Social class, health behaviour, and mortality among men and women in eastern Finland

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Abstract

Objective—To evaluate the associations between social class as defined by occupation, health behaviour, and mortality from all causes and coronary heart disease among middle aged men and women in eastern Finland.

Design—Prospective observational study of two independent, random population samples examined in 1972 and 1977.

Setting—North Karelia and Kuopio, Finland.

Subjects—8967 men and 9694 women aged 30-64 years at the beginning of the follow up study. The subjects were followed up for mortality up till 1987 by using the National Death Registry.

Measurements and main results—Altogether 1429 men and 620 women died during the follow up, 603 men and 164 women of coronary heart disease. Among both sexes, compared with white collar workers unskilled blue collar workers had more adverse risk factors and also higher mortality due to coronary heart disease, other cardiovascular diseases, cancer, violent causes, and all other causes. Among men the age adjusted relative risk for all cause mortality in unskilled blue collar workers v white collar workers was reduced from 1.86 (95% confidence interval 1.55 to 2.22) to 1.47 (1.23 to 1.77) when adjusted for smoking, serum cholesterol concentration, hypertension, body mass index, and physical activity in leisure time. Among women the corresponding reduction in hazard ratio was from 1.49 (1.15 to 1.92) to 1.39 (1.07 to 1.81). The respective hazard ratios for coronary heart disease were 1.54 (1.16 to 2.02) and 1.22 (0.92 to 1.61) among men and 1.74 (1.05 to 2.90) and 1.66 (0.99 to 2.79) among women.

Conclusions—Unfavourable cardiovascular risk factors and high mortality are concentrated among lower social classes in Finland. Among men about half of the excess coronary and all cause mortality among unskilled blue collar workers was associated with their unfavourable risk factor profile. The association was smaller in women.

Introduction

Differences in mortality between the social classes are clearly larger in Finland than in other Nordic countries and also possibly somewhat larger than in Great Britain.^{1,2} During the 1980s the relative differences in mortality between the social classes have increased in Finland.^{3,4} Social class measured in middle age and mortality from future coronary heart disease are interwoven in a complex network of influences, and more adverse cardiovascular risk factors among the lower social classes explain only part of their higher mortality.⁵⁻¹⁴ Other factors include current material conditions, social mobility, psychosocial factors, and environmental influences as well as health during

pregnancy and childhood.¹⁵ According to most previous analyses^{7-12,14} about one quarter to one half of the excess coronary risk among men in lower social classes is associated with well known, preventable cardiovascular risk factors. None of these previous analyses has, however, studied women. In the present article we examine the associations between social class, as defined by occupation, cardiovascular risk factors, and mortality among 18 661 middle aged men and women in eastern Finland.

Study population and methods

In connection with the North Karelia Project independent 6.6% random samples of men and women born in 1913-47 and living in the counties of North Karelia and Kuopio were invited for examination in 1972 (men and women aged 25-59) and in 1977 (men and women aged 30-64).¹⁶ The only larger urban area in North Karelia is Joensuu, a town of 50 000 inhabitants. An additional 6.6% random sample of those living in Joensuu was also examined and added to the present analyses to increase sample size among non-farmers. Participation rates were 92.4% in 1972 and 89.6% in 1977.¹⁷ Smoking, physical activity in leisure time, and use of antihypertensive drugs were determined from a self administered questionnaire. Blood pressure was measured once with subjects seated, and serum cholesterol concentration was analysed with the Liebermann-Burchard method.

Occupational status was obtained through record linkage with the 1970 population census for those examined in 1972 and with the 1975 population census for those examined in 1977. Subjects were divided into four social classes on the basis of the 21 grade socioeconomic variable in the population census database by following the classification used by Valkonen *et al.*³ The four social classes used were (a) white collar workers—for example, those with university degrees, technicians, nurses, book keepers, cashiers, bank clerks, sales staff, telephone operators, non-commissioned officers; (b) skilled blue collar workers—for example, postal workers, janitors, railway staff, workers in mining and manufacturing work (except assistant workers), fire fighters, cooks, waiters, hairdressers; (c) unskilled blue collar workers—for example, forestry workers, assistant workers, kitchen hands, cleaners, nursery nurses, messengers, lift attendants; and (d) farmers—own account workers at farms and agricultural employers.

Pensioners were classified according to their past occupation. Employers and own account workers in occupations other than agriculture, students, pensioners with missing past occupation, and others with missing data on socioeconomic status were excluded from the analyses (n=1355). Housewives and others without present or past occupation were classified according to the head of the household. The

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TABLE I—Age adjusted distributions (percentages) of selected socioeconomic factors among eastern Finnish men and women aged 30-64 in 1972-7 by social class

Social class	No	Mean (SD) age (years)	Married	With 8 years of education	Owned cars	Unemployed
Men:						
White collar workers	2138	42.7 (9.2)	92	64	83	1
Skilled blue collar workers	3057	43.1 (8.9)	85	18	64	2
Unskilled blue collar workers	1358	45.4 (9.0)	60	6	34	5
Farmers	2414	47.6 (9.0)	78	11	55	1
P value*		<0.001	<0.001	<0.001	<0.001	<0.001
Women:						
White collar workers	3318	42.4 (8.9)	75	59	67	1
Skilled blue collar workers	1947	45.1 (9.5)	81	18	51	2
Unskilled blue collar workers	1529	46.9 (9.0)	76	14	42	2
Farmers	2900	48.6 (8.9)	82	17	49	1
P value*		<0.001	<0.001	<0.001	<0.001	<0.001

*Significance of global test for heterogeneity of differences between four social classes after adjustment for age, living area, and year of examination.

final analysis included 8967 men and 9694 women aged 30 to 64 years. None of the subjects had missing data on smoking.

Follow up of mortality in the study population was achieved through record linkage with the National Death Registry. By the end of 1987 there had been 2049 deaths, 767 due to coronary heart disease (*International Classification of Diseases* (eighth revision) codes 410-414).

Hypertension was defined as systolic blood pressure > 159 mm Hg or diastolic blood pressure > 94 mm Hg or use of antihypertensive drugs during the past week. Smokers who had quit smoking during the past six months were classified as current smokers. Obesity was defined as body mass index exceeding 27 kg/m². Physical activity in leisure time was determined by using a four level question describing the usual intensity of physical activity in leisure time. Those subjects who mostly read, watched television, or did other non-strenuous activities were classified as having little physical activity in leisure time. Those reporting as having been unemployed most of the year were classified as unemployed.

Means were age standardised by analysis of co-

variance and proportions and mortality rates by the direct method by using study population as the standard. Differences in risk factors attributable to social class were tested by using logistic regression models for categorical variables and analysis of covariance for continuous variables. Mortality was analysed with Cox's proportional hazards model.¹⁸ Statistical tests for differences in social class were global tests for heterogeneity with 3 df, except in tables IV and V, in which tests for trend are also presented. Farmers were excluded from these tests for trend.

As the associations for social class with mortality among both sexes were similar in the two cohorts and in the two areas, only pooled estimates are presented. Area and cohort were adjusted for by stratification in the Cox's models. Inspection of the residuals of the final Cox's models revealed no outliers and no departures from the proportionality assumption for social class.

In the mortality analysis serum cholesterol concentration, body mass index, and square of body mass index were used as continuous variables; smoking was divided into three categories (as in table VI), and other variables were dichotomised.

Results

The largest social class among men was skilled blue collar workers, but among women it was white collar workers (table I). Differences in education were large between the social classes. Among men, unskilled blue collar workers were more often unmarried and unemployed than men in other classes. There were also large differences in car ownership. Among women these differences were smaller.

Levels of all risk factors, except obesity among men and smoking among women, changed to a less favourable direction from white collar workers to unskilled blue collar workers (table II). Among men, farmers in general occupied an intermediate position but had the most unfavourable mean concentrations of

TABLE II—Age adjusted cardiovascular risk factors among eastern Finnish men and women aged 30-64 in 1972-7 by social class

