Social Inequalities and Cancer
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I: Unemployment and cancer: a literature review

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With a tenth of the labour force involuntarily out of work, unemployment has become an important element among the socioeconomic determinants of health in the rich countries. Unemployed men have an excess cancer mortality of close to 25% compared with that of all men in the labour force. The available data from various countries indicate that this excess risk is found both in periods when the unemployment rate is about 1% and in periods when it is about 10%. Furthermore, it persists long after the start of unemployment and it does not disappear when social class, smoking, alcohol intake, and previous sick days are controlled for. The excess cancer mortality comes mainly from lung cancer, and the increased risk of lung cancer does not disappear when social class and number of previous sick days are controlled for. Unemployment does not increase smoking, but unemployed men have a slightly higher smoking prevalence before unemployment. However, as the excess lung cancer risk among unemployed men remains after controlling for social class, it seems unlikely that it can be explained only by differences in smoking prior to unemployment.

The populations of the countries of the Organization for Economic Cooperation and Development on average experienced an unemployment rate of 6.5% in 1993. This percentage increased to 9.2% when discouraged workers and those involuntarily working part time were classified as unemployed (OECD, 1994). The unemployment rate in the United States of America has fluctuated between 5% and 10% during the past 20 years, and was 7% in 1993. The unemployment rate in Japan increased from close to 1% in the early 1970s to more than 2% in 1993. A very dramatic increase was seen in the unemployment rate in countries of the European Union. The rate was below 3% in the early 1970s but went up to 11% in 1985, and although it decreased to close to 8% in 1990, it increased again to close to 11% in 1993 (European Commission, 1994) (Figure 1).

With a tenth of the labour force involuntarily out of work, unemployment has thus become an important element among the socioeconomic determinants of health in the rich countries. This chapter focuses on unemployment as a potential risk factor for developing cancer. The problems faced by cancer patients in continuing working after diagnosis and treatment are not discussed.

The chapter reviews available studies on cancer mortality and morbidity among unemployed men. Due to the considerable changes in the participation of women in the labour market during the last 30 years, data on health in relation to unemployment among women are often difficult to interpret and are therefore not discussed here.

Data sources

The available studies on cancer mortality and cancer morbidity among unemployed men are all cohort studies, where populations classified as unemployed at the start of the study period are followed-up for cancer death and/or incident cancer cases over a certain period of time. The observed numbers of cancer deaths and/or incident cancer cases are compared with the expected numbers based on the accumulated person years at risk and rates for either all men or all economically active men in the respective populations. The results are reported as standardized mortality ratios (SMRs), standardized incidence ratios (SIRs) or relative risks (RRs). Cancer mortality among unemployed men has been studied in the United Kingdom, Finland, Italy (Turin), the United States, and Denmark. Cancer morbidity among unemployed men has been studied in the United Kingdom and Denmark.

United Kingdom

Longitudinal study 1971 In the Office of Population Censuses and Surveys longitudinal study, routinely

