are countries where the mortality has been high but is declining. France as for males exhibits a low death-rate from ischaemic heart disease, as also does Hong Kong. It is significant that those countries where the death-rate is rising or has been rising until very recently, namely, Australia, England and Wales, Denmark, Netherlands, New Zealand and the U.S.A. are those where substantial participation of women in smoking is of relatively long duration. The picture is not clear because, as has been earlier remarked in this paper, ischaemic heart disease is influenced independently by factors other than smoking and these factors are being attacked, often more resolutely than is smoking.

CANCER

The most pronounced association between smoking and disease, and the earliest one established, is that of lung cancer. The risk of dying from cancer of the lung and bronchus is generally increased tenfold by smoking. The excess mortality is reduced, but only reduced, for smokers who consume filter cigarettes and low tar nicotine cigarettes. Ex-smokers experience decreasing lung cancer mortality which approaches that of non-smokers after 10–15 years of cessation. The lung, trachea and bronchus is the most frequent site affected but smoking increases the risk of cancer of several other sites—oral cavity, oesophagus, urinary bladder, kidney and pancreas. As for lung cancer, there is in laryngeal, oral and oesophageal cancer a dose-response effect, the risk increasing with the average daily consumption of cigarettes. For these cancers there also appears to be a synergistic effect between smoking and alcohol intake. Pipe and cigar smokers experience approximately the same risk as cigarette smokers for all of these cancers except cancer of the lung.

LUNG CANCER (INCLUDING CANCER OF TRACHEA AND BRONCHUS)

Tables 1 and 2 show the more recent experience of lung cancer mortality in a number of countries. Looking first at males it can be seen that in all countries where there is substantial participation in smoking, death-rates have been rising and in most countries where this level of smoking has been prolonged (the 'incubation' period for lung cancer may be thirty years or so) the mean rate at ages 60–69 has reached or approached 400 per 100,000. The experience of England and Wales and the Netherlands suggests that this may represent the peak of the extra mortality associated with the recent level of smoking and other environmental conditions. Given the competition of other causes of death (already noted earlier) for Austria, France, Germany F.R., and Japan, it may be that the death-rate for lung cancer will peak at a somewhat lower level for these countries, perhaps around 300 per 100,000. This appears to have occurred already in Austria and Germany F.R. There does seem to have been a recent downturn in those countries where progress has been made in reducing smoking.

Turning to Table 2 it can be seen that in most countries where a high proportion of women have been smoking for many years—England and Wales, Denmark, Hungary, Netherlands, Poland, Sweden, U.S.A., Australia and New Zealand—the death-rate at ages 60–69 is still rising and in most cases, quite rapidly. The death-rate is also increasing in many other countries, even where the prevalence of smoking in women is alleged to be comparatively low, for example, Austria, Yugoslavia, Hong Kong. In Germany F.R. the age group death-rates fluctuated after 1964, rising in 1965–69, falling back slightly in 1970–74 but since then mortality from lung cancer in women has been rising.

REFERENCES

- BENJAMIN, B. (1981). *Smoking Mortality*. In papers of seminar on biological and social aspects of mortality. International Union for the Scientific Study of Population. Liege.