RISK FACTORS FOR, AND 13-YEAR MORTALITY FROM, CARDIOVASCULAR DISEASE BY SOCIOECONOMIC STATUS.

A STUDY OF 44690 MEN AND 17540 WOMEN, AGES 40-49.

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0 ABSTRACT

The 25849 men in the 1972 Oslo study and the 18841 men and 17540 women in the 1974-1976 county study were followed-up through 1986 with respect to mortality. The focus of interest in the present study was socioeconomy and Coronary Heart Disease (CHD) risk and mortality. However, stroke mortality and mortality from all causes combined were also studied. The association between education, income and occupation and blood lipids, blood pressure, smoking and exercise, was studied through linear and logistic regression analyses. The association between socioeconomy and CHD mortality was analyzed with Cox regression and standardized mortality ratios (SMRs). Statistical modelling was used to improve fit between socioeconomic factors, risk factors and mortality.

In men, increasing risk levels were found with lower socioeconomic status. The effect of each socioeconomic indicator varied somewhat from one risk factor to the other, smoking was the risk factor with the strongest socioeconomic gradient.

In women, income was a weaker predictor of risk levels than in men, and the socioeconomic differences were smaller. Systolic blood pressure showed a marked decrease with increasing status, whereas smoking *increased* with increasing income in women.

CHD mortality differences by socioeconomic status in men were generally greater than would be expected from the risk factor differences. At the same risk level in stratified analyses, low status men still had increased mortality, suggesting increased susceptibility in the low status groups.

CHD deaths were too few in women to allow extensive analyses. All cause mortality was associated with socioeconomy, but the gradients were smaller than those found in men, and sometimes in the opposite direction.

The main theories regarding the associations between socioeconomy and health, i.e. the artefact, the selection, the materialist and the cultural explanation, are discussed in some detail, and related to the findings of the present study. The follow-up of occupational mortality in the Nordic countries found similar differences by occupation as the present study, but had no risk factor information. Even after adjusting for risk level, a mortality gradient by socioeconomic status remained. The problem of incomplete adjustment for risk is discussed.

The socioeconomic risk and mortality differences should be taken into account in intervention strategies. The risk differences by socioeconomy are large, and present a major challenge in achieving equality in health. Roughly 50% of the mortality differences could be attributed to risk factor differences. An MI risk score (myocardial infarction risk score) is based on blood pressure, cholesterol and number of cigarettes smoked. Factors for each of these three risk factors are multiplied to give an MI risk score. The excess mortality in the low status groups, even when compared with high status groups at the same MI risk score level, lessens the prospect that equality in CHD mortality by social status will be achieved in the near future.

1 INTRODUCTION

1.1 WHAT IS SOCIOECONOMY?

The stem "socio" or social, pertains to the relationship between individuals and communities, of living or being in groups rather than separately. "Economy" may be defined as control and management of the money, goods, and other resources of a community, society, or household. Socioeconomic status then would be an indication of the position in the hierarchy of society, regarding power, prestige or resources. Socioeconomic status may be defined using different underlying variables, most commonly used are occupation, education, and income[1].

1.2 HEALTH AS CAPITAL

In communities relying on manual labor, health is a main economic asset. Good health allows its "owner" to be a successful hunter, a productive laborer, or to cultivate new land. In the industrialized world, health and economic ability are still connected, but the amount of physical strength required is reduced in most occupations. On the other hand, impaired mental health, e.g. schizophrenia, has repeatedly been associated with downward mobility[2,3,4] in industrial countries. Some economists have viewed inequalities in health from a "human capital" view[5], arguing that the optimum level of health is where marginal cost equals marginal benefit. However, the connection between socioeconomic status and health is often seen as more subtle than this.

1.3 SPECIFIC HEALTH ASPECTS AND SOCIOECONOMY.

1.3.1 Historical perspective

Health has been associated with socioeconomic status from the early days of medicine, Plato (427-347 BC) reported deformities as the result of certain occupations. In Great Britain, the health of the population has been systematically recorded since the mid-nineteenth century[6]. The British Registrar General, Dr. Farr, in his 1861 report offered advice on how to prevent the excess mortality observed in miners and publicans[7]. This shows not only that he was aware of the socioeconomic differences, but about their causes. Norwegian medicinal statistics have also documented the social and economic relationships with health. Early Norwegian studies used geographical regions[8,9,10], and contrasts between urban and rural areas as socioeconomic markers. A pioneer in Norwegian social science and epidemiology, Eilert Sundt[11], speculated on the mortality differences in neighboring communities. One of his hypotheses was that if the proportion in the lower classes was greater in one area than in another, this could cause the mortality differences. He was also concerned with the lack of safety measures and equipment in the fishing boats in northern Norway, compared with southern Norway.

1.3.2 Attempts to reduce inequality

With the development of various models of national health insurance systems, the gross inequalities in health care between rich and poor in most industrialized countries

were modified[12]. In theory some measure of health care is now available for all. Also, most developed countries have special care for single mothers, low income families, and disabled persons. The gap between high and low income people regarding access to commodities, education and political power has been reduced. The increased welfare, hygiene, and nutrition have been credited with a general improvement in health, measured e.g. by average life expectancy at birth[13], perinatal mortality[14,15], height of military recruits[16], and incidence of tuberculosis[17] over the last 100 years in most developed countries.

1.3.3 Persisting health inequalities

But the socioeconomic gradients in health persisted, as the low status groups improved their health to reach the level of the high status group, this group moved even further ahead[12]. Even today, low income, low education, poor housing and low status occupations are associated with higher mortality[12,18,19] and morbidity[12,20] from a variety of causes. Among these are chronic diseases[21], infections[12], accidents[12], and perinatal mortality[22]. This applies to Norway as well, although socioeconomic differences are small in the Scandinavian countries compared to the UK and USA. The persisting inequalities in health have triggered much debate and research[23].

1.3.4 Coronary heart disease and socio-economy

Diseases deviating from the common pattern, i.e. with higher incidence in the high status groups, were coronary heart disease in men[24,25,26], some cancers[27,28], and diabetes. Coronary heart disease was rare until about 1900, but has increased throughout the twentieth century to become the leading cause of death in the industrialized world. All social groups have seen a reduced incidence of rheumatic and infectious heart disease. In the higher socioeconomic strata, there has been a substantial decrease in morbidity and mortality from ischemic heart disease in men[26,29]. CHD mortality in younger females (< 65 years) is much lower than in men, and in Western Europe female CHD mortality rates are not consistently declining[30,31]. In Norway one of the earlier epidemiological studies of cardiovascular disease found CHD to be more common in executive employees, employers, and professionals, and less common in workers[32]. Particular attention was paid to drivers in this study. Although numbers were small, there was no evidence for an increased mortality in drivers. A study by Holme[33,34] in great detail studied the socioeconomic differences in risk factors in the Oslo Study. The Oslo Study screenees are also part of the men in the present study. In Sweden, Vågerö and Norell have carried out a similar study, linking the 1960 Swedish census to the Swedish Death register[35]. This study had some information about smoking habits, but not about blood lipids or blood pressure. Their main result was that men in higher socioeconomic groups had higher CHD and CVD mortality, whereas the opposite was found in women. Smoking habits in men could partly explain socioeconomic gradient in the Swedish follow-up. In Norway and the UK cardiovascular disease now affects the lower socioeconomic groups increasingly more than the higher groups[12,36,37]. A parallel on the national scale is that the wealthier of the developed countries, such as USA, Japan, UK, and Norway now have declining CHD mortality rates, whereas many Eastern European countries show increasing rates[26]. Most developing countries still have low rates, but cardiovascular mortality

rates are increasing in these parts of the world[38]. Given the knowledge of the natural course of this epidemic, primordial prevention of cardiovascular disease in the third world may be possible.

1.4 PROPOSED LINKS BETWEEN SOCIOECONOMY AND HEALTH

Many studies have shown that mortality and morbidity is associated with social class or socioeconomic status. Why this association persists is less clear. The major causes of death are no longer infections, hunger or accidents, but over-eating, smoking, and alcohol abuse. These are all expensive habits, and should perhaps be less common in the less affluent.

The relationship between social status and health has been discussed for more than a century[6,7]. Recent debate, flared i.a. by the Black report[12], has focused on four main explanations for the inequalities in health.

1. *Artefact - social mobility*
2. *Natural selection - healthy workers*
3. *Materialist - structuralist differences*
4. *Cultural and behavioral differences*

These explanations seem to encompass most arguments[37,39], especially if the human capital models[5] are seen as materialist - structuralist. These four positions will be reviewed in greater detail in the discussion.

1.5 MEASURING SOCIOECONOMIC STATUS

1.5.1 Historical aspects

Sociologists have developed most of the theory and measures of social class to quantify relative position within society. Theories on socioeconomy are usually influenced by Marx and Weber's interpretation of class, economy and power. Marx categorized class based on a group's relation to the means of production, which emphasized economic inequality. Weber differentiated position on three dimensions: class, status and party (or power). "Class" was seen as having an economic base, implying ownership and control of resources, and would often be measured by income. "Status" was considered related to prestige or honor in the community, implying access to life chances, based on social factors such as family background, lifestyle, and network. "Power" was related to a political context.

1.5.2 Choice of indicator

In epidemiology some measure of social class is frequently included[29]. Social class is often considered a confounder, sometimes a risk factor and rarely a variable descriptive of the sample. The manner in which it is measured and how it is controlled for may have consequences for an epidemiologic study[1]. Using the wrong indicator may give misleading results. Socioeconomic indicators are acquired in a certain time sequence, education is e.g. mostly determined in the early twenties. The labor market will change over time, as new categories replace no longer needed positions. Thereby a mixed cohort and time change in occupation-based socioeconomic status occurs. If studying up- or down-ward mobility the indicator and the age of the sample must

match. Downward mobility in adults may e.g. not be seen from their education, usually determined before the mobility under study.

1.5.3 Education, occupation and income

Most social class measures are based on an occupational ranking. The occupational group may be seen as a proxy for educational requirements and monetary payoffs (socioeconomy or class), or as a measure of esteem in public opinion (prestige or status). Education is an indicator of both class and status. It correlates to income and occupation, and is sometimes used as a proxy for variables in the economic domain. The third indicator: income or wealth, clearly is in this domain.

1.5.4 The British Registrar General's scale

This was the first scale to allocate occupations into social classes, and is still widely used in the United Kingdom. Scales using the Registrar General's scale as a model were developed in other countries, e.g. Australia, Norway (CBS)[40], and Sweden[41]. The British Registrar General's scale was developed in 1911 to allocate the occupation of the head of the household to one of five social classes:

I	*Professional, executive*	
II	*Intermediate non-manual*	
IIIn	*Low level non-manual*	] *Combined into class III.*
IIIm	*High level manual, supervisor.*	
IV	*Partly skilled manual*	
V	*Unskilled manual.*	

It was assumed by the Registrar General that social standing based on occupation would provide an indication of a person's education and culture. Occupations were ordered by the degree of skill involved and the social position implied. Revisions made every ten years considered changes in skills and status, and incorporated new occupations. This has resulted in major changes in the composition and relative size of the classes. Class V has tended to decrease in size, and 26% of occupations were allocated to a different class in 1961 than in 1951[42]. It is therefore sometimes unclear whether changes in disease patterns by class are real or reflect the changing composition of the classes.

The British Registrar General's scale has been criticized for being prejudiced in the ranking of occupations[43]. The ranking of occupations according to skill and social position used no objectively measurable criteria, the statisticians at the Registrar General had to use their own judgement to a large extent. Occupation-based measures will usually be confronted with this problem.

The British Registrar General's scale was initially designed to discriminate infant mortality rates, and was subsequently related to all cause mortality in adults. Validation against the perinatal mortality in 1921[1,43,44], led to changes in the classification so that the mortality would increase monotonically from low to high social class. Using this scale to examine the relation between class and mortality or morbidity may therefore be a questionable tautology.