Social class	No	% Who smoked	% With hypertension*	% With obesity	% Who undertook little physical activity in leisure time	Mean (SD) serum cholesterol (mmol/l)	Mean (SD) height (cm)
Men:							
White collar workers	2138	42	36	37	18	6.63 (1.20)	173.3 (6.3)
Skilled blue collar workers	3057	53	39	36	25	6.76 (1.28)	171.2 (6.2)
Unskilled blue collar workers	1358	63	44	29	36	6.90 (1.26)	169.8 (6.6)
Farmers	2414	44	39	34	47	6.96 (1.32)	170.9 (6.5)
P value†		<0.001	<0.01	<0.001	<0.001	<0.001	<0.001
Women:							
White collar workers	3318	15	31	30	32	6.57 (1.30)	159.8 (5.7)
Skilled blue collar workers	1947	16	36	40	45	6.72 (1.38)	158.1 (5.6)
Unskilled blue collar workers	1529	14	36	42	47	6.81 (1.35)	157.3 (6.1)
Farmers	2900	4	43	45	65	6.86 (1.38)	157.9 (5.8)
P value†		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

*Systolic blood pressure > 159 mm Hg or diastolic blood pressure > 94 mm Hg or taking drugs for blood pressure.

†Significance of global test for heterogeneity of differences between four social classes after adjustment for age, living area, and year of examination.

TABLE III—Mortalities for specific causes adjusted for age per 1000 person years of follow up among eastern Finnish men and women aged 30-64 by social class. Figures are numbers (rate)

Social class	Person years of follow up	Cause of death					
		Coronary heart disease	Other cardiovascular diseases	Cancer	Violent causes	All other causes	All cause mortality
Men:							
White collar workers	26 556	100 (5.0)	31 (1.6)	43 (2.2)	27 (1.1)	26 (1.2)	227 (11.1)
Skilled blue collar workers	37 307	194 (6.4)	61 (2.1)	86 (3.0)	63 (1.7)	51 (1.7)	455 (14.8)
Unskilled blue collar workers	16 451	119 (7.5)	44 (2.8)	69 (4.4)	48 (2.9)	37 (2.4)	317 (20.0)
Farmers	29 742	190 (5.6)	63 (1.9)	76 (2.2)	51 (1.8)	50 (1.6)	430 (13.0)
Women:							
White collar workers	42 736	29 (1.0)	22 (0.6)	51 (1.4)	10 (0.2)	15 (0.4)	127 (3.7)
Skilled blue collar workers	25 082	34 (1.4)	27 (1.1)	40 (1.6)	12 (0.5)	20 (0.8)	133 (5.4)
Unskilled blue collar workers	19 504	37 (1.7)	25 (1.1)	35 (1.6)	11 (0.5)	19 (0.9)	127 (5.8)
Farmers	37 638	64 (1.3)	57 (1.2)	70 (1.5)	11 (0.3)	31 (0.7)	233 (5.1)

TABLE IV—Relative differences in mortality from coronary heart disease between social classes among 17 829 eastern Finnish men and women aged 30–64* with increasing adjustment for various risk factors

Social class	No of deaths	Hazard ratio (95% confidence interval)† adjusted for			
		Age	Age and smoking	Age, smoking, cholesterol, and hypertension	Age, smoking, cholesterol, hypertension, body mass index, and physical activity
Men:					
White collar workers	95	1	1	1	1
Skilled blue collar workers	182	1.36 (1.06 to 1.74)	1.28 (1.00 to 1.64)	1.18 (0.92 to 1.51)	1.18 (0.92 to 1.52)
Unskilled blue collar workers	108	1.54 (1.16 to 2.02)	1.32 (1.00 to 1.75)	1.20 (0.91 to 1.59)	1.22 (0.92 to 1.61)
Farmers	183	1.10 (0.86 to 1.41)	1.11 (0.86 to 1.42)	0.99 (0.77 to 1.28)	0.99 (0.76 to 1.27)
P for global test‡		0.004	0.12	0.23	0.18
P for trend§		0.002	0.07	0.22	0.23
Women:					
White collar workers	26	1	1	1	1
Skilled blue collar workers	28	1.26 (0.74 to 2.15)	1.28 (0.75 to 2.18)	1.25 (0.73 to 2.13)	1.14 (0.67 to 1.96)
Unskilled blue collar workers	35	1.74 (1.05 to 2.90)	1.87 (1.12 to 3.12)	1.85 (1.11 to 3.09)	1.66 (0.99 to 2.79)
Farmers	60	1.29 (0.81 to 2.05)	1.54 (0.96 to 2.49)	1.44 (0.89 to 2.33)	1.24 (0.76 to 2.03)
P for global test‡		0.20	0.09	0.11	0.25
P for trend§		0.04	0.02	0.02	0.06

*Includes those subjects with no missing data on any of risk factors analysed.

†Relative mortality differences between social classes when adjusted only for age, then also for smoking, then also for serum cholesterol and hypertension, then also for body mass index, body mass index squared, and leisure time physical activity. All models stratified by living area and year of examination.

‡Significance of global test for heterogeneity of mortality differences between four social classes after adjustment for other factors.

§Significance of trend test, excluding farmers.

serum cholesterol and physical activity in leisure time. Among women, farmers had the lowest prevalence of smoking but had unfavourable levels of other risk factors.

All cause mortality was highest among unskilled blue collar workers of both sexes (table III). Relative differences in mortality due to cancer and violent causes of death between social classes were larger among men than among women, otherwise differences were similar. Mortality among farmers was intermediate to that in white collar and unskilled blue collar workers.

In age adjusted analyses unskilled blue collar workers had 54% higher coronary mortality than white collar workers (hazard ratio 1.54; table IV). About one third of this excess mortality was associated with smoking. When serum cholesterol concentration and prevalence of hypertension were further adjusted for, the excess mortality among unskilled blue collar workers was reduced to 20%. Further adjustment for obesity and physical activity in leisure time had little effect. Among women adjustment for smoking widened the social class differences, especially for the female farmers. Further adjustment for other risk factors reduced the differences slightly below the age adjusted figures. Further adjustment for height, in addition to all the other risk factors analysed, reduced

the hazard ratio in unskilled blue collar workers *v* white collar workers to 1.18 (95% confidence interval 0.89 to 1.57) among men and to 1.57 (0.93 to 2.66) among women.

Among men differences in all cause mortality between social classes were larger than in mortality from coronary heart disease (table V). About one third of the excess mortality among the unskilled blue collar workers was associated with smoking. Only a minor proportion of the excess mortality among women in lower social classes was associated with the risk factors examined. Further adjustment for height, in addition to all the other risk factors analysed, reduced the hazard ratio in unskilled blue collar workers *v* white collar workers to 1.42 (1.18 to 1.71) among men and to 1.29 (0.99 to 1.69) among women.

The effects of smoking and social class on all cause mortality were also examined in a stratified analysis (table VI). Given the wide confidence intervals in several strata the associations of social class with all cause mortality were in general similar to the estimates in table V. The hazard ratios, however, tended to be smaller among men who were former smokers. Also, when we calculated risk ratios for smoking were calculated from the table, former smoking proved more harmful among white collar men (risk ratio 1.56) than among skilled (1.30) or unskilled (0.96) blue

TABLE V—Relative differences in all cause mortality between social classes among 17 829 eastern Finnish men and women aged 30–64* with increasing adjustment for various risk factors

Social class	No of deaths	Hazard ratio (95% confidence interval)† adjusted for			
		Age	Age and smoking	Age, smoking, cholesterol, and hypertension	Age, smoking, cholesterol, hypertension, body mass index, and physical activity
Men:					
White collar workers	211	1	1	1	1
Skilled blue collar workers	429	1.44 (1.22 to 1.70)	1.35 (1.15 to 1.59)	1.30 (1.10 to 1.54)	1.29 (1.09 to 1.52)
Unskilled blue collar workers	282	1.86 (1.55 to 2.22)	1.60 (1.34 to 1.92)	1.53 (1.28 to 1.83)	1.47 (1.23 to 1.77)
Farmers	405	1.15 (0.97 to 1.36)	1.15 (0.97 to 1.36)	1.10 (0.93 to 1.30)	1.04 (0.88 to 1.24)
P for global test‡		<0.001	<0.001	<0.001	<0.001
P for trend§		<0.001	<0.001	<0.001	<0.001
Women:					
White collar workers	118	1	1	1	1
Skilled blue collar workers	122	1.36 (1.06 to 1.76)	1.36 (1.06 to 1.76)	1.34 (1.04 to 1.73)	1.27 (0.98 to 1.64)
Unskilled blue collar workers	117	1.49 (1.15 to 1.92)	1.52 (1.17 to 1.97)	1.50 (1.15 to 1.94)	1.39 (1.07 to 1.81)
Farmers	217	1.23 (0.98 to 1.54)	1.33 (1.06 to 1.68)	1.28 (1.02 to 1.62)	1.14 (0.89 to 1.45)
P for global test‡		0.02	0.01	0.02	0.07
P for trend§		0.003	0.002	0.003	0.01

*Includes only those subjects with no missing data on any of risk factors analysed.

†Relative mortality differences between social classes when adjusted only for age, then also for smoking, then also for cholesterol and hypertension, then also for body mass index, body mass index squared, and leisure time physical activity. All models stratified by living area and year of examination.

‡Significance of global test for heterogeneity of mortality differences between four social classes after adjustment for other factors.

§Significance of trend test, excluding farmers.

TABLE VI—Age adjusted associations of social class with all cause mortality among 17 829 eastern Finnish men and women aged 30–64* separately for never smokers, former smokers, and current smokers

Social class	No of people	No of deaths	Mortality/1000 person years†	Hazard ratio‡ (95% confidence interval)
Men:				
Never smokers:				
White collar workers	673	34	6.2	1
Skilled blue collar workers	688	47	7.4	1.27 (0.81 to 1.97)
Unskilled blue collar workers	252	28	11.5	1.97 (1.19 to 3.25)
Farmers	783	78	7.8	1.20 (0.80 to 1.81)
Former smokers:				
White collar workers	522	60	9.7	1
Skilled blue collar workers	693	79	9.6	0.99 (0.71 to 1.39)
Unskilled blue collar workers	218	35	11.0	1.13 (0.74 to 1.71)
Farmers	531	90	10.6	1.00 (0.72 to 1.39)
Current smokers:				
White collar workers	864	117	14.3	1
Skilled blue collar workers	1549	303	20.5	1.53 (1.24 to 1.90)
Unskilled blue collar workers	789	219	24.0	1.75 (1.39 to 2.19)
Farmers	1017	237	17.9	1.21 (0.97 to 1.51)
Women‡:				
Never smokers:				
White collar workers	2513	82	3.1	1
Skilled blue collar workers	1479	96	4.9	1.48 (1.10 to 1.99)
Unskilled blue collar workers	1215	96	5.3	1.62 (1.21 to 2.19)
Farmers	2658	209	5.0	1.43 (1.11 to 1.86)
Current smokers:				
White collar workers	486	29	6.5	1
Skilled blue collar workers	296	24	8.4	1.16 (0.67 to 2.00)
Unskilled blue collar workers	182	20	10.1	1.44 (0.81 to 2.55)
Farmers	85	6	6.1	0.77 (0.32 to 1.87)

*Same subjects included as in tables IV and V.

†Adjusted for age. Hazard ratios adjusted also for living area and year of examination by stratification.

‡Former smokers excluded due to small number of deaths (12).

collar workers, which suggests residual confounding by socioeconomic status.

Discussion

The higher mortality due to most causes in the lower social classes has been shown repeatedly both in Finland^{3,4,6} as in other industrialised Western countries.^{19,20} Based on our results about half of the excess mortality among male unskilled blue collar workers in eastern Finland was associated with their more adverse cardiovascular risk factor profile. Among women a clearly smaller proportion of the association between social class and mortality was associated with the risk factors analysed.

Several previous prospective studies have examined this issue among middle aged men but none among women. In the Whitehall study of British civil servants the excess risk of coronary death in the lowest compared with the highest grade of employment was 170% (relative risk 2.7) when adjusted for age and 110% (relative risk 2.1) when adjusted also for other cardiovascular risk factors. Therefore, about one third of the excess mortality due to coronary heart disease in the lowest grade was associated with their more adverse risk factor profile.^{7,10} Similarly, an estimate of about one half can be derived from the population based British Regional Heart⁸ and Oslo studies⁵ and a study of United States employees,¹¹ an estimate of about one third from a study in the former Soviet Union¹² and from a cross sectional study in Scotland,¹⁴ and an estimate of about one quarter from a study in Sweden.⁹ In contrast, a Danish study suggested a very small effect of smoking,¹³ which in other studies has been the dominant factor.

Taken together the results from most of these studies are remarkably consistent given the small number of deaths in several studies and the differences in the association of social class with risk factors over time²¹ and place. For example, in the older British studies average serum cholesterol concentrations were higher in upper social classes^{7,8} in contrast within the present and other Scandinavian studies^{9,22,23} and the more recent Scottish study.¹⁴ It should therefore be clearly acknowledged that the associations of social class with risk factors and mortality are not universal but may change in time and place. Given this, it is

surprising that several articles do not even mention the date of their baseline examination.

Among women adjustment for smoking increased the observed differences in social class especially among the female farmers, who rarely smoked. Overall, among women the excess mortality in the lower social classes had clearly less association with the risk factors studied than among men. Today in Finland the risk factors studied may explain more of the social class differences among women as currently more Finnish women in the lower classes smoke compared with women in the higher social classes.^{21,23} We also did not have information on the women's high density lipoprotein cholesterol concentrations, which may be a more important risk factor than total cholesterol among women.²⁴

The clear social class differences in height were also able to explain part of the differences in mortality. Height, however, reflects factors operating in early life that are no longer modifiable in adulthood.¹⁵

In the present analyses women's social class was primarily determined on their own present or past occupation not the husband's, as has been done in most studies.²⁵ In the beginning of the 1970s about 60% of middle aged women were working in their own occupation in the present study areas.^{26,27} Also, previous analyses from Finland have shown that classification by either own or spouse's occupation has little effect on the occupational mortality differentials.²⁸ Therefore, misclassification of the women's occupation is an unlikely explanation for the present findings. Farmers in the present classification are a very heterogeneous group, and they cannot easily be placed in the more or less hierarchical classification of workers.² Therefore farmers were excluded from the analyses with trend test but included in the overall comparisons.

Mortality was predicted by using factors which exert their influence at different levels of the hypothetical causal pathway that finally leads to death. When all these factors are entered in the analysis at the same time their relative importance is strongly influenced by the degree of measurement error in each variable.²⁹ This makes it very hard to respond to the question of whether cardiovascular mortality is more strongly associated with social class than lifestyle. Such a distinction is not even very helpful as the socioeconomic status of a person and his or her lifestyle are so tightly linked.

The present estimate of the proportion of the association between social class and mortality that is mediated through risk factors may be either too low or too high. Including other risk factors, like haemostatic factors,³⁰ in the analysis could have increased the power of the risk factors to "explain" mortality differences between social classes. Also having repeated measurements of the risk factors would have strengthened their association with mortality.³¹ On the other hand, we used only a single, broad measure of socioeconomic status. Therefore the social classes used are heterogeneous in respect to socioeconomic position and, for example, smoking can be related to socioeconomic position also within the social class categories.³² This suggestion is also supported by the present results. Use of several measures of socioeconomic position¹⁰ or a finer classification would probably have strengthened the association between socioeconomic status and mortality.

A sizeable part of the excess mortality in lower social classes seems to be mediated through the known cardiovascular risk factors. Therefore, it may be possible to narrow social class differences in health through improvements in health behaviour among the lower social classes. In accordance with the *Health for All 2000* programme of the World Health Organisation one of the major aims of health policy in Finland is to

Key messages

- Both unfavourable cardiovascular risk factor profiles and increased mortality concentrate in lower social classes
- No previous study has assessed what proportion of the excess coronary mortality among women in lower social classes is associated with risk factors
- In this Finnish study about half of the excess mortality among men in lower social classes but a clearly smaller proportion among women was associated with their more adverse cardiovascular risk factor profile
- It may be possible to narrow differences in health between social classes through improvements in health behaviour, especially among men
- This by itself will not be sufficient, but the increasing health inequalities need to be dealt with at multiple levels, from general social policy to everyday practice

narrow inequalities in health.³³ Relative differences in mortality between social classes have, however, increased in Finland in the 1980s³⁴ as in some other Western industrialised countries.^{19,34} At the same time educational differences in obesity in eastern Finland have increased among both sexes, and smoking among women has changed from a habit of the more educated in the 1970s to a habit of the less educated in the 1980s.²¹ In contrast, differences in serum cholesterol concentration and blood pressure have remained stable. This indicates that social class differences in mortality may not diminish in the future in Finland.

To decrease the health inequalities between socioeconomic groups present health promotion methods should be reformulated to take into account the needs and abilities of the lower social classes. This by itself will not be sufficient, but the increasing inequalities in health need to be dealt with at multiple levels, from general social policy to everyday practice.^{35,36}

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- Kunst AE, Mackenbach JP. The size of mortality differences associated with educational leave in nine industrialized countries. *Am J Public Health* 1994;84:932-7.
- Kunst AE, Mackenbach JP. International variation in size of mortality differences associated with occupational status. *Int J Epidemiol* 1994;23:742-50.
- Valkonen T, Martelin T, Rimpelä A. Socio-economic mortality differences in Finland 1971-1985. Helsinki: Central Statistical Office of Finland, 1990. (Studies 176.)
- Valkonen T. Trends in regional and socio-economic mortality differentials in Finland. *International Journal of Health Sciences* 1992;3:157-66.
- Holme I, Helgeland A, Hjermann I, Leren P, Lund-Larsen PG. Four-year mortality by some socioeconomic indicators: the Oslo Study. *J Epidemiol Community Health* 1980;34:48-52.
- Salonen JT. Socioeconomic status and risk of cancer, cerebral stroke, and death due to coronary heart disease and any disease: a longitudinal study in eastern Finland. *J Epidemiol Community Health* 1982;36:294-7.
- Marmot MG, Shipley MJ, Rose G. Inequalities in death-specific explanations of a general pattern? *Lancet* 1984;ii:1003-6.
- Pocock SJ, Shaper AG, Cook DG, Phillips AN, Walker M. Social class differences in ischaemic heart disease in British men. *Lancet* 1987;iii:197-201.

- Rosengren A, Wedel H, Wilhelmsen L. Coronary heart disease and mortality in middle aged men from different occupational classes in Sweden. *BMJ* 1988;297:1497-500.
- Davey Smith G, Shipley MJ, Rose G. Magnitude and causes of socioeconomic differentials in mortality: further evidence from the Whitehall study. *J Epidemiol Community Health* 1990;44:265-70.
- Liu K, Cedres LB, Stamler J, Dyer A, Stamler R, Nanas S, et al. Relationship of education to major risk factors and death from coronary heart disease, cardiovascular diseases and all causes. Findings of three Chicago epidemiologic studies. *Circulation* 1982;66:1308-14.
- Dennis BH, Zhukovsky GS, Shestov DB, Davis CE, Deev AD, Kim H, et al. The association of education with coronary heart disease mortality in the USSR lipid research clinics study. *Int J Epidemiol* 1993;22:420-7.
- Hein HO, Suadicani P, Gyntelberg F. Ischaemic heart disease incidence by social class and form of smoking: the Copenhagen male study—17 years' follow-up. *J Intern Med* 1992;231:477-83.
- Woodward M, Shewry MC, Smith WCS, Tunstall-Pedoe H. Social status and coronary heart disease: results from the Scottish heart health study. *Prev Med* 1992;21:136-48.
- Forsdahl A. Are poor living conditions in childhood and adolescence an important factor for arteriosclerotic heart disease? *British Journal of Preventive and Social Medicine* 1977;31:91-4.
- Puska P, Tuomilehto J, Salonen J, Nissinen A, Virtamo J, Björkqvist S, et al. The North Karelia project: evaluation of a comprehensive community programme for control of cardiovascular diseases in North Karelia, Finland 1972-1977. Copenhagen: WHO/EURO, 1981.
- Salonen JT. Smoking and dietary fats in relation to estimated risk of myocardial infarction before and during a preventive community programme. Kuopio: University of Kuopio, 1980. (Series original reports 1/1980.)
- Cox D. Regression models and life-tables (with discussion). *Journal of the Royal Statistical College* 1972;34:187-220.
- Wing S, Dargent-Molina P, Casper M, Riggan W, Hayes CG, Tyroler HA. Changing association between community occupational structure and ischaemic heart disease mortality in the United States. *Lancet* 1987;ii:1067-70.
- Townsend P, Davidson N, Whitehead M. *The Black report and the health divide*. Harmondsworth: Penguin, 1988.
- Pekkanen J, Uutela A, Valkonen T, Vartiainen E, Tuomilehto J, Puska P. Coronary risk factor levels: differences between educational groups in 1972-1987 in eastern Finland. *J Epidemiol Community Health* 1995;49:144-9.
- Holme I, Helgeland A, Hjermann I, Lund-Larsen PG, Leren P. Coronary risk factors and socioeconomic status. The Oslo study. *Lancet* 1976;ii:1396-8.
- Luoto R, Pekkanen J, Uutela A, Tuomilehto J. Cardiovascular risks and socioeconomic status: differences between men and women in Finland. *J Epidemiol Community Health* 1994;48:348-54.
- Crouse III JR. Gender, lipoproteins, diet, and cardiovascular risk. *Lancet* 1989;ii:318-20.
- Arber S. Opening the "black box": inequalities in women's health. In: Abbott P, Payne G, eds. *New directions in the sociology of health*. Brighton: Falmer Press, 1990.
- Statistics Finland. *Population and housing census 1970. Industry and industrial status*. Helsinki: Statistics Finland, 1973. (Official statistics of Finland VI C:104.)
- Statistics Finland. *Population and housing census 1975. Occupation and industry*. Helsinki: Statistics Finland, 1978. (Official statistics of Finland VI C:105.)
- Martikainen PT. Socioeconomic mortality differentials in men and women according to own and spouse's characteristics in Finland. *Sociology, Health and Illness* (in press).
- Savitz EA, Baron AE. Estimating and correcting for confounder misclassification. *Am J Epidemiol* 1989;129:1062-71.
- Markowe HLJ, Marmot MG, Shipley MJ, Bulpitt CJ, Meade TW, Stirling Y, et al. Fibrinogen: a possible link between social class and coronary heart disease. *BMJ* 1985;291:1312-4.
- MacMahon S, Peto R, Cutler J, Collins R, Sorlie P, Neaton P, et al. Blood pressure, stroke and coronary heart disease. 1. Effects of prolonged differences in blood pressure—evidence from nine prospective observational studies corrected for the regression dilution bias. *Lancet* 1990;335:765-74.
- Davey Smith G, Shipley MJ. Confounding of occupation and smoking: its magnitude and consequences. *Soc Sci Med* 1991;32:1297-300.
- Ministry of Social Affairs and Health. *Health for all by the year 2000. The Finnish national strategy*. Helsinki: Ministry of Social Affairs and Health, 1987.
- Marmot MG, McDowell ME. Mortality decline and widening social inequalities. *Lancet* 1986;ii:274-6.
- Adler NE, Boyce WT, Chesney MA, Folkman S, Syme SL. Socioeconomic inequalities in health. No easy solution. *JAMA* 1993;269:3140-5.
- Mackenbach J. Tackling inequalities in health. *BMJ* 1995;310:1152-3.

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ONE HUNDRED YEARS AGO

ON OVER-OPERATING IN GYNAECOLOGY

Shortly afterwards came a brief but not very creditable period when "clitoridectomy" was strongly advocated as a remedy for numerous ills. This fortunately had a very limited currency and was speedily abandoned. Then followed a time in which displacement of the uterus held the field, and every backache, every pelvic discomfort, every general neurosis was attributed to mechanical causes, and must needs be treated by uterine pessaries. Again, we had an epoch when oophorectomy or castration of women was not only recommended and largely practised, as a means of restraining haemorrhage in bleeding fibroids, but also as a remedy for certain forms of neurosis even when the ovaries were healthy or not seriously diseased. Ere long it was discovered that removing the ovaries for neuroses, even if safely accom-

plished so far as life was concerned, besides unsexing the woman, was frequently followed by more severe nervous penalties than those for which it had been used as a remedy; that, in fact, it often entailed a loss of mental equilibrium, and sometimes ended in insanity. . . . A too reckless attempt at progress not only impairs the reputation of gynaecology, but the experience and recognition of faults must be gained at the expense of much suffering to many patients—patients of the gentler sex, on whom no man with a spark of chivalrous feeling would desire to inflict unnecessary pain. They are absolutely at the mercy of the medical men, and submit in blind faith to what he recommends as the best to be done under the circumstances. . . . The first instinct should be to try if an operation can be avoided, not to seek reasons for performing it. (*BMJ* 1895;iii:284.)