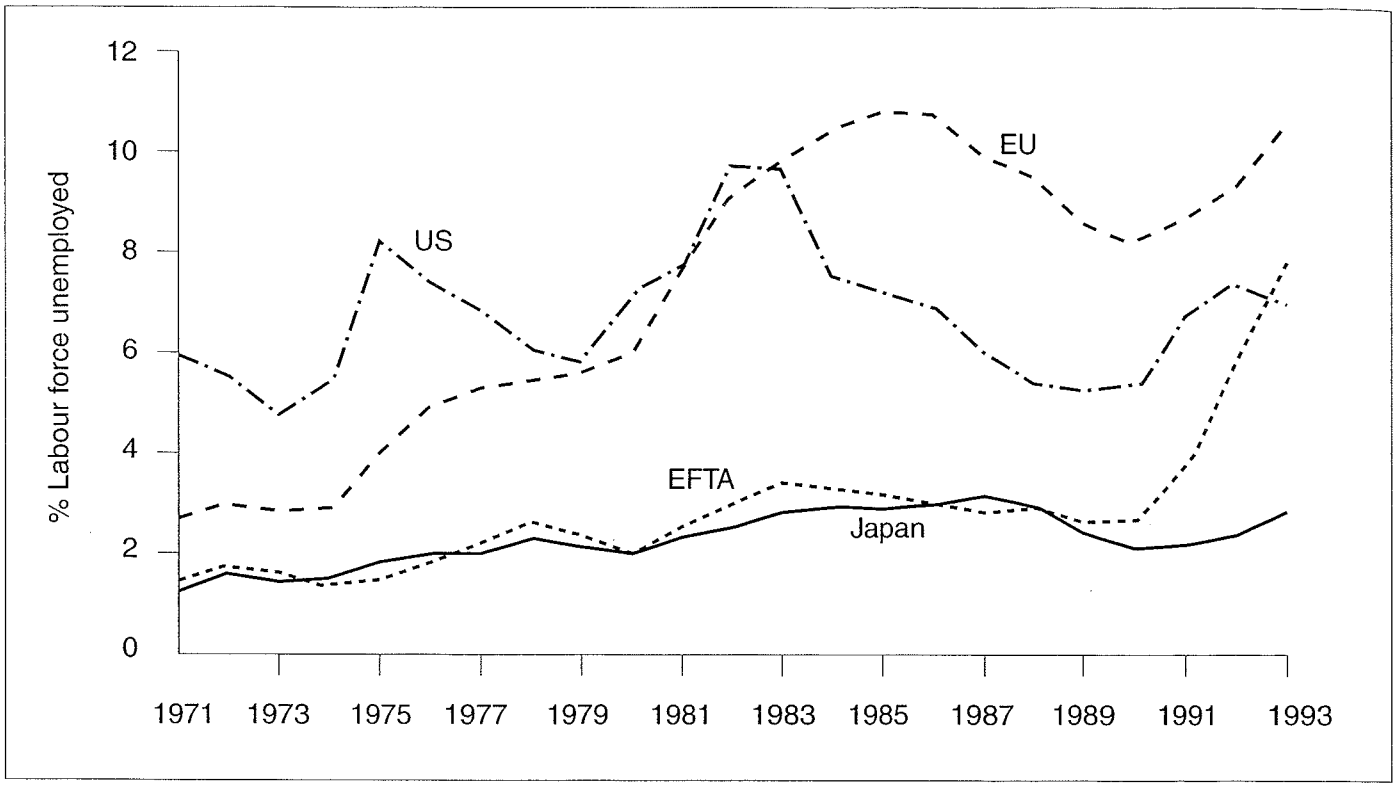

Figure 1. Unemployment rates in the European Union (EU), Economic Free Trade Association (EFTA), United States of America (US) and Japan 1971 to 1993. Redrawn from European Commission, 1994.

collected census, vital status, and other data are brought together continuously in time for a 1% sample of individuals in the United Kingdom. The study started with a 1% sample of the 1971 census population, which included 530 000 persons. They were followed-up for mortality in the National Health Service Central Register for the 10-year period 1971–1981, and 513 000 were successfully traced. In the analysis, the unemployed group comprised those men who indicated in response to the 1971 census question on economic position that they were seeking work or waiting to take up a job in the week before the census. Among 161 699 men aged 15–64, 5961 (3.6%) were seeking work, and during the 10-year follow-up period 1971–1981, 102 cancer deaths occurred in this group (Moser *et al.*, 1990). The population was also followed-up for incident cancer cases during the same period by linkage to data from the National Cancer Registration Scheme, and 267 incident cancer cases occurred (Kogevinas, 1990).

Longitudinal study 1981 When the longitudinal study was updated with information from the 1981 census, 14 675 men in the age group 15–64 were recorded as seeking work. They were followed-up for mortality in the National Health Service Central Register for the three-year period 1981–1983. Cancer deaths were reported only for 1983, when 25 cancer deaths occurred in this group (Moser *et al.*, 1987).

British Regional Heart Study In 1978–1980, men aged 40–59 were randomly selected from one general practice in each of 24 towns in England, Wales and Scotland to form the study population of the British Regional Heart Study. At the time of recruitment, research nurses administered a standard questionnaire includimg questions on occupational history, employment status, and medical history. After five years (1983–1985), a postal questionnaire was sent to all surviving men still resident in the United Kingdom and information was obtained from 7275 (98%) on their employment status during the five years before recruitment and the five years between the two questionnaires. Included in the analysis were 6191 men with continuous employment during the five years preceding recruitment; 923 (15%) of these men experienced unemployment not due to illness during the next five years. Mortality was followed through the National Health Service Central Register up to January 1990, and 27 cancer deaths occurred (Morris *et al.*, 1994).

Table 1. Populations covered by studies of cancer mortality and/or morbidity among unemployed men

Country	Population	Age group	Number of: All men	Number of: Unemployed men	Percentage unemployed	Reference
United Kingdom	1971 census	15–64	161 699	5661	4%	Moser *et al.*, 1990
	1981 census	16–64	NA	14 675	6–14%	Moser *et al.*, 1987
	1978–1980 British Regional Heart Study	40–59	6191	923	15%	Morris *et al.*, 1994
Finland	1980 census	30–54	NA	NA	7%	Martikainen, 1990
Italy	1981 census	15–59	NA	13 462	4%	Costa & Segnan, 1987
USA	1979–1983 Current Population Surveys	White, 25–64	137 274	7501	5%	Sorlie & Rogot, 1990
Denmark	1970 census	20–64	1 292 337	15 340	1%	Lynge & Andersen, 1996
	1986 census	20–64	1 352 932	183 184	14%	Lynge & Andersen, 1996

NA, not applicable.

Finland

The Finnish study was based on the 1980 census records in Finland linked with all deaths during 1981–1985 and certain variables from the 1970 and 1975 censuses. In addition, variables that measure health and income were linked from the data files of the Social Insurance Institution and the National Board of Taxation. The analysis concerned men in the labour force aged 30–54 at the time of the census. Only wage earners were included. The duration of employment during the year before the census was known for all subjects. During the study period, 2.7 million person years were accumulated, of which 200 000 (7%) were among the unemployed. The number of observed cancer deaths was not reported (Martikainen, 1990).

Italy

A longitudinal study in Italy followed the mortality in a cohort of more than a million people who were residents of Turin at the time of the 1981 census. This study included 13 462 men aged 15–59 who, having lost their job, were seeking a new one in the week before the 1981 census (4%). Their mortality was followed through 1985, and 78 cancer deaths occurred (Costa & Segnan, 1987).

United States

The National Longitudinal Mortality Study in the United States comprises records assembled from the United States Bureau of Census Current Population Surveys. The surveys used for the analysis were obtained in March 1979, April 1980, August 1980, December 1980, March 1981, March 1982, and March 1983. In all, 137 274 White men aged 25–64 were identified. Of these, 7501 (5.4%) were recorded as unemployed. They were matched to the National Death Index to ascertain death for a five-year follow-up period, and 20 cancer deaths occurred (Sorlie & Rogot, 1990).

Denmark

1970 census In total, 2.8 million persons aged 20–64 participated in the 1970 census in Denmark.

Table 2. Total cancer mortality and morbidity, and lung cancer mortality and morbidity, in unemployed men

Country and population	Follow-up period	Age group	All cancer			Lung cancer			Reference
			Obs.	SMR/RR	Adj. SMR/RR	Obs.	SMR/RR	Adj. SMR/RR	
United Kingdom	1971–1981	15–64	102	1.44	1.28[a]	56	1.89	1.62[a]	Moser *et al.*, 1990
1971 census,	1971–1975		52	1.42	NA	33	2.06	1.74[a]	
mortality	1976–1981		50	1.48	NA	23	1.70	1.45[a]	
1971 census,	1971–1981	15–64	267	1.29	NA	96	1.50	NA	Kogevinas, 1990
incidence	1971–1975		103	1.18	NA	43	1.56	NA	
	1976–1981		164	1.37	NA	53	1.46	NA	
1981 census, mortality	1983	16–64	25	1.38	NA	14	2.09	NA	Moser *et al.*, 1987
1978–1980 British Regional Heart Study, mortality	1978/80–1989	40–59	27	1.74	1.59[b]	NA	NA	NA	Morris *et al.*, 1994
Finland	1981–1985	30–54	NA	1.39	1.17[c]	NA	2.05	1.43[c]	Martikainen, 1990
1980 census, mortality									
Denmark	1970–1980	20–64	NA	1.33	NA	NA	NA	NA	Iversen *et al.*, 1987
1970 census,	1970–1975		163	1.24	NA	70[d]	1.54[d]	NA	Lynge & Andersen, 1996
mortality	1976–1980		NA	1.40	NA	NA	NA	NA	Iversen *et al.*, 1987
1970 census, incidence	1970–1975		291	1.25	NA	97[d]	1.64[d]	NA	Lynge & Andersen, 1996
1986 census, mortality	1986–1990	20–64	1204	1.23	NA	464[d]	1.44[d]	NA	Lynge & Andersen, 1996
Italy	1981–1985	15–59	78	1.75	NA	NA	NA	NA	Costa & Segnan, 1987
1981 census, mortality									

Table 2. (contd.) Total cancer mortality and morbidity and lung cancer mortality and morbidity, in unemployed men

Country and population	Follow-up period	Age group	All cancer Obs.	All cancer SMR/RR	All cancer Adj. SMR/RR	Lung cancer Obs.	Lung cancer SMR/RR	Lung cancer Adj. SMR/RR	Reference
USA 1979–1983 Current Population Survey, mortality	1979–1983	25–64	20	0.86	NA	NA	NA	NA	Sorlie & Rogot, 1990

Obs., observed number; Adj., adjusted.
[a]Age and social class controlled for.
[b]Age, town, social class, smoking, alcohol intake, and pre-existing disease at initial screening controlled for.
[c]Age, socioeconomic status, education, marital status, use of reimbursable medicines, and number of sick allowance days controlled for.
[d]Cancer of respiratory organs (International Classification of Diseases and Causes of Death, revision 8, 160–163).

They were classified by status of work based on the information from self-administered census questionnaires on their status of work on 9 November 1979. Among 1 292 337 economically active men, 15 340 (1.2%) were recorded as unemployed. Their mortality was followed for a 10-year period by linkage to the National Population and Death Registers (Iversen *et al.*, 1987; Lynge & Andersen, 1996); there were 163 cancer deaths during the first five years. Their cancer incidence was followed for a five-year period by linkage to the National Cancer Register; there were 291 incident cancer cases during these five years (Lynge & Andersen, 1996).

1986 census In total, 3 million persons aged 20–64 were included in the 1986 census in Denmark. They were classified by status of work based on information in public administrative registers for the period 1981–1985. Persons classified as unemployed had been unemployed for at least 30% of the year for each of the years during the period 1981–1985. Among 1 352 932 economically active men, 183 184 (13.5%) were unemployed. Their mortality was followed for a five-year period by linkage to the National Population and Death Registers, and 1204 cancer deaths occurred (Lynge & Andersen, 1996).

Results

Table 1 shows that the proportion of unemployed men varied from 1% (1970 cohort from Denmark) to 14% (1981 cohort from the United Kingdom and 1986 cohort from Denmark) in the studied cohorts. Table 2 shows that all of these cohorts of unemployed men had an excess cancer mortality, except for the 1979–1983 cohort from the United States.

In the United Kingdom, men who described themselves as 'seeking work' at the time of the 1971 census had an SMR of 1.44 for dying of cancer during the period 1971–1981. The SMR was reduced to 1.28 when social class was controlled for. The excess was seen both in the period 1971–1975 (SMR = 1.42) and in the period 1976–1981 (SMR = 1.48) (Moser *et al.*, 1990). The unemployed men also had an excess cancer morbidity with an SIR of 1.28 for the period 1971–1981 (Kogevinas, 1990). Men who described themselves as 'seeking work'

Table 3. Cancer mortality and morbidity for sites other than lung in unemployed men

Country and population	Follow-up period	Age group	Cancer site	Obs.	SMR/RR	Adj. SMR/RR	Reference
United Kingdom 1971 census, incidence	1971–1981	15–64	Stomach	14	0.82	NA	Kogevinas, 1990
			Colon	16	1.40	NA	
			Rectum	12	1.14	NA	
			Pancreas	7	1.17	NA	
			Prostate	12	1.04	NA	
			Bladder	17	1.33	NA	
			Leukaemia	6	1.54	NA	
Finland 1980 census, mortality	1981–1985	30–54	Stomach	NA	1.18	1.06[a]	Martikainen, 1990
			Colon and rectum	NA	1.42	1.60[a]	
Denmark 1970 census, mortality	1970–1975	20–64	Digestive organs	47	1.15	NA	Lynge & Andersen, 1996
			Male genital and urinary organs	22	1.27	NA	
			Haematopoietic system	8	0.70	NA	
Denmark 1970 census, incidence	1970–1975	20–64	Digestive organs	77	1.34	NA	Lynge & Andersen. 1996
			Male genital and urinary organs	48	0.98	NA	
			Haematopoietic system	14	0.79	NA	
Denmark 1986 census, mortality	1986–1990	20–64	Digestive organs	306	1.14	NA	Lynge & Andersen, 1996
			Male genital and urinary organs	138	1.10	NA	
			Haematopoietic system	89	0.91	NA	

Obs., observed number; Adj., adjusted.

[a]Age, socioeconomic status, education, marital status, use of reimbursable medicines, and number of sick allowance days controlled for.

at the time of the 1981 census in the United Kingdom had an SMR of 1.38 for dying of cancer in 1983 (Moser *et al.*, 1987).

Men who were employed both when they were recruited to the British Regional Heart Study in 1978–1980 and during the previous five years but who lost employment during the five subsequent years had a RR of 1.74 for dying of cancer between recruitment and 1989. The RR was reduced to 1.59 when town, social class, smoking, alcohol intake, and pre-existing disease at the initial screening were controlled for (Morris *et al.*, 1994).

The duration of unemployment in the year before the census was known for all subjects in the 1981 census in Finland. During the period 1981–1985, unemployed men had a RR of 1.39 for dying of cancer. This was reduced to 1.17 when socioeconomic status, education, marital status, and use of reimbursable medicines and number of sick allowance days in the previous year were controlled for (Martikainen, 1990).

An SMR of 1.75 for dying of cancer during the years 1981–1985 was found for men who reported seeking work at the time of the 1981 census in Turin, Italy (Costa & Segnan, 1987).

In the USA an SMR of 0.86 was found for cancer mortality among men registered as unemployed at any of the Current Population Surveys in

1979–1983. Mortality was followed through 1983 only (Sorlie & Rogot, 1990).

In Denmark, unemployed men had an excess cancer mortality of close to 25% during the first five years of follow-up both in the 1970 cohort (SMR = 1.24) and in the 1986 cohort (SMR = 1.23). A similarly increased cancer morbidity was found for the 1970 cohort (SIR = 1.25) (Lynge & Andersen, 1996). The observation from the 1971 census in the United Kingdom of an excess cancer mortality among unemployed men during both the first five years and the next five years of follow-up was also seen in the Danish 1970 cohort, where the RR for dying of cancer was 1.25 during the years 1970–1975 and 1.40 during the years 1976–1980 (Iversen *et al.*, 1987).

Table 2 shows that in all countries with available data, the excess cancer mortality came mainly from an excess risk of lung cancer. The SMR for lung cancer in the United Kingdom 1971 census data was 1.89, and 1.62 when social class was controlled for (Moser *et al.*, 1990). The SIR for lung cancer in this cohort was 1.50 (Kogevinas, 1990). The SMR for lung cancer in the United Kingdom 1981 census data was 2.09 (Moser *et al.*, 1978). The RR for lung cancer for unemployed men in the Finnish 1981 census data was 2.05, and 1.43 when background variables such as socioeconomic status and number of sick days were controlled for (Martikainen, 1990). In Denmark, the SMRs for cancer of the respiratory organs were 1.54 for the 1970 cohort and 1.44 for the 1986 cohort. The SIR for cancer of the respiratory organs for the 1970 cohort was 1.64 (Lynge & Andersen, 1996).

The data are sparse on cancer mortality and morbidity for sites other than lung among unemployed men. The available data are listed in Table 3. There might be an indication of an excess risk for cancer of the colon, rectum and bladder among unemployed men. However, more detailed tabulations than those presently published are needed for the data to be informative.

Discussion

In summary, the data reviewed in this chapter point to an excess cancer risk among unemployed men. This excess risk exists when unemployed men constitute 1% or 10% of all men; it persists long after the unemployment started; and it does not disappear even when social class, smoking, alcohol intake, and previous sick days are controlled for.

The key question concerning the excess cancer mortality and morbidity seen in unemployed men is whether this excess is purely an effect of selection of unhealthy persons into unemployment or whether the unemployment in itself increases the risk of cancer.

Unemployment has in many studies been associated with minor psychological disorders such as negative effects on happiness, life satisfaction, self-esteem and an increase in general distress, anxiety and depressed mood (Hammerström, 1994). Social activity and participation – and therefore social support – also fall dramatically for many unemployed people (Bartley, 1994).

It is difficult to study the association be-tween psychosocial factors and the risk of later developing cancer. However, some follow-up studies have been undertaken of cancer mortality and cancer morbidity in populations in which personality, extent of social network, and so on have been assessed at the start of the study period. Although a positive association between a depressed mood and later risk of cancer has been reported (Persky *et al.*, 1987), most studies have failed to find such an association (Kaplan & Reynolds, 1988; Zonderman *et al.*, 1989; Linkins & Comstock, 1990; Vogt *et al.*, 1992). Site-specific cancer data are available from only some of the studies. In the 12-year follow-up study of cancer incidence in persons from Washington County, Maryland, USA (Linkins & Comstock, 1990), an 18-fold risk for cancer sites associated with smoking was found among heavy smokers with a depressed mood compared with never smokers without a depressed mood. The sparse data in the other studies do not indicate an excess risk of such cancers in depressed persons (Persky *et al.*, 1987; Kaplan & Reynolds, 1988).

The results presented in this chapter showed an excess cancer incidence among unemployed men, but this excess risk was not equally shared among all cancers. The excess risk came mainly from lung cancer. The SMR for lung cancer in the United Kingdom 1971 census data was 1.89, and 1.62 when social class was controlled for. The SMR for lung cancer in the United Kingdom 1981 census data was 2.09. The RR for lung cancer for unemployed men in the Finnish 1981 census data was 2.05, and 1.43 when background variables such as socio-

Table 4. Changes in smoking habits when continuously employed men become unemployed

Country and population	Year of recruitment	Year of follow-up	Age at recruitment	Number of men	Smoking at recruitment		Smoking at follow-up		Reference
					Current smoker	Heavy smoker	Current smoker	Heavy smoker	
United Kingdom British Regional Heart Study	1978–1980	1983–1985	40–59						Morris *et al.*, 1992
– continuously employed[a]				4401	37%	13%	29%	8%	
– unemployed for other reasons[b]				376	45%	16%	35%	10%	
Denmark MONICA I	1982	1987	30, 40 50, 60						Osler, 1995
– continuously employed[c]				1083	57%	36%	51%	34%	
– not continuously employed[d]				96	63%	37%	61%	34%	

[a]Men employed at initial screening, without unemployment in previous five years and with continuous employment throughout the five years after initial screening.
[b]Men employed at initial screening, without unemployment in previous five years and with unemployment for reasons other than illness during the five years after initial screening.
[c]Men employed at initial screening and continuously employed throughout the five years of follow-up.
[d]Men employed at initial screening and not continuously employed throughout the five years of follow-up.

economic status and number of sick days were controlled for. The SMR of 1.54 for cancer of respiratory organs among unemployed men in the Danish 1971 census data was above the SMRs of 1.35 and 1.13 found for skilled and unskilled workers, respectively (Lynge, 1979).

Unemployed men thus seem to have an excess lung cancer risk. This exists when unemployed men constitute 1% or more than 10% of all men; it persists long after the unemployment started; and it does not disappear when social class and number of sick days are controlled for.

As smoking is the main risk factor for lung cancer it is interesting to look at the available data on unemployment and smoking habits. Data from the longitudinal studies on risk factors for heart disease from the 1980s from both the United Kingdom (Morris *et al.*, 1992) and Denmark (Osler, 1995) show that the slightly higher prevalence of smoking among unemployed men than among employed men in the 1980s was due to differences in smoking habits established before unemployment started (Table 4). The available data therefore do not support the hypothesis that smoking increases as a result of unemployment. A survey of smoking habits among men in Denmark in 1986–1987 showed that less than 50% of salaried employees with a higher education smoked, whereas 60% of unskilled workers and more than 70% of unemployed men smoked. A similar survey in 1990–1991 showed, however, a prevalence of smoking between 50% and 60% in all of the three groups (Osler, 1992).

Moser *et al.* (1990) argued that 'to explain an excess of lung cancer mortality in 1971–1981, exposure to a risk factor before 1971 would seem likely to have been necessary'. None of the available studies provides data on

lung cancer among the unemployed in which smoking has been controlled for. However, in the British Regional Heart Study the excess risk (RR) of all cancer mortality changed only from 1.74 to 1.59 when social class, smoking and so on at the time of recruitment were controlled for, and the excess risk of lung cancer prevailed after controlling for social class both in the United Kingdom 1971 and 1981 census and in the Finnish 1981 census studies. It therefore seems unlikely that differences in smoking habits prior to unemployment alone can explain the excess lung cancer risk among unemployed men.

Maybe men who became unemployed had been exposed to occupational carcinogens more frequently, or maybe development of lung cancer was actually accelerated during unemployment. It is interesting in this context that the combination of heavy smoking and depressed mood was associated with a high risk of smoking-associated cancers in one study (Linkins & Comstock, 1990). From the available data it is not possible to distinguish between such possibilities. But it remains an observation that unemployed men compared with employed men have a 40% to 70% excess risk of lung cancer, which can probably not be explained by excessive smoking alone.

References

Bartley, M. (1994) Unemployment and ill health: understanding the relationship. *J. Epidemiol. Community Health*, 48, 333–337

Costa, G. & Segnan, N. (1987) Unemployment and mortality. *Br. Med. J.*, 294, 1550–1551

European Commission (1994) *Employment in Europe 1994*. Luxembourg, Office for Official Publications of the European Communities

Hammerström, A. (1994) Health consequences of youth unemployment – review from a gender perspective. *Soc. Sci. Med.*, 38, 699–709

Iversen, L., Andersen, O., Andersen, P.K., Christoffersen, K. & Keiding, N. (1987) Unemployment and mortality in Denmark 1970–80. *Br. Med. J.*, 295, 879–884

Kaplan, G.A. & Reynolds, P. (1988) Depression and cancer mortality and morbidity: prospective evidence from the Alameda County Study. *J. Behav. Med.*, 11, 1–13

Kogevinas, M. (1990) *Longitudinal study: socio-demographic differences in cancer survival 1971–1983*. London, Her Majesty's Stationery Office

Linkins, R.W. & Comstock, G.W. (1990) Depressed mood and development of cancer. *Am. J. Epidemiol.*, 132, 962–972

Lynge, E. (1979) Occupational mortality in Denmark 1970–75 (in Danish) (Statistiske undersøgelser nr. 37). København, Danmarks Statistik

Lynge, E. & Anderson, O. (1997) Unemployment and cancer in Denmark 1970–1975 and 1986–1990. In: *Social Inequalities and Cancer,* Kogevinas, M., Pearce, N., Susser, M. & Boffetta, P., eds (IARC Scientific Publication No. 138) Lyon, International Agency for Research on Cancer pp. 353–359

Martikainen, P. (1990) Unemployment and mortality among Finnish men. *Br. Med. J.*, 301, 407–411

Morris, J.K., Cook, D.G. & Shaper, A.G. (1992) Non-employment and changes in smoking, drinking, and bodyweight. *Br. Med. J.*, 304, 536–541

Morris, J.K., Cook, D.G. & Shaper, A.G. (1994) Loss of employment and mortality. *Br. Med. J.*, 308, 1135–1139

Moser, K.A., Goldblatt, P.O., Fox, A.J. & Jones, D.R. (1987) Unemployment and mortality: comparison of the 1971 and 1981 longitudinal study samples. *Br. Med. J.*, 294, 86–90

Moser, K., Goldblatt, P., Fox, J. & Jones, D. (1990) Unemployment and mortality. In: Goldblatt, P.O., ed., *Longitudinal study: mortality and social organisation.* London, Her Majesty's Stationery Office. pp. 81–97

OECD (1994) Employment outlook. Paris, Organization for Economic Cooperation and Development

Osler, M. (1992) Smoking habits in Denmark from 1953 to 1991: a comparative analysis of results from three nationwide health surveys among adult Danes in 1953–1954, 1986–1987 and 1990–1991. *Int. J. Epidemiol.*, 21, 862–871

Osler, M. (1995) Unemployment and change in smoking behaviour among Danish adults. *Tobacco Control*, 4, 53–56

Persky V.W., Kempthorne-Rawson J. & Shekelle, R.B. (1987) Personality and risk of cancer: 20-year follow-up of the Western Electric Study. *Psychosomatic Med.*, 49, 435–449

Sorlie, P.D. & Rogot, E. (1990) Mortality by employment status in the national longitudinal mortality study. *Am. J. Epidemiol.*, 132, 983–992

Vogt, T.M., Mullooly, J.P., Ernst, D., Pope, C.R. & Hollas, J.F. (1992) Social networks as predictors of ischemic heart disease, cancer, stroke and hypertension: incidence, survival and mortality. *J. Clin. Epidemiol.*, 45, 659–666

Zonderman, A.B., Costa, P.T. & McCrae, R.R. (1989) Depression as a risk for cancer morbidity and mortality in a national representative sample. *J. Am. Med. Assoc.*, 262, 1191–1195

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