1.5.5 Measurement issues

Evidence, at least from the US, suggests that social class is not one-dimensional[1]. Although correlated, education, occupation and income mark distinct aspects of socio-economic standing. The underlying "it" is not conceptually unitary. This multi-dimensionality is often approached by using previously constructed composite indices. The advantage is that such indices are comparable from study to study, the disadvantage that they may be outdated or suboptimal. Another approach is to collect multiple indicators of social class and from the data learn if and how they should be combined[45]. Multivariate methods may control simultaneously for several variables, and allow partial correlations and assessment of the independent effects of correlated variables. Some argue that the composite indices may have outlived their time, and may obscure important differences in associations[45].

Measurements of social class may be considered discrete or quantitative. Teevan[46] compared several measures of social class, each used as an ordinal variable but with different cut-points and number of categories. He found considerable variation in the relation to three outcome variables, correlations ranging from 0.05 to 0.36 for the same indicator.

The view that a valid measurement of a concept requires prior theory may discount the socioeconomic indicators. The theoretical formulations in the area of social class tend to be complex, diverse and difficult to operationalize. A gold standard against which to validate any social class scale does not exist. The use of social class in sociology may not be the use relevant to predict health outcomes in epidemiology.

Status inconsistency i.e. that different indicators giving discrepant social classes cause classification problems. Changes in status over time are common, and sometimes this may also result in status inconsistency[1,47]. Having many years of education but low income is e.g. discrepant, and such combinations may have special health impacts.

2 PURPOSE OF STUDY

I wished to study the relationship between socioeconomic factors, risk factors for coronary heart disease (CHD) and mortality from CHD and all cause mortality. More specifically, the aim was to study the relationship between socioeconomic status and CHD mortality after adjusting for risk factor differences.

Other studies have found socioeconomic risk factor differences. In this study the patterns of these associations were scrutinized. Statistical modelling was used to determine linear and nonlinear associations and interactions. Graphical displays of risk factors versus socioeconomic factors were used as a guide for further modelling, and to show the complex patterns. The relative importance of several socioeconomic factors in determining risk level and mortality rates was a key point of interest.

The underlying hypotheses were that risk factor levels are higher in lower socio-economic status, and that risk factor differences explain some, but not all of the variation in mortality. Differences in the relationship between risk factors and socio-economy were expected between men and women, and between the four study areas. We had indications that drivers, hotel and restaurant workers and unskilled workers had excessive morbidity[48,49,50], and wished to identify other high mortality and high risk factor occupations.

The occupational mortality follow-up of the Nordic countries identified high and low mortality occupations[49], but had no risk factor information. If only minor mortality gradients remain after adjusting for the risk factor defferences, this would suggest that most mortality differences could be explained by risk factor differences. Remaining mortality gradients after risk adjustments, if any, might suggest that risk factor differences are not the only explanation of the high mortality in the low status groups.

3 METHODS

3.1 STUDY AREAS

3.1.1 Historical background and selection of areas

In the 1970s there were major regional differences in cardiovascular morbidity and mortality in Norway, northern Norway suffering about twice the mortality of the southwestern part. The National Health Screening Service set out to study the county with the highest risk, Finnmark, and the two low risk counties Sogn og Fjordane and Oppland. The study design was kept close to that of the Oslo Study[51], to allow later pooling of data[52].

3.1.2 Presentation of the four study areas

Oslo, the capital, is a city of 460,000. There are many jobs in the administrative and business sectors. The three other counties are mainly rural, the population scattered in smaller towns and settlements over a wide area. Oppland is a farming and foresting county, with a fair amount of light industry. Sogn og Fjordane has many small farms, mainly with sheep and milk production. There are hydro-power plants and electro-metallurgical industry. Finnmark relies on fishing and fish processing, maintaining military bases, mining and quarrying. The Lapp, or Sami population in Finnmark traditionally husbands reindeer, but many work in other sectors. All four areas are attractive to tourists, and employ many in hotel, restaurant and travel services. The four areas comprise 21% of the Norwegian population (male and female, all ages), and 29% of the total land area. Although Oslo technically is a county, the term "the counties" will refer to Oppland, Sogn og Fjordane and Finnmark only.

3.2 CARDIOVASCULAR DATA

3.2.1 Sampling procedure

3.2.1.1 Oslo

The Oslo Study[51] (1972-73) invited all men 40-49 years old and a 7% sample of men ages 20-39. The men attended screening at the Oslo board of health, and were not recontacted if they did not attend. One reason for this was to avoid a time-lagged and self-selected group of late attenders. The Oslo study group assigned screening dates by birth day, (all born the 1st in any month were invited before any born the 2nd in any month) to avoid systematic interaction of season with area-associated characteristics.

3.2.1.2 The counties

The county study[52] (Finnmark 1974-75, Sogn og Fjordane 1975-76, Oppland 1976-78) invited all men and women between 35 and 49 years, and a 10% sample of the population 20-34 years old. In four Finnmark municipalities, 100% in the age range 20-49 were invited. In the three counties high attendance was sought by various means. The invitation letter, containing name, address and identification number, was mailed ten days before screening. Alternative places to attend were offered, as decentralized as possible. Travelling by bus and working in rented premises, the screening teams visited 480 places in the three counties. A ship-borne team with screening

facilities on board visited some coastal areas with poor roads. These four studies now presented jointly, include 96,633 men and women invited to screening, of which 75,655 (79%) attended, Table 1. An additional 1,172 persons returned the questionnaire with a reason for non-attendance.

Attendance was defined as having a recorded systolic blood pressure. Information from the non-attenders who returned the questionnaire was used in tables when appropriate. Some tables may therefore add up to more than the numbers of attenders. Mortality information is available for the total population, e.g. even non-attenders. Most non-attenders to screening answered the census questions, and consequently have socioeconomic data.

3.2.2 Screening procedure

3.2.2.1 Oslo

The screening nurses were permanently stationed in offices at the Oslo board of health. Screenees moved through a series of screening stations. Blood pressure (mm Hg) was measured twice, one minute apart, using a sphygmomanometer. Subjects were seated for at least five minutes before the first measurement, the second reading was used. The nurses followed a standardized protocol and were monitored i.a. using repeated sessions with taped Korotkoff sounds. Subjects were asked about time since last meal. The nurses measured height (cm) and weight (kg), and drew non-fasting blood samples. The Central laboratory, Ullevål Hospital determined cholesterol, triglycerides and blood glucose in serum. The nurses checked the questionnaire to avoid omissions or inconsistencies. These, if any, were corrected with help from the respondent. A computer program later checked the questionnaires for logical errors and the nurses were informed about any errors detected. Through this procedure the number of incomplete and inconsistent questionnaires dropped to very low levels. The nurses did not question the respondents to verify diagnoses etc.

The questionnaire (Appendix B), was mailed with the invitation, completed at home and brought to screening. It covered i.a. symptoms of angina pectoris or diagnosed cardiovascular disease, smoking, leisure time exercise and physical activity at work . The Oslo questionnaire included questions about perceived level of "stress".

3.2.2.2 The counties

The screening staff consisted of two technicians, one also being the driver, and four specially trained nurses. Besides the procedures already mentioned, the serum was sent in cooling containers to the Central laboratory, Ullevål Hospital, Oslo. Extra questions in the county questionnaire asked about recent sick leave, domestic work, shift work, disability or unemployment benefits, or relocation because of the job, and municipality of birth. For women the occurrence of menopause or pregnancy was noted. One question (yes/no) about family history of cardiovascular disease was included, but perceived job stress was not.

In the ethnically diverse Finnmark, the questionnaire asked about Lapp (Sami), Finnish or Norwegian grand-parents. In communities with a substantial Lapp population the questionnaire and other printed material were available in the Lapp language.

Non-attenders were encouraged to mail their completed questionnaires to the headquarters of the National Health Screening Service. These questionnaires, a total of 1,172 in the three counties, checked and corrected when possible, have been included in the analyses. The National Health Screening Service handled all aspects of the coding and punching of data, and checked for inconsistencies, doublets, impossible or unphysiological values and missing data. All unusual lab results were checked against the Ullevål Central Laboratory result protocol. At least two nurses were responsible for blood pressure measurements on all locations to minimize artificial interregional differences. During the 6-year screening period, a total of sixteen nurses participated, measuring from 400 to 8,392 blood pressures each. Eight nurses were responsible for about 75% of the blood pressure measurements.

3.2.3 Pooling data from Oslo and the counties

There were some differences between the Oslo and the County studies. If possible, data was recoded to make the answers comparable, (or only "the counties" analyzed). The differences were usually small, e.g. whether the intervals included or approached the bounding values, or whether one extra category was offered. In Oslo, the question about number of cigarettes smoked per day, or amount tobacco bought per week used preset categories, whereas these were open-ended questions in the counties. In all areas the mid-point of the given interval was used. Regarding the use of variables, this study follows the same principles as that of Tverdal[53] in his follow-up study of mortality by risk factor level.

3.2.4 Groups A, B or C

The questionnaire had several questions about diagnoses and symptoms of cardiovascular disease. Subjects were divided into three health groups according to the information obtained. If reporting no history of disease or symptoms, the person was assigned to "Group C" or "Healthy." Subjects assigned to "group A" had answered "yes" to one or more questions asking about having or having had myocardial infarction, angina pectoris, other heart disease, arteriosclerosis obliterans, stroke, diabetes or treatment for high blood pressure, or taking nitroglycerine. To be in group B they would similarly have to report any or both symptoms, e.g. chest pain or calf pain precipitated by exertion and alleviated by ten minutes or less of rest. If qualifying for both A and B they were assigned to group A. Previous studies have mainly focused on group C[53], in this study all health groups are analyzed jointly.

3.2.5 MI risk score

An MI risk score was calculated by multiplying factor values for gender, serum cholesterol, systolic blood pressure and cigarette smoking. The factors may be found in Bjartveit et al[52]. The MI risk score was constructed from a different data set than the present, based on middle-aged men A serum cholesterol of 4.91 mmol/l or less was given a factor of 1.0, rising to 25 at serum cholesterol of 11.6 mmol/l or above. Similarly, systolic blood pressure below 135 mm Hg was given a factor of 1, increasing to 4.5 if blood pressure was higher than 170 mm Hg. Smoking no cigarettes daily gave a factor of 1, increasing to 4 if smoking 25 cigarettes or more daily. Men were given a factor of 5, women 1. This gives an MI risk score range from 5 to 2250 in

men, and from 1 to 450 in women. The MI risk score values may be interpreted as relative incidence risk of first myocardial infarction.

3.3 SOCIOECONOMIC DATA

3.3.1 Sources of socioeconomic data

3.3.1.1 Census 1970

A nationwide census was carried out by the Central Bureau of Statistics in 1970. Answering the census was required by law. Non-responders were reminded several times and contacted personally to ensure high response rates. Each person over fifteen years returned separate forms, the head of the household received a questionnaire more comprehensive than the others. (Including housing details).

To examine the association between cardiovascular disease and socioeconomic background, the cardiovascular files were matched with selected data from the 1970 census[54]. Linkage was done by the CBS, and an anonymized file was made available for analysis. The 1970 census focused on housing conditions, but included information about education (highest attained) and occupation (current). A household identifying number was assigned to members in the same household, making the identification of spouses possible.

3.3.1.2 Income tax data

Data from the Internal Revenue Service was obtained by matching the screening file to the national tax data files from the same year as the screening. Using the national files would ensure that income from other communities and from stocks, real estate etc. were included. Taxable net income was recorded. Private enterprise and wage earners' incomes were added, all incomes were price index adjusted to 1987 NOK. The price index in 1987 was divided by the price index in the screening year, and this factor multiplied with the income. Using this method, Oslo (1972) incomes were multiplied by 3.54, and Oppland (1976) incomes by 2.7.

3.3.2 Description of socioeconomic data

3.3.2.1 Occupation

The Nordic Classification of Occupations[55] provides detailed job categories. Knudsen & Øiens translation[56] of the Treiman Scale of occupational prestige[57] supplied the British job titles. Thus I could assign the Norwegian occupations into social classes I to V according to the British Registrar General's system of assigning socioeconomic status by occupation[58]. The Norwegian Bureau of Statistics in 1970 employed a similar occupation-based grouping[59] into social classes A to E, based on the work of Skrede[60]. No official standard of social class was available for the 1970 census, although a standard was constructed for the 1980 census[40].

Another social status indicator is the Treiman index of Occupational Prestige[57], which was translated to fit the Nordic occupation codes[56]. This index is international, i.e. it rates the "prestige" of occupations in different countries on a comparable scale, with a range from 0 to 100. On this scale, paper boys and shoe shiners are in the low range with a Treiman prestige score around 15 and archbishops and ambassadors are

in the high range with scores over 80. As the British Registrar's scale[58], the Treiman prestige score is based on occupation only.

Homemakers, house work

Less than 50% of the women had an occupational code in the 1970 census. House work was not assigned to an occupation code in the Nordic classification, nor to a social class in the British Registrar's reports. Based on information from the census (1970) and the cardiovascular screenings (1972-78), I assigned a separate occupation code to women doing mainly house work. The combination of house work as main occupation with work hours, work force status and census occupation code was used. Those finally classified as house workers may be assumed to have house work as main occupation. To be included the person would have no occupation code, would themselves (at screening) claim that house work was the main occupation, would have <500 work hours per year and be non-working according to the "work force status" items in the tax data file (screening year). House workers were given an unused occupation code belonging in the "Service work" group, code 292128. The Nordic classification assigned a farm worker code to women living on farms, unless she explicitly stated that she was the one running the farm. This would lead to major discrepancies in female occupation membership. Rural women on farms would be given an unskilled worker label, and would be in the work force. Urban women would not be in the work force, and have no social class membership. Therefore, homemakers with farming codes were reassigned when certain criteria where fulfilled. Women (and men) with farming codes, who said their main occupation was doing house work, were reassigned to a separate code (242128) in the "farm area," but were seen as house workers in many contexts. With these definitions, about 50% of the women had house work as their main occupation. Women choose fewer occupations than men. If "mainly domestic work" is considered an occupation, more than 90% of Norwegian women could be assigned to eighteen defined occupations. Most of these were low in socioeconomic status.

Students

Students, likewise, had no occupation code in the census. I placed students within (but with a separate code) the pedagogic group (202625) when they worked less than 500 hours per year and said they were students at the census.

No occupation code

The subjects left without any occupation code then were the non-responders to the census, the unemployed, retired or disabled who did not give their last occupation, and those giving an occupation that was not classifiable within the Nordic Standard. People having occupation codes but not actively working, may be found by the variables on work force status (working or non-working), work hours, and possibly income, but were not excluded in the present analyses. A detailed account on the coding of occupations is appendix C.

3.3.2.2 Comparison with other occupational classifications

Only minor differences exist between the CBS classification[55] of male occupations into 37 groups and the 64 occupations I have used in this analysis. Although I have kept some smaller occupations such as doctors, dentists, jurists etc. separate, and

assigned codes for students, these groups are small compared to the total sample. In some mortality analyses by occupation, men are grouped into 18 broader occupations to achieve sufficient numbers of deaths. Holme[34,33] devised his own socioeconomic groups based on combinations of income and education. I have chosen to tabulate the risk factors against combinations of income and education, but not to label such combinations as socioeconomic groups 1, 2 etc.

In women the difference between my classification and that of the CBS is greater. This is mainly because of the smaller number of women invited to screening combined with the many with no occupation outside the home. I had no other option but to collapse all manual and industrial occupations into one group. Separate codes were assigned to house wives and farm wives, as described in the previous paragraph. Most of the occupations with significant numbers of women were grouped as by the CBS, e.g. teachers, nurses, and hotel and restaurant workers.

The main principles behind assigning socioeconomic status to occupations are similar in almost all parts of the world, something Treiman[57] noted in his international "occupational prestige" scale. It is therefore not surprising that the main groups turn out to be similar even when different researchers in industrialized countries assign occupations into socioeconomic groups. Besides the underlying agreement even **between** cultures on the ranking of occupation, the extensive influence from the British Registrar General's[58] scales adds to the uniformity. Problem areas are not the clear cut occupations. Differences appear when assigning the retired, house wives, students, members of the armed forces etc. into socioeconomic groups. The main difference is that some classifications leave these groups out of all analyses, some group women with their husbands' occupations, retired with last or longest held occupation etc.

In this study, I had no information about longest held or earlier occupation. I have chosen to group women by her own occupation, even if her husband was invited to screening so that information about him would have been obtainable.

3.3.2.3 Education

Education was coded according to the 1970 four-digit Nordic Classification of education[61]. The first digit corresponds to the number of years of education, additional digits yield more specific information about type of education, degree, field etc. Education codes beginning with 9 (unknown education), codes beginning with 0 (No education or only preschool, kindergarten etc.), and codes beginning with 1 (1-6 years of education) were usually left out of the analyses. In some tables these three groups will appear jointly as "Missing". The commonly used education grouping was 200-299 (7-9 years of education), 300-499 (10-12 years, including "folk high school," 10th year after 9th mandatory year etc.), 500-699 (13-16 years, university or college levels I and II), and 700-899 (17 or more years, university level III, graduate and post-graduate studies).

Women had less education than men, only 35 of the attenders had 17 or more years of education. Therefore the figures do not show the highest educated women, but the information usually is available in the accompanying table. In the tables, the highest education was not collapsed with 13-16 years, for several reasons. Firstly, the high education group was retained in the adjustment basis, and the expected mean by

income groups will have a specific correction for high education groups. Secondly, men and women with 13-16 years may be compared directly, and thirdly, the top status female group often deviated from the pattern of decreasing risk with increasing status, although not systematically.

3.4 MORTALITY DATA

3.4.1 Coding of deaths

The Central Bureau of Statistics codes the death certificates according to the current International Classification of Disease and causes of death (ICD). For deaths occurring from 1972 through 1985 this was the ICD-8[62] (in 1986 the ICD-9[63]), Norwegian versions. The CBS codes up to four causes of death stated by the physician responsible for certifying, of which three are supposed to be directly implicated in a chain of events leading to death. The cause chosen by the CBS as the underlying cause has been used as the base for analysis.

3.4.2 National mortality register

All deaths occurring in Norway each year are added to a cumulative file of all deaths. The cumulative file is updated, checked and maintained by the National Health Screening Service. Death certificates are required for all deaths, both in or out of hospital. There is virtually no loss due to missing registration, but cause of death may be missing if the person is lost at sea, presumed drowned etc. Of 380000 deaths in the CBS mortality follow-up[48], only 211 had no stated cause of death.

The accuracy of the cause of death registration was discussed by Tverdal in his Ph.D. dissertation[53], based on the same screening population as this study. The medical certificate is the responsibility of the attending physician, supplementary information was obtained in 33% of deaths, mostly cancer deaths. For all deaths in 1980, the diagnostic evidence was as follows:

1. *Autopsy* *14.0%*
2. *Medical attention during last illness* *76.1%*
   (With or without post mortem inspection of body)
3. *Post mortem inspection of body and previous medical attention for the condition registered as cause of death.* *3.8%*
4. *Post mortem inspection of body, no previous medical treatment.* *6.1%*

Some deviations from the ICD coding rules used by the CBS throughout the follow-up were:

If diabetes was reported as underlying cause to a cardiovascular disease, the cardiovascular disease was registered as underlying cause of death, and diabetes as associated cause of death.

Sudden death was kept as the underlying cause of death unless previous myocardial infarction was mentioned as associated cause, in which case coronary heart disease was coded as the underlying cause of death. If diabetes, tuberculosis, operated cancer without metastases, or late effects of previous injury were coded as associated cause of death, and sudden death was coded as the underlying cause, sudden death was kept as the underlying cause.

The autopsy rate in this material was higher than in the general population, the main reason being that these deaths occurred at younger ages. Tverdal[53] reported autopsy rates of 30% in men and 14% in women attending screening, and 42% in men and 21% in women not attending.

In some rural areas, where no physician attended the deceased, the police will send a death certificate with name and time of death to the community health center. Any physician with knowledge about the health status of the deceased will fill in the form, sometimes consulting with relatives. Usually, the cause of death in such circumstances will be fairly well known as the patient would have been under treatment for cancer, apoplexy etc. This practice has been more common in Finnmark and peripheral parts of Sogn og Fjordane and Oppland, than in Oslo, and much more common in the elderly and chronically sick than in unexpected deaths.

3.5 DATA MATCHING

All matching of data used the unique 11-digit number assigned to all residents of Norway, consisting of date of birth and a control number. A national register keeps track of current address and makes a simple random sampling procedure available for the total population. Mortality files, emigration files and census files may be linked using this number. Emigrations were added to this file when mortality analyses were undertaken, follow-up time was censored at date of emigration.

3.6 STATISTICAL METHODS

3.6.1 Selection, sampling

Study counties were selected because they represented extremes in cardiovascular mortality, and because many known risk factors were high in Finnmark and low in Oppland and Sogn og Fjordane. Oslo was the natural study population for the Oslo Study research group. These four counties were therefore no random sample of Norwegian counties. On the other hand, sampling within each county and age stratum was an equal probability sample. With a "sampling" of 100% in the age groups 35-49, and an attendance of about 90% the sample should be representative for each county. When pooling the counties, adjustment for county was often carried out. Very small differences were found between crude and adjusted values.

3.6.2 Age adjustment of means.

Adjustments employed the total male or female study population as the standard. The mean risk factor level in every age-sex combination was calculated, and the expected risk factor level in any education or income group, given the age distribution of the group, was calculated. The overall mean was divided by the expected mean, the resulting adjustment factor was then multiplied with the observed mean. In a group with younger members, the age adjustment factor would be greater than 1, thus correcting the observed risk level upwards (if risk increased with age). This adjustment closely follows the procedure for finding the expected number of deaths when calculating Standardized Mortality Ratios, SMR. Also, the education marginal was adjusted for age and income, and the income marginal adjusted for age and education to find the remaining effect. Mean risk factor levels in every age-income combination

were then used. Age was taken from the population register files, and there should be virtually no misclassification. Adjusting the effect of education for income, or the opposite, often markedly reduced the effect on a risk factor. Although "overmatching" may be a problem, the occurence of such effect modifications may indicate whether income or education is the best predictor for a given socioeconomic risk association. In the linear and logistic regressions, age was entered as a variable. MANOVA (multiple analysis of variance) was used to obtain age and county adjusted mean risk factor levels by different socioeconomic markers[64].

3.6.3 Analysis of risk factors by income and education

As already mentioned, income and education are correlated variables. The highly educated earn more, although those with high income not necessarily have higher education. To evaluate the impact of education and income, both separately and jointly, two strategies were used.

3.6.3.1 Cross tabulation.

Subjects were crossclassified by education and income groups. Crossclassification imposes no set weights to income and education as in many preconstructed indices[45]. Mean age adjusted risk factor levels were calculated to find the joint effect of income and education. To find the separate effects, e.g. of income, the age and education adjusted marginal was used. This may underestimate the effect by overmatching. Also, the separate education effect was income adjusted. For men the difference between 7-9 years and 17+ years of education, and between 0 and 280000+ NOK of income is reported. Only 35 women had 17 or more years of education, and only 17 made more than 280000 NOK/Year. In women 7-9 years of education was therefore compared to 13-16 years, and 0 income to 200000-279999 NOK/Year. The table analyses use crude MI risk score and triglyceride values, whereas the regressions use the natural log of these skewed variables. Given the same blood pressure, serum cholesterol and number of cigarettes, men have 5 times the MI risk score of women due to a factor of 5 for gender[52].

3.6.3.2 Multiple linear regression

Linear regression, using SPSS[64] with the risk factor of interest as the dependent variable and age, BMI, county, education and income as independent variables was done. (When systolic or diastolic blood pressure was the dependent variable, blood pressure treatment was added as independent variable). The coefficients obtained would be age, BMI and county adjusted estimates of the linear association between the risk factor and education and income. When computing the effect of a 10 kg weight difference, the men were assumed to be 1.80 m and the women 1.65 m tall. BMI will then change 0.31 and 0.37 respectively if the weight changes 10 kg. As education is a categorical variable, it was made into 3 dummy variables, where 10, 11-12 and 13+ years of education were compared with 7-9 years. Thus no assumptions about interval scale or monotony were made. Income was used as a continuous variable, with an additional dummy variable for 0 income. The regressions shown (e.g. Table 21, Table 51) had all socioeconomic variables simultaneously in the model. Separate regressions for each socioeconomic variable were also carried out. No coefficients

deviated substantially from the joint regressions. Subjects had to have complete data on all variables to be included in the regressions. As shown in Table 1 to Table 10, most attenders had complete data sets.

Regression models

Several regression models were examined: All included age, BMI, Oslo and Finnmark as 0,1 dummy variables. In addition, all models used dummy variables for education. Income was treated differently in the different models, and was the variable presenting problems in the regressions. Income was skewed, with a tail of higher incomes, and a small group with no income. In the first models income was entered as a continuous variable. Dummy variables for 0 income, high income and low income were added. No curvilinear tendency was apparent, but 0 income earners were often different from income earners. Therefore the dummy variable for 0 income was kept. The 291 men, of which 167 attended, earning more than 500000 NOK were excluded as were women with incomes greater than 300000 NOK, leaving out 15 of which 13 attended. This was done to avoid outliers with Z-scores with absolute values greater than 4. Assigning an income of 100 NOK to all 0-income men and log-transforming income, only led to minor changes in the coefficients. As the log-income model was less interpretable regarding low income, the untransformed income was used.

Explanation of tables

Two regression coefficients are shown in each regression. In the column labelled "coefficient" the regression coefficient for each independent variable with its original scale may be found. This coefficient is an estimate of how much the dependent variable changes with an increase in one unit of the independent variable. In addition, the "Beta" coefficient estimates how many standard deviations (SD) the dependent variable changes when the independent variable increases one SD. Beta coefficients may therefore be directly numerically compared.

Further modelling

All models examined for a certain risk factor gave essentially the same coefficients, but with different properties regarding residuals. Linear regression assumes multivariate normal residuals. The first linear model included the full range of all variables. Later models in one way or other modified the highest values of risk factors, income and education, either by collapsing, leaving out or log transforming. The model used to summarize the linear regression of risk factors on socioeconomic variables was selected to avoid multivariate outliers >3 SD from the regression line. The final models included age and BMI even when these were not significant, as they were viewed as "control variables". Curbing both income and risk factors in the high end, and lumping all 13+ years of education into one dummy will essentially give coefficients for the great bulk of subjects with medium risk and medium socioeconomy. The models had R^2 of about 0.10.

Income in women

A third of the female population had no recorded income, due to the many housewives being taxed with their husbands. Although this group was very different from the few 0 income men, the dummy variable for 0 income was kept. In this context as a "housewife" coefficient.

Causality

When a risk factor is said to increase or decrease with education or income, no causal relationship is implied. The statements should be interpreted as statistical associations, with the said direction.

3.6.3.3 Logistic regression

In the logistic regressions (BMDP LR[68]) smoking or exercise was the dependent variable (0,1). Income (0,-40, -80, -120, -160, -200, ≥200 (1000 NOK)), education (dummy variables; 10, 11-12, 13+ years), Finnmark (Yes/No), Oslo (Yes/No), and age (40-44,45-49 years) were independent variables (grouped). Interaction and quadratic terms were used to check for non-parallel slopes and curvilinearity. When adequate fit was not obtained by the basic model, stratification by county or county interactions, new dummy variable coding etc. were undertaken to achieve a goodness of fit X^2 with a p-value >0.05. Multivariate outliers with Z-scores > 3 (absolute value) were removed and the model rerun, this never changed the coefficients to any extent.

3.6.4 Analysis of risk factors by occupation

Age adjusted (1-year age groups) means were calculated for each occupation. In addition, cholesterol in men, and several risk factors in women were adjusted for county as well as age. Per cent daily smokers and physically inactive were not age adjusted. These risk variables show small age gradients in the 40-49 year range.

3.6.5 Rank correlation coefficients

The occupations were ordered by mean risk factor levels, attendance, income and mortality rates, and given rank numbers 1-65 in men and 1-19 in women. The un-weighted rank numbers were correlated (Pearson's product-moment coefficients), giving Spearman rank correlations. The rank correlations thus obtained were used to find patterns in the occupational risk levels. The number of units in this analysis is the number of occupations, and fewer significant correlations were found in women (19 occupations) than in men (65 occupations) presumably partly for this reason.

3.6.6 Confounder misclassification

When trying to evaluate the effect of socioeconomic status on mortality, adjust-ments were made for risk differences. However, cholesterol, blood pressure and smoking were measured once only, and measurement errors may cause the mortality gradient associated with these factors to be underestimated. To minimize the problem, several analyses were carried out stratified by risk level rather than adjusted for risk. In such analyses measurement errors on cholesterol, blood pressure, and smoking habits would have to vary systematically by socioeconomic group to influence the socioeconomic gradient. Self-reported smoking habits may vary by social class. The most probable direction would be that high status groups minimize their smoking more than low status groups do. This would reduce, not increase, the differences between high and low status groups in stratified analyses.

3.7 ANALYSIS OF MORTALITY

3.7.1 Follow-up endpoints

All subjects were followed through 1986. Observation years were calculated individually from date of examination to date of death, emigration, or December 31st, 1986. Observation years for non-attenders were calculated from the day they should have attended. Main cause of death, as coded by the Central Bureau of Statistics was applied, stroke codes 430-438, coronary death codes 410-411, 412.0-412.3, 413, sudden death codes 782.4 and 795 in the International Classification of Disease, ICD-8[62] (ICD-9[63] in 1986), Norwegian versions. The mortality follow-up by Tverdal[53] gives a detailed discussion of the sudden deaths. An abridged list of 69 causes of death has been in use at the NHSS (Appendix B) to follow time trends of Norwegian mortality rates through the various ICD-versions, and was also used in this study.

3.7.2 Age adjustment

Age adjustment (indirect method) used the total male or female sample population (one-year age groups) as the standard. Usually only attenders were included. When no risk factor adjustment is used, the total invited population may be the adjustment base, otherwise, attenders form the base. If all invited are used, this will be indicated in the table or figure heading. The expected number of deaths was calculated by the subject-year method[65]. Standardized Mortality Ratio (SMR) is the ratio of observed to expected number of deaths·100. When number of deaths was also adjusted for blood pressure, the rate in every age, county and blood pressure combination (10 mm systolic, 5 mm diastolic) was similarly applied[66]. Rates are age adjusted number of deaths per 1000 years of observation. In men there was a sufficient number of deaths from cardiovascular causes and sudden death to calculate mortality rates for each occupation. Mortality was first calculated for the 65 occupations from the original recode, as the expected number of deaths exceeded one in all of them. Then the 65 occupations were collapsed into 18 "main groups", largely by using the first digit in the Nordic classification of occupation. In women there were only 56 deaths from coronary heart disease and sudden death, and all cause mortality had to be used.

3.7.3 Log-linear mortality trends

To estimate log-linear trend coefficients from the adjusted mortality rates in the previous paragraph, the statistical program GLIM[67] was used. A Poisson distribution of the error term was assumed, and the number of deaths observed divided by the number of deaths expected was modelled. 95% confidence limits of the loglinear coefficients were calculated as the coefficient +/- 1.96· Standard error (S.e.) of the coefficient. Log-linear coefficients were also obtained by the Cox proportional hazards analyses[68]

3.7.4 Analysis of mortality by socioeconomy

Although cardiovascular screening data was missing, census information was available for most non-attenders. This allows presentation of mortality by socioeconomic variables in all invited. Mortality in every education and income combination and in each occupation was age and county adjusted. Adjusting for county was

necessary as Finnmark was selected because of high mortality levels. Mortality by occupation is in addition presented simultaneously adjusted for age, county and MI risk score. The 64 occupations in men were collapsed into 18 main occupation groups in some mortality analyses. The mortality of these occupations may be directly compared with the follow-up studies by CBS[48] and the Nordic occupational follow-up[49]. Because this material is smaller, I had to collapse some occupations more than the NOMESCO[49] study did when comparing occupational mortality in the Nordic countries. These "Main occupations" were NYK code:

NYK code	Occupation groups:
00-05	*Technical, chemical, physical, medical, health related.*
06	*Pedagogical*
07-09,0X,313	*Humanities, juridical, religious, artistic, literary*
10-11	*Executives, higher business and public administration*
20,21,29	*Office work, book keeping, cashier work, clerical work*
300-330(-313)	*Trade, wholesale, retail sale, agents, sales from office or outlet*
40-42,44	*Farming, livestock, forestry*
43	*Fishing, whaling, sealing*
50-59,73,75	*Mining, quarrying, iron and metal, smelting, foundry work*
60-69(-64)	*Air/rail/sea transport, post/telecommunication.*
64	*Bus/truck/taxi/tram drivers*
70-72,80,82,84	*Light industry, textile, leather, graphical, food processing*
76-79	*Building work*
81,83,85-88	*Process work, chemical, glass, ceramic, power supply, stationay engine work, and warehouse, loading and reloading, wrapping, packing.*
90,98	*Public safety and control, military work*
91-93(-934,939)	*Hotel and restaurant, janitor, cleaning work*
0-999(-above)	*Other known occupations, NEC*
Blank, X22	*Unoccupied, not known occupation*

In the Nordic mortality follow-up[49], mortality was adjusted for age. In the present study, additional adjustments were made for smoking, cholesterol and blood pressure differences. The amount of mortality reduction that would be possible if high risk occupations had mean risk level may be suggested when comparing these rates. Adjusting probably underestimates the mortality gradient, and the benefit of risk reduction may be greater than the observed differences between mortality rates adjusted for age and county, and those additionally adjusted for MI risk score.

4 RESULTS

4.1 ATTENDANCE

4.1.1 Cardiovascular screening

A total of 44690 men in Oslo, Oppland, Sogn og Fjordane and Finnmark between 40 and 49 years old were invited to screening (Table 1), of whom 33173 (74.2%) had a recorded blood pressure qualifying as attendance. There were 16189 attending Oslo men, comprising 50% of the total number of attending men. Oslo attendance was 62.6% in the 40-49 year age group. Attendance was high in the three counties, 91% for the men between 40 and 49 years. Finnmark had lower attendance than the other two counties, but higher than Oslo.

A total of 17540 women in Oppland, Sogn og Fjordane and Finnmark were invited, 16418 (93.6%) attended. Female attendance was high in all counties, but slightly lower in Finnmark.

4.1.2 Census

There were important differences between men and women regarding coverage (Table 1). Information about highest attained education from the 1970 census was available for 98.5% of the men and 98.8% of the women. Information about current occupation, and consequently about social class was available for 47% of the women and in 95% of the men. The main reason for this difference was that the 43% of the women had no occupation code in the census coding procedure, but could be reassigned to a "house wife" group.

4.1.3 Tax data

Incomes greater than 0 were available from the taxation data file for 97% of the men and 68% of the women (Table 1). Wage-earners must return an income report. Husband and wife may fill this out jointly even if both earn wages, or they may return separate forms even if only one is a wage-earner. All employers, own account professionals and farmers must return income tax forms. The tax data file did not supply information about income before tax deduction.

4.2 DISTRIBUTION OF SOCIOECONOMIC STATUS

4.2.1 Distribution of socioeconomic status by county

Percentages in each category of education, income, class, and Treiman prestige score varied by county (Table 2). The proportion with 17 or more years of education was 7.7% in Oslo men, 2.5% in Oppland, 2.2% in Sogn og Fjordane and 1.4% in Finnmark, in women 0.3% or less in all counties (Table 3). The percentage with income greater than 200000 was 33% in Oslo, 19% in Oppland, 15% in Sogn og Fjordane and 12% in Finnmark, in women 1.1% in Oppland, less in the other counties. Note that incomes are price index adjusted to 1987-levels. Per cent belonging to social class V, i.e. unskilled workers, was 12% in Oslo men, 16% in Oppland, 21% in Sogn og Fjordane and 30% in Finnmark. Women in class V comprise 3% in Oppland and Sogn og Fjordane and 9% in Finnmark. Those holding physically demanding jobs (from the screening questionnaire) represent different degrees of selection from the

county populations. In Oslo only 4% of the men reported the heaviest manual work load, compared to 28% in Oppland, 31% in Sogn og fjordane, and 20% in Finnmark. In women 4% in Oppland, 11% in Sogn og Fjordane and 2% in Finnmark report heavy manual work. (Data not shown).

4.2.2 Distribution of socioeconomic status in the total material

Figure 1 shows the number of men invited and attending in each main combination of education, income and class. Of the 44690 men invited, almost 10000 had 7-9 years of education, an income less than 160000 NOK/year **and** belonged to classes IV or V. Another 4214 men had 13+ years of education, an income equal to or higher than 160000/year and belonged to classes I or II.

The main socioeconomic combinations in women used different cutpoints for education and income. Homemakers were included as a separate social class, few of these higher income or education (Figure 2). Of the 17540 women, 7062 had 7-9 years of education, earned less than 80000 NOK/year and reported house work as main occupation. Only 404 women had 10 or more years of education, earned 80000 NOK/Year or more **and** belonged to social class I, II or III.

4.2.3 Income by occupation

The lowest mean income in men, Table 4, was found in reindeer herders. They had an income of only 38700, even lower than the income of unoccupied men, (50200). Farm workers (77500), students, fishers, farmers, loggers, wood workers, dock workers and textile workers (127200), also had low incomes. The highest incomes were seen in physicians (383700), Judges/lawyers (321500), university lecturers (296000), dentists, business administrators, architects, chief engineers, teachers, accountants, and central public administrators, (251400).

Mean incomes in women were lower than men's, Table 5. The lowest incomes were found in the constructed occupations; house wives (18000) farm wives (18800), and the unoccupied (56900). Other low income occupations were personal service (58300) and food processing work (60800). The highest incomes were found in teachers (139200), nurses (129300), and technical/scientific work (123200).

4.2.4 Correlation between socioeconomic factors

Correlations between education, income, class and Treiman prestige score are shown in Table 6. (Education in years from 7 to 18, income in NOK, Class as I, II, IIIn, IIIm, IV, V, and Treiman from 18 to 78). All four socioeconomic markers were correlated, the highest correlation of 0.83 was found between the two occupation-based classifications: British Registrar's social class and Treiman prestige score in men. Income and education had a correlation coefficient r=0.46, and income and class r= -0.38, in men. In women the correlations are lower than in men, except the correlation between Treiman prestige score and income, which was 0.49 in women and 0.42 in men. Turning to the rank correlations, income rank in men was negatively correlated to risk factor ranks and mortality rank, and positively to Treiman prestige rank, Table 7. In women income rank was negatively correlated to systolic and diastolic blood pressure and leisure inactivity, and positively to Treiman prestige rank, Table 8.

4.2.5 Male/female differences in socioeconomy

Differences between the proportion of men and women in the higher socioeconomic groups were marked (Table 2 and Table 3, Figure 1 and Figure 2). Most men had incomes of 80-200000 NOK/year, and substantial numbers had an education of 10 years or more. Of the attending men, 1576 (4.8%) had 17 or more years of education, and 8215 (25%) earned more than 200000 NOK/Year. In women on the other hand, higher education and incomes were rare. Only 38 of the invited (0.2%) had 17 or more years of education, and 140 (0.8%) earned 200000 NOK/Year or more. As many as 5626 (32%) women had no registered income of their own, and 13843 (79%) had 7-9 years of education.

4.3 MEAN RISK LEVELS BY GROUP A, B, OR C AND COUNTY

4.3.1 Numbers in groups A, B or C

Attendance cannot be tabulated by groups A, B or C, because return of the questionnaire was required to assign group membership. Group A, i.e. reporting a cardiovascular diagnosis or diabetes, contained a total of 2338 men and 1241 women. There were 1301 men and 685 women who reported undiagnosed chest or calf pain, interpreted as angina or intermittent claudication. These make up group B. The rest, 29543 men and 14683 women, reported neither diagnoses nor symptoms and were considered "healthy" i.e. to be in group C, Table 9 and Table 10.

4.3.2 Mailed questionnaires and complete data

Some mailed their questionnaire to the National Health Screening Service, giving information about smoking and symptoms/diagnoses of CVD and diabetes. Therefore the numbers with smoking status in Table 9 and Table 10 exceed the number with a measured blood pressure.

More than 99.9% of those who attended had their cholesterol measured, and 97.9% agreed to height and weight measurements (Table 9 and Table 10). Attenders with different occupations, educations and income agreed equally to blood sampling and height and weight measurements. (Data not shown).

4.3.3 Mean risk factor levels by group A, B or C and county

Group A men (Table 9) had higher mean cholesterol, triglycerides, blood pressure and BMI, but lower smoking rates than the two other groups. Group A men had a slightly lower mean income and education than group C men. Group B men, with symptoms but no diagnoses, had intermediate cholesterol, triglycerides, and BMI. They had the highest smoking proportion and tended toward the lowest income and education. Blood pressure was the same as in the healthy group. Group C means were close to the total population means.

Mean cholesterol in all groups (A, B or C) was higher in Finnmark (7.6). Oslo and the two other counties had similar mean cholesterol levels (6.9). Oppland had the highest triglyceride means (2.6), the other counties had similar triglyceride levels, about 2.2 mmol/l, but Finnmark interestingly had the lowest triglyceride level in all groups (A, B and C). Systolic blood pressures were similar in the four study areas.

Finnmark men smoked to a greater extent than men in the other counties (Table 9). Oslo men had the highest education and income levels.

In women, the differences between groups A, B and C were similar to those observed in men (Table 10). Group A women, (CVD or diabetes diagnosis) had higher cholesterol (8.0 mmol/l), triglycerides (2.2 mmol/l), BMI (2.9 g/cm^2) and blood pressure (146 mm systolic), and smoked less (29%) than the other groups. Group B women, with undiagnosed symptoms, had the highest smoking rate (41%). Group C, i.e. healthy women had the highest mean income, 45000 compared with about 37000 in the other groups. The same county differences in mean income were seen in women as in men, i.e. Oppland women had the highest mean income.

4.3.4 Treatment differences by class and county

Diagnoses and treatment of CHD was rare in women, and results for women are therefore not presented. The proportion with cholesterol above 9 mmol/l was 15.5% in Finnmark men and between 5.7% and 6.0% in Oslo and the other counties, Table 11. Finnmark men reported group B symptoms at cholesterol ≤ 9 mmol to a greater extent than Sogn og Fjordane and Oppland men, and slightly more than Oslo men. When cholesterol was greater than 9 mmol, proportions with symptoms or disease in Finnmark was the highest of all four counties. The proportion of Finnmark men with a diagnosis of cardiovascular disease or diabetes (group A) was as high as in the other counties. At low as well as high cholesterol levels, Oppland and Sogn og Fjordane men reported less undiagnosed symptoms. Oslo men, for whom medical care should perhaps be most available, reported a rather high proportion of undiagnosed symptoms. At cholesterol ≤ 9 mmol/l, all counties had similar proportions reporting diagnosed cardiovascular disease or diabetes.

Although numbers were small, there was a tendency that more high status men with high cholesterol had a cardiovascular diagnosis (group A), whereas more low-status men had undiagnosed symptoms (group B).

In men with cholesterol less than 9 mmol/l, use of nitroglycerine, Table 12, increased from class I+II to class V in all counties. At cholesterol 9mmol/l or higher numbers were small and there were no consistent class or county differences.

The proportion with systolic blood pressure above 160 mm was similar in all counties, (from 6.7% to 8.6%, Table 13). The percentage of men with systolic pressure above 160 mm who reported taking antihypertensive treatment varied from 6.3% to 20.7%, being lowest in class IV+V Sogn og Fjordane men, and highest in class I+II Finnmark men. In all four counties, more men in class I+II than in class IV+V with high blood pressure reported blood pressure treatment. Finnmark had the lowest proportion of "healthy" group C men.

4.4 ATTENDANCE BY SOCIOECONOMIC FACTORS

4.4.1 Education, income and class

All main socioeconomic combinations in men shown in Figure 1 had attendance greater than 50%. Men with the combination of high education (13+), high class (I+II), yet low income (>160000), had the lowest attendance rates, but this was a small

group of only 338 invited men. No main combination of income, education or class in women (Figure 2) had attendance rates less than 80%.

Attendance in the very low and very high income groups (Table 14, Table 15 and Figure 3), showed greater differences in male attendance than seen in the main socioeconomic combinations. Attendance increased with income and decreased with education. There is also a strong relationship (Figure 4) between education and income, cross tabulation is necessary to see the separate effects. Male attendance was markedly lower in the lowest socioeconomic groups in Oslo[34,51], and this was also evident in the pooled data (Table 14 and Figure 1, Figure 3).

Socioeconomic gradients in female attendance were small regarding income and education, (Table 16 and Table 17, Figure 5). The relationship between income and education was evident in women as well as in men, but the mean income was much lower (Figure 6).

4.4.2 Occupation

When studying specific occupations, low attendance in the total material was seen in physicians (33.3%), seamen (40.4%), unemployed, hotel/restaurant workers, ship officers, editors+journalists, jurists, students, university lecturers, and military men (58.1%), Table 18. Particularly high attendance was seen in farmers (95.6%), reindeer herders, wood workers, miners, loggers, teachers, fishermen, farm workers, traffic controllers and smelter workers (83.9%). The county effect was seen in that many high attendance occupations were uncommon in Oslo. In all occupations except architects, Oslo attendance was lower than attendance in the counties. The five occupations with the lowest attendance in Oslo were seamen (17%), unoccupied (21%), physicians (23%), ship officers (35%) and hotel and restaurant workers (41%). The five occupations with the lowest attendance in the counties were seamen (55%), ship officers (60%), physicians (66%), and unoccupied (69%). In the counties, 43 of the 65 occupations had attendance rates greater than 90%, in Oslo no occupation had attendance greater than 80%. There was a socioeconomic gradient in attendance, in that the highest and the lowest socioeconomic groups both have lower attendance than medium status occupations. Attendance rank (total population) was not significantly correlated to any risk factor rank except systolic blood pressure, nor to mortality ranks, Table 7.

In women (Table 19) the attendance was generally high in all occupations, 15 of the 19 occupations had attendance greater than 90%. The mean attendance was 93.6%, ranging from 99.1% to 66.3%. High attendance was seen in house wives (99.1%), shop cashiers (96.8%) and farm wives (96.7%). Particularly low attendance was seen in women with no occupation, 66.3%, followed by artists/students (81.4%) and nurses (88.1%). The low and high attendance in women is partly an artefact, because to assign women without occupation to farm wife, student or house wife categories, she had to return the questionnaire. Therefore non-attenders will remain as "no occupation," whereas attenders may be assigned to another category. The attendance in the combined group of all women initially without an occupation code, was 95%. No clear socioeconomic gradient in attendance was seen, although hotel and restaurant workers and industry/manual workers were both in the lower attendance

occupations. Nurses had low attendance, just as physicians. Attendance rank in women was not correlated to any risk factor rank, nor to mortality rank, Table 8.

4.5 RISK FACTORS BY EDUCATION AND COUNTY

4.5.1 Systolic blood pressure

Systolic blood pressure decreased with education in both men and women (Figure 7 and Figure 8). A multiple Analysis of Variance (MANOVA) was used, with the risk factor as dependent variable, age as covariate, and county and socio-economic variables as factors. Main effects and interaction between factors was tested. County differences were not significant, and there was no significant interaction between county and education regarding systolic blood pressure. In all four counties the same tendency of falling blood pressure with increasing education was seen. Men with 7-9 years of education had a mean systolic blood pressure of 137.3 mm, men with 13 or more years of education 133.4 mm. Women with 7-9 years of education had a systolic blood pressure of 134.8 mm, women with 13+ years of education a blood pressure of 128.7 mm, a difference of 6.1 mm.

4.5.2 Serum cholesterol

Mean cholesterol decreased with increasing education, from 7.07 mmol/l to 6.78 mmol/l in men and from 6.95 mmol/l to 6.70 mmol/l in women (Figure 9 and Figure 10) The very high cholesterol levels in Finnmark were more marked than the education differences. There was an interaction between county and education in men, this was not significant in women.

4.5.3 Smoking

Smoking rates decreased steeply with education, from 58% to 33% in men and from 37% to 26% in women (Figure 11 and Figure 12). Finnmark men smoked to a greater extent, and Oppland and Sogn og Fjordane somewhat less than Oslo men. In women smoking decreased with increasing education. Smoking rates were highest in Finnmark, lowest in Sogn og Fjordane, and the gradient was steeper in Oppland than in the other two counties. The education and county interaction effect was significant in both men and women.

4.5.4 MI risk score

MI risk score was very similar to serum cholesterol in its relationship with county and education (Figure 13 and Figure 14). MI risk score decreased with increasing education, from 64 to 41 in men and from 8.9 to 6.8 in women. MI risk score was markedly higher in Finnmark than in the other areas, and MI risk score in Oslo was slightly higher than in Sogn og Fjordane and Oppland men. The interaction between county and education was of borderline significance in men, nonsignificant in women.

4.6 RISK FACTORS BY SOCIAL CLASS AND COUNTY

4.6.1 Systolic blood pressure

Systolic blood pressure was higher in men in class V, unskilled workers, (137 mm) than in class I, professionals and executives (133 mm), Figure 15. Men with missing class information, i.e. men with no classifiable occupation, had an intermediate blood pressure level (135 mm). The same general pattern was seen in all four study areas, but the gradient was less marked in Oppland and Oslo than in Finnmark and Sogn og Fjordane. The county, class and interaction term between class and county were significant in men.

The social class grouping in women differs from that in men. Due to small numbers, classes I and II had to be collapsed, as were classes IV and V, Figure 16. Homemakers were entered as a separate social class. Blood pressure increased markedly with class, women in classes I+II had a systolic blood pressure of 129 mm, compared with 135 mm in class IV+V. Homemakers had a systolic blood pressure of 134 mm. In women the county differences were not significant, whereas the interaction between county and class was highly significant, as it was in men.

4.6.2 Serum cholesterol

Mean cholesterol also increased with social class, in men from 6.82 mmol/l in class I to 7.12 mmol/l in class V, falling to 7.07 in men with missing class information, Figure 17. As described earlier, mean cholesterol in Finnmark was higher than in the other study areas. In men the interaction between county and class was significant, Finnmark men in class II had mean cholesterol relatively lower than in the other counties.

In women, Figure 18, cholesterol increased from class I+II, (6.76 mmol/l), to class IV+V, (6.98 mmol/l). Finnmark again had high, and Oppland low cholesterol levels, but the interaction between county and class was not significant.

4.6.3 Smoking

Smoking rates showed the strongest relationship with class in men, Figure 19. Only 36% of social class I men were smokers, compared with 71% of class V men. County differences were significant, men in Finnmark smoked more than men in the other areas. There was no significant interaction between county and class in men.

In women, county differences in smoking rates were more marked, and there was a significant interaction between county and class, Figure 20. Smoking increased with class in Oppland, from 26% in class I+II to 37% daily cigarette smokers in class IV+V. Smoking increased from 35%in class I+II to 50%in class IV+V in Finnmark. In Sogn og Fjordane however, smoking decreased (n.s.) from 26% in class I+II to 23% in class IV+V.

4.6.4 MI risk score

MI risk score increased with class in men, Figure 21, the pattern was similar to that observed for cholesterol. MI risk score in men in class I was 36, in class V it was 71. From this would be expected that the CHD mortality rate in unskilled workers, class V, was twice that of men in class I. County differences were marked, Finnmark men

had higher MI risk score in all social classes. There was a significant interaction term between county and class regarding MI risk score.

In women, Figure 22, MI risk score increased from 6.4 in class I+II to 8.8 in class IV+V, and was 9.0 in homemakers. Finnmark women had very high MI risk score, particularly in manual classes and homemakers. The interaction between class and county was not significant.

4.7 RISK FACTORS BY EDUCATION AND INCOME

4.7.1 Systolic blood pressure

Cross tabulation, systolic blood pressure, men

When pooling Oslo and the counties and calculating age adjusted mean risk levels by income and education combinations (Table 20 and Figure 23), results were similar to the county specific analyses shown in Figure 7 to Figure 21. The age adjusted systolic blood pressure was 137.4 mm in men with 7-9 years of education and 133.2 mm in men with 17+ years of education, a difference of 4.2 mm. Blood pressure was 137.5 mm in the 0-income group, 138.7 mm in the 1-40000 income group, and 134.3 mm in the 280000+ income group, a difference of 3.2 mm between the 0 and the highest income group. Figure 23 suggests an interaction between income and education, blood pressure did not decrease with education in the 0 income group, but decreased with education for middle incomes especially. There was a 1.9 mm drop in blood pressure when going from low to high education after adjusting for income. When adjusting for education, very little remained of the income gradient. The age adjusted difference between those with 7-9 years of education and 1-40000 NOK and 17+ years of education and 280000+ NOK was 5.3 mm. (4.0 mm when compared with 0 income men). "Under-achievers" i.e. those with high education and low income had slightly higher (n.s.) systolic blood pressure than those with high education and high income. "Overachievers" i.e. those with low education and high income did not differ from those with low education and low income.

Regression analysis, systolic blood pressure, men

In the regression analysis (Table 21), the 424 men (1%) with systolic blood pressure greater than 185 mm were excluded to avoid outliers, as explained in methods. Drug treatment (no/yes) of high blood pressure was included as a dummy variable (0,1). Systolic blood pressure increased 0.3 mm for every year, 3.6 mm for a 10 kg weight increase and was 0.76 mm lower in Finnmark and 0.21mm lower in Oslo men (n.s.). Those on blood pressure treatment had 13.4 mm higher systolic blood pressure.

Education was associated with systolic blood pressure in men. Compared with men with education of 7-9 years, blood pressure was lower in all higher educations. The relationship was not monotonous, those with 10 years of education had 1.0 mm lower, those with 11-12 years 0.5 mm lower (n.s.) and those with 13+ years of education had 2.1 mm lower systolic blood pressure.

There was a small but significant effect of income. When income increased by 200000 NOK, systolic blood pressure decreased 0.9 mm. The calculated difference between men with 7-9 years of education and an income of 50000 NOK with 13+

years of education and an income of 300000 NOK was 3.2 mm. Zero income earners did not deviate significantly from the prediction based on income as a continuous variable, R^2 of regression =0.093.

Cross tabulation, systolic blood pressure, women

Note that "high income" in women was the 200-280000 NOK group, and "high education" was 13-16 years. The age adjusted systolic blood pressure was 134.9 mm in the low education group, and 127.7 mm in the high education group, a difference of 7.2 mm (Table 22 and Figure 24). The low income women had a systolic blood pressure of 136.6 mm, and the high income women 126.2 mm, a difference of 10.4 mm. In women as well as in men, blood pressure decreased less with education in the 0 income group. There was still a 4.8 mm difference between 7-9 and 13-16 years of education, when adjusting for income. When adjusting for education, the income gradient was 4.7 mm. The differences between education/income groups were greater than in men. Separate figures for "overachievers" and "underachievers" would be based on very small numbers.

Regression analysis, systolic blood pressure, women

In the regression analysis (Table 23), 260 women with systolic blood pressure greater than 185 mm were excluded. Therefore the mean blood pressure is lower than in Table 22. Systolic blood pressure increased a notable 0.77 mm for every year of age between 40 and 49, and 3.2 mm for 10 kg weight increase. Mean blood pressure was 1.1 mm lower in Finnmark. Those on blood pressure treatment had 12.1 mm higher blood pressure.

The association between education and blood pressure was stronger in women than in men. Women with 10 years of education had 1.6 mm lower, 11-12 years have 2.7 mm lower, and 13 years or more of education had 4.0 mm lower systolic blood pressure.

The many women with 0 income were mostly homemakers, and their systolic blood pressure was 1.6 mm higher compared with women with income. An income difference from 1 to 200000 NOK higher was associated with 1.9 mm lower systolic blood pressure, about twice the income effect seen in men. Wage differences of 200000 were rare in women, more common in men. The joint effect moving from 7-9 years of education and 0 income to 13+ years of education and an income of 250000 was a calculated systolic blood pressure difference of 8 mm, R^2 of regression =0.129.

4.7.2 Diastolic blood pressure

Cross tabulation, diastolic blood pressure, men

The age adjusted diastolic blood pressure was 86.5 mm in the low, and 85.6 mm in the high education group, a difference of 0.9 mm (Table 24 and Figure 25). The difference between no income (88.2 mm) and the highest income group (85.9 mm) was 2.3 mm. Diastolic blood pressure seemed constant from 7-9 to 11-12 years of education, only in the two highest educational categories was there a small decrease. When adjusting for age and education, the blood pressure difference by income was 1.6 mm, and when adjusting for age and income, the education effect was reduced to

0.5 mm. The joint effect of moving from high/high to low/low was 2.2 mm. Men with no income had higher blood pressure at most educational levels. "Under-achievers" and "overachievers" showed no consistent deviation from the rest.

Regression analysis, diastolic blood pressure, men

In the regression analysis (Table 25) 60 men with diastolic blood pressure greater than 130 mm were excluded. Diastolic blood pressure increased 0.19 mm for every year of age, and 3.3 mm for every 10 kg weight increase (1.80 m tall). Oslo men had on average 1.9 mm higher diastolic blood pressure, Finnmark men did not differ significantly from men in Oppland and Sogn og Fjordane. Diastolic blood pressure was 12.2 mm higher in men on treatment for hypertension

Education was not significantly associated with diastolic blood pressure in men. The pressure decreased with income, a 200000 NOK increase corresponded to 1.2 mm lower diastolic pressure. Zero income earners were not significantly different from the effect estimated from income as a continuous variable. R^2 of regression =0.146.

Cross tabulation, diastolic blood pressure, women

The diastolic pressure was 82.8 mm in the low, and 81.0 mm in the high education group, a difference of 1.8 mm (Table 26 and Figure 26). In the 0 income group it was 83.6 mm and in the 200-280000 it was 80.8 mm, a difference of 2.8 mm. When adjusting for income as well as education, the difference between low and high education was reduced to 0.1 mm, and when adjusting for education, the difference between 0 and high income was 0.8 mm. The joint effect of moving from high/high to low/low was 3.2 mm. Women with no reported income, i.e. mostly housewives, seem to have higher diastolic pressure than the other groups at all educational levels.

Regression analysis, diastolic blood pressure, women

The 20 women with diastolic blood pressure greater than 130 mm or less than 60 mm were excluded (Table 27). Diastolic blood pressure increased 0.33 mm with every year, and 2.5 mm with a 10 kg weight increase. Finnmark women had 0.85 mm lower diastolic pressure. Women on blood pressure treatment had 9.6 mm higher blood pressure.

The effect of education was marginal, only the 13+ years of education differed from 7-9 years, with 0.90 mm lower diastolic pressure. Pressure decreased 0.64 mm with 200000 NOK higher income (n.s.). Women with 0 income have 0.56 mm higher diastolic blood pressure, R^2 of regression =0.166. Both Table 26 and Figure 26 show what appears to be decreasing diastolic blood pressure in women with increasing income, but in the many women with 7-9 years of education the relationship is U-shaped. This may explain the lack of a significant income coefficient in the linear regression, although the 0-income women had significantly higher diastolic pressure than any-income women.

4.7.3 Serum cholesterol

Cross tabulation, cholesterol, men

The age adjusted cholesterol was 7.09 mmol/l in the low, and 6.71 mmol/l in the high education group, a difference of 0.38 mmol/l (Table 28 and Figure 27). The income difference was 0.54 mmol/l, from 7.37 to 6.83 mmol/l. Adjusting for county (Table 29 and Figure 28) gave the same results. Adjusting for education reduced the income effect to 0.31 mmol/l, and adjusting for education reduced the income gradient to 0.21 mmol/l. The joint effect of moving from low education and low income to high education and high income was 0.67 mmol/l. In general a consistent pattern of high serum cholesterol with low socioeconomic status was evident. "Underachievers" with 10 or more years of education and only 1-79999 in income had lower mean serum cholesterol. "Overachievers" did not differ from other men with 7-9 years of education.

Regression analysis, cholesterol, men

In the regression (Table 30) the 87 men with cholesterol greater than 12 mmol/l were excluded because of problems with extreme outliers in the regression. Cholesterol increased 0.032 mmol/l for every year of age, and 0.20 mmol/l with a 10 kg weight increase. Finnmark men had 0.72 mmol/l higher cholesterol values, and Oslo men 0.13 mmol/l higher than Sogn og Fjordane and Oppland men.

Cholesterol decreased with education. Compared with men with 7-9 years of education, this amounted to 0.09 mmol/l if having 10 years, 0.11 mmol/l if having 11-12 years and 0.20 mmol/l if having 13+ years of education. The calculated effect of a 200000 NOK income increase was a reduction in cholesterol of 0.51 mmol/l. Those with no income had an additional 0.17 mmol/l higher mean cholesterol. Thus, a man with no income and 7-9 years of education would have a calculated 1.0 mmol/l higher cholesterol than a man with 13+ years of education and 250000 NOK/Year, R^2 of regression =0.066.

Cross tabulation, cholesterol, women

The serum cholesterol was 6.99 mmol/l in the low and 6.59 mmol/l in the high education groups, a difference of 0.40 mmol/l (Table 31 and Figure 29). In the 0 income group, serum cholesterol was 6.95 mmol/l and in the high income group 6.60 mmol/l, a difference of 0.35 mmol/l. The education adjusted effect of income was a mere 0.08 mmol/l, whereas the education effect remained 0.30 mmol/l even after accounting for income. Moving from low income/low education to high income/high education gave a cholesterol difference of 0.33 mmol/l. In women, the relationship between socioeconomy and cholesterol was less marked than in men, and there was almost no effect of income on female cholesterol.

Regression analysis, cholesterol, women

Cholesterol increased a substantial 0.074 mmol/l with every year of age, and 0.10 mmol/l with every 10 kg weight increase if 1.65 m tall, Table 32. Finnmark women had on average 0.58 mmol/l higher cholesterol levels, reflecting the large county differences in cholesterol.

Cholesterol decreased with education. Women with 10 and 11-12 years of education had cholesterol values about 0.12 mmol/l lower, and women with 13 or more years of education had cholesterol 0.26 mmol/l lower than women with 7-9 years. Income had no impact on female cholesterol levels, R^2 of regression =0.081.

4.7.4 Serum triglycerides

Cross tabulation, triglycerides, men

Triglyceride levels decreased with income (Table 33 and Figure 30), from 2.82 mmol/l to 2.13 mmol/l, a drop of 0.69 mmol/l. This was reduced to 0.46 mmol/l if education was adjusted for. With education the reduction in triglycerides was 0.38 mmol/l from 2.43 mmol/l to 2.05 mmol/l, reduced to a difference of 0.28 mmol/l if education was adjusted for. The joint effect of moving from high education/high income to low education/low income was 0.85 mmol/l. The men with 0 income had increased triglyceride levels. Adjusting for time since last meal was done in the regression, but not in the table. "Overachievers" and "underachievers" did not differ from other men with the same education.

Regression analysis, triglycerides, men

Because serum triglycerides were skewed, with a long tail of high values, the natural log of triglycerides was used in the regression (Table 34). Changes reported are per cent change of triglyceride level, not percentage points.

Serum triglycerides increased 4% from 40 to 49 years of age. Time since last meal was included in the regression, and serum triglycerides decreased 6.6% for every category. (<1hour, 1-2 hours, 2-4 hours, 4-8 hours, >8 hours). Finnmark men had average triglyceride levels 8% lower, and Oslo men 2% lower than those of Sogn og Fjordane and Oppland.

Education of 11 years or more was associated with lower triglycerides, 3.3% lower for 11-12 years, and 3.9% lower if 13 or more years of education. Triglycerides decreased with income, and was 4.4% lower if income was 200000 NOK higher. Zero income earners had 4.5% higher triglyceride level in addition to the effect of income as a continuous variable, (p=0.045), R^2 of regression =0.14.

Cross tabulation, triglycerides, women

Women with high incomes had lower triglyceride levels, Table 35 and Figure 31. The decrease with income was more marked in women with low or high education, and was not seen in women with 11-12 years of education. The difference between low and high education was 0.27 mmol/l, and was reduced to 0.20 if accounting for income. The difference between high and low income was 0.35 mmol/l, reduced to 0.16 if adjusting for education as well as age. The joint effect of moving from low education/low income to high/high was 0.42 mmol/l. Female mean triglyceride level was 1.71mmol/l, significantly lower than the male mean of 2.35 mmol/l.

Regression analysis, triglycerides, women

The mean ln triglycerides of 0.43 in the regression (Table 36) correspond to 1.54 mmol/l, 0.16 mmol/l less than the arithmetic mean of 1.71 mmol/l. The effect of 10

years of age was a 14% increase in triglycerides. Triglycerides increased 9.8% with a weight increase of 10 Kg (1.65m tall). Triglyceride values in Finnmark women were the same as in the other counties, whereas Finnmark triglyceride levels in men were lower.

Higher education was associated with lower triglycerides. Women with 10 years of education had 3.8% lower, those with 11-12 years of education had 6.4% lower and those with 13+ years had 13% lower triglyceride values. Income was not associated with ln triglycerides in women. R^2 of regression =0.11.

4.7.5 Smoking

The proportion of men smoking any tobacco product was 56% (Table 37 and Figure 32), of cigarettes 47.1% (Table 38 and Figure 33). Tobacco smoking varied by county, 55% of men in Oslo, 52% in Oppland, 52% in Sogn og Fjordane and 66% in Finnmark smoked cigarettes. Data for any tobacco smoking by county is not shown, Figure 11 show the county differences for cigarette smoking .

Cross tabulation, smoking, men

Smoking decreased with income and with education. All changes are in percentage points. In the 0 income group there were 57.7% daily cigarette smokers, whereas in the highest income group there were only 30.4% smokers (Table 38 and Figure 33). The drop of 27.3% from no income to the highest income was reduced to 11.7% if adjusted for education. Smoking decreased 27.6% with education, from 52.9% to 25.3%. Adjusted for income the difference was 13.4%. The combined effect of going from low/low to high/high was 36.7%, a substantial socioeconomic gradient. "Overachievers" did not differ more than the income difference would suggest, but "underachievers", i.e. men with high education and low income, smoked more than would be expected.

Regression analysis, smoking, men

Smoking was coded 0 for non-smokers and 1 for cigarette smokers. The plots (Table 38 and Figure 33) showed a linear decrease in proportion of smokers with education and an additional effect of income, again the differences are in percentage points. Ordinary linear regression was first used (Data not shown), and although the standard errors of the coefficients will be inflated, the coefficients themselves are unbiased estimates[69]. The regression coefficients obtained showed that there were 8% fewer smokers among those with the 10 and 11-12 years of education, and 21% fewer smokers in those with 13 or more years of education, compared with men with 7-9 years. With a 100000 NOK increase in income the smoking prevalence decreased 5.0%. There were 19.6% more smokers in Finnmark and 8.3% more smokers in Oslo than in the two counties. Age and BMI were not entered as variables.

As smoking was a 0,1 variable a logistic regression model (Table 39) was undertaken. Income was first grouped as in the tabular and linear regression analyses, with a dummy variable for 0 income. This was changed to separate county-income terms to achieve an adequate overall fit of the model. Education was grouped as in the previous linear regressions. The exponentiated coefficients give the relative increase

in the smoking prevalence when the independent variable increased one unit. The plots of predicted versus observed proportions indicated an acceptable fit, and the goodness of fit p-value was 0.137.

The proportion of smokers was significantly associated with education and income in the logistic regressions, but the effect of income varied by county. 0-income men had to be excluded to achieve adequate fit and an interpretable model. In Oslo, as income increased one category (about 40000), the proportion of daily smokers was 0.84 of the previous level, i.e. the relative risk (RR) of smoking was 0.84. In Finnmark, the RR of smoking was 0.91 for every 40000 income increase, and in Sogn og Fjordane and Oppland, RR was 0.97. Moving from the lowest to highest income groups in Oslo would mean a smoking reduction to 0.35 of the original level (0.84^6), in Finnmark to 0.55 of the low income level (0.91^6), and in Sogn og Fjordane and Oppland to 0.85 (0.97^6) of the 1-40000 income smoking level.

Relative risk of smoking decreased with education in all three counties. If the relative risk of smoking (RR) was 1.00 in the 7-9 years of education, those with 10 and 11-12 years of education had smoking proportions 0.73 of this, whereas those with 13 or more years of education had a relative risk of smoking of only 0.44. Compared to Sogn og Fjordane and Oppland (RR=1.00), Finnmark residents had an RR of smoking of 3.06 and Oslo men an RR of smoking of 2.76. A total of 15473 smokers and 17136 non-smokers were used in the logistic regression analysis. The interaction of income with living in Sogn og Fjordane or Oppland was marginally significant with p=0.048. All other p-values were less than 0.0002. Figure 11 and Figure 19 show the county differences in the effect of education and class on smoking.

Cross tabulation, smoking, women

The female smoking percentage was 35.9% (Table 40 and Figure 34). In women, as well as in men, the county differences were large. Female smoking percentages were 37% in Oppland, 27% in Sogn og Fjordane, and 47% in Finnmark, shown in Figure 12 and also reported in earlier papers[74]. Smoking decreased with education, from 37.4% to 20.0%, this was not changed by adjusting for income. The decrease was stronger in middle and high income women, in 0-income women there was little change in smoking with education. The few women with 17 or more years of education had high smoking proportions, about 46%. In the group with no income (mostly homemakers) there were 29.4% daily smokers, whereas the highest income group had 31.9% smokers. If adjusted for education and age there were 28.7% smokers in the 0 income group, and 47.4% in the high income group. The combined effect of going from low/low to high/high was a 6.5% decrease in the percentage of daily smokers. There were 49.9% smokers in the group with low education/high income and only 24.9% smokers in the group with high education/0 income, a difference of 25%. Compared with men, income had the opposite effect on female smoking proportions.

Regression analysis, smoking, women

The linear regression (Data not shown) estimated that the smoking percentage was 4.6% (percentage points) lower in women with 10 years, and 9.7% lower in women with 11-12 years of education. Women with 13 or more years of education, had 21.9% fewer smokers compared to those with 7-9 years. With a 100000 NOK

increase in income the smoking prevalence increased 5.9%. This is in contrast to men, in whom smoking decreased 5.0% with 100000 NOK income increase. In 0-income women, (homemakers) the smoking percentage dropped an additional 6.5%. There were 12.9% more smokers in Finnmark. Age and BMI were not entered as variables.

Logistic regression (Table 41) with smoking as a 0,1 dependent variable again showed that both income and education were significantly associated with smoking, but not monotonically so. The interaction between income and county seen in men was not found. Although the full interaction model gave a goodness of fit p-value of 0.49, and the reduced model a goodness of fit of about 0.08, the latter is presented because it was simpler and the coefficients were almost identical.

Again smoking decreased with education and increased with income. Compared with women with 7-9 years of education, the smoking proportions were 0.82 of this in women with 10 years of education, 0.67 with 11-12 years of education, and 0.39 with 13 or more years of education. This was an even stronger decrease than seen in men. All income categories had higher smoking proportions than the 0-income group, the relative risk of smoking was 1.3 in the 1-39 000 income, 1.7-1.8 in the 40-120000 groups, 1.9 in the 120-160000 group and then dropped to 1.6 in women earning more than 160000 NOK/Year, all terms highly significant with p-values < 0.0005. The significance of income as a set was high, although the small group earning more than 160000 was not significantly different from the 0-income group.

Because high education is associated with high income, this may account for the small differences observed in crude smoking proportions with increasing education. In the logistic regression, 5898 of the women were smokers and 10488 were non-smokers.

4.7.6 Non-smoking.

There are three aspects of non-smoking. Some have never been daily smokers, called never-smokers. Some are ex-smokers, and there is a proportion of the ever-smokers who have quit, this will be called "quit proportion" or quitters.

Never-smoking (Table 42 and Figure 35), increased with education in men. The mean never-smoking proportion was 24%, increasing from 21.1% in men with 7-9 years of education to 36.8% in men with 17 or more years of education. The never-smoking proportion changed little with income, from 24.8% in 0 income men to 30.7% in the highest income group.

The proportion of never-smokers of 52% in women was much higher than the 24% in men, Table 43 and Figure 36. In 0-income women, the never-smoking proportion decreased with education, in women with some income the never-smoking proportion tended to increase with education. This complicated pattern may explain the small gradients seen with education, from 52% never-smokers in women with 7-9 years of education to 64% never-smokers in women with 13-16 years of education. Zero-income women had never-smoking proportions of 59%, high income women 52%.

The ex-smoking proportion was 28.7% in men and increased with education and income (Table 44 and Figure 37). Men with 7-9 years of education had an ex-smoking proportion of 25.6%, men with 17 or more years of education 37.7%, a difference of 12.1%. Adjusting for income reduced this to 27.4% and 30.0%, reducing the difference to only 2.6%. The ex-smoking proportion was 16.8% in men with no

income, and 38.9% in the highest income men, a difference of 22.1%. Adjusting for education reduced this to 18.5% and 32.8%, a difference of 14.3%. Ex-smoking in men was strongly related to income, less to education.

The ex-smoking proportion was lower in women (Table 45 and Figure 38), 11.7% compared with 28.7% in men. There were minor differences by education, from 10.8% in women with 7-9 years of education to 16.2% in women with 13-16 years of education. Women with 0 income had an ex-smoking proportion of 11.5, high income 12.5%. Adjusting for education eliminated income as a factor influencing ex-smoking proportions in women, this was very different from the pattern seen in men. The only women with an ex-smoking proportion comparable to men's (39.6%), were the few with 17 or more years of education and an income greater than 280000. The large number of never-smokers in women will dilute the ex-smoking proportions, since the maximum proportion of ex-smokers possible is limited to the proportion who ever smoked cigarettes daily. In women there are 50% never-smokers, and even if all female smokers quit, the ex-smoking proportion would only be 50%.

The quit proportion, i.e. the proportion of ever-smokers who have quit (Table 46 and Figure 39) was 37.9% in men. This quit proportion increased with education, in men with 7-9 years of education, 32.6% of the ever-smokers had quit smoking, in men with 17 or more years of education 59.8% of the smokers had quit. Only 22.6% of smokers with no income had quit, and 56.1% of the high income men had quit. The differences with education and income were large. It is noteworthy that 3 out of 5 smokers in the high status groups have managed to quit smoking.

In women, (Table 47 and Figure 40), the quit proportion also increased with education, but remained unchanged or even decreased with income. The total quit proportion was 34.6%, quite similar to the quit proportion in men of 37.9%, and this highlights the dilution of never-smokers in female ex-smoking proportions. The quit proportion was 22.4% in women with 7-9 years of education, and 44.8% in women with 13-16 years of education, a doubling of the proportion who have managed to quit. The income effect was small, 28.1% of 0 income women, and 34.5% of high income smoking women had quit.

4.7.7 MI risk score

Cross tabulation, MI risk score, men

The age adjusted MI risk score was 62.9 in the low and 35.4 in the high education group, a difference of 27.5 (Table 48 and Figure 41). The MI risk score was 77.8 in the 0-income, and 44.9 in the high income groups, a difference of 32.9. When adjusting for income, the education effect was 15.9. The income difference was 17.6, adjusted for education. The MI risk score differences by income were greater for the less educated, and virtually nonexistent in those with 17 or more years of education. MI risk score more than doubled when moving from high income/high education to no income/low education, 35.2 versus 79.8.

Regression analysis, MI risk score, men

MI risk score was log transformed in the regression (Table 49), and effect of changes in the independent variables is reported as percentage changes. MI risk score

increased 26% from 40 to 49 years of age, and a 10 kg weight increase was associated with a 36% score increase. Finnmark residents had markedly raised MI risk score values, on average 76% higher. Oslo men had MI risk scores 16% higher.

MI risk scores decreased with higher education. Both 10 and 11-12 years of education were associated with MI risk score about 11% lower, whereas men with 13+ years of education had 25% lower risk scores. MI risk score decreased with income, a 200000 NOK higher income indicated a 15% lower MI risk score. R^2 of regression =0.10.

Cross tabulation, MI risk score, women

The pattern between socioeconomic factors and MI risk score in women was unclear. The mean MI risk score in the low education group was 9.2, and in the high education group (13-16 years) 5.7, a difference of 3.6 (Rounded, Table 50 and Figure 42). The difference by income was 3.8, from 9.2 to 5.4 (income 200-279000). However, MI risk score was not monotonous in its relation to income, as may be seen from Figure 42. The explanation is i.a. the peculiar smoking pattern, high income women smoke to a greater extent than low and middle groups.

Regression analysis, MI risk score, women

The dependent variable in the regression (Table 51) was ln MI risk score. MI risk score increased 65% in the age period between 40 and 49 years of age. A 10 kg heavier woman had a 10% higher MI risk score. If she was taking blood pressure medication, her MI risk score was 63% higher. Finnmark women had on average an MI risk score 48% higher than Sogn og Fjordane and Oppland women.

MI Risk score decreased with education. Educations of 10 and 11-12 years had similar effects, a risk score 15% lower. If the woman had 13 years or more of education, her MI risk score was 29% lower. Income was not related to MI risk score in women. R^2 of regression = 0.11.

4.7.8 Physical inactivity during leisure

Logistic regression analysis, physical inactivity, men

The questionnaire item about physical activity during leisure hours offered 4 response categories (appendix A). The lowest level corresponds roughly to "reading, watching TV, doing less than 4 hours of any physical leisure activity per week". Categories 2 to 4 imply higher activity levels. In these analyses the categories 2-4 were considered any activity and given the value 0, and were compared to "no physical activity", coded as 1. Logistic regression showed that both income and education were significantly associated with inactivity. An interaction between income and county was found. It was impossible to achieve an adequate fit with Oslo and the counties simultaneously in the model and yet have an interpretable model. Therefore, separate analyses were done for Oslo (Table 52), Sogn og Fjordane and Oppland combined (Table 53) and Finnmark (Table 54). Inactivity decreased with increasing education in Oslo. Compared with 7-9 years of education, the RR of inactivity in Oslo was 0.79 for those with 10 years of education, 0.69 for those with 11-12 years of education, and 0.58 for men with 13 or more years of education,

p<0.0001. In Sogn og Fjordane and Oppland these RRs were 0.81, 0.68 and 0.86 respectively, p<0.002. In Finnmark, education was not significantly associated with inactivity levels. The effect of high education in Finnmark was in the opposite direction as in the other areas. The RRs of inactivity in Finnmark were 1.13, 1.14 and 0.69, p=0.16. Relative risk of inactivity by income (compared to 1-39999, 0 income excluded) was in Oslo 1.4 in the 40-79 999 income, 1.4 in the 80-129 999 groups, 0.92 in the 120-160000 group, 0.82 in the 160-199 999 income group, and 0.74 in the highest income group, this was significant, p<0.0001. In Sogn og Fjordane and Oppland these RRs were 0.86, 0.75, 0.51, 0.45, 0.59 and 0.63 in the highest income group, p<0.0005. In Finnmark, income was not significantly associated with inactivity levels, the coefficients were 1.5, 1.1, 1.1, 1.2, 1.4 and 1.6 in the highest income group, p=0.26. Although not significant, Finnmark was the only county where high income and education was associated with higher inactivity levels, i.e. with less exercise.

Logistic regression analysis, physical inactivity, women

In women (Table 55), an adequate fit (p=0.22) was obtained when analyzing the counties jointly. Finnmark women had an RR of inactivity 1.43 that of the other counties, p<0.0005. Inactivity decreased with education and was U-shaped with income. Compared with women having 7-9 years of education, RR of inactivity was 0.87 in women with 10 years of education, 0.80 in women with 11-12 years and 0.70 in women with 13 or more years of education, p=0.002. Comparing with 0-income women, RR of inactivity was 0.74 (income 1-39 999) 0.61 (40-79 999), 0.64 (80-119 999), 0.62 (120-159 999), and 0.75 in the highest income group, 160000+, p<0.0005.

4.8 RISK FACTORS BY OCCUPATION

4.8.1 Systolic blood pressure

The mean male systolic blood pressure (Table 56) was 136.4 mm, ranging from 129.9 mm to 141.6 mm. The ten occupations with the lowest systolic blood pressures, were the clergy (129.9 mm), lawyers, reindeer herders, students, chief engineers, natural scientists, central administrators, hotel/restaurant workers, staff administrators and university lecturers (133.2 mm). The medium blood pressure occupations were seamen (135.7 mm), janitors and plastic production workers (135.9 mm). The highest systolic pressures were found in loggers (141.6 mm), farm workers, mechanics, shop cashiers, fishermen, textile industry workers, farmers, carpenters, unspecified construction workers, graphical industry workers, machine operators and food processing workers (137.7 mm). Systolic blood pressure rank was significantly and positively correlated with all other risk factor ranks and mortality rank, and correlated negatively with income rank, Table 7.

In women, the mean unadjusted systolic blood pressure was 133.9 mm. The crude difference from highest (136.6 mm) to lowest (125.4 mm) was 11.2 mm. Adjustment for age (Table 57) reduced the difference to 10.7 mm, adjusted low 125.6 mm, high 136.3 mm. (Adjusting for age moved the packers from 18th to 15th place.) The lowest blood pressure means were found in nurses (125.6 mm), technical/science staff and teachers (128.2 mm). The highest blood pressures were found in farm wives (136.3 mm), house wives and food processing workers (134.7 mm). Adjusting for

county in addition to age did not further change the occupation means. Systolic rank correlated strongly with physical inactivity, MI risk score and diastolic blood pressure ranks, and less with cholesterol and triglyceride ranks. The rank correlation between income and systolic blood pressure was strongly negative, Table 8.

4.8.2 Diastolic blood pressure

The overall age adjusted mean diastolic blood pressure in men (Table 58) was 86.3 mm, ranging from 80.9 mm to 89.2 mm. The ten lowest mean diastolic blood pressures were found in reindeer herders (80.9 mm), natural scientists, students, chief engineers, central administrators, university lecturers, lawyers, chemical processing workers, staff administrators, and dentists (85.4 mm). The middle occupations were business administrators, unspecified leaders, and ship officers, all 86.3 mm. The highest diastolic pressures were found in physicians (89.2 mm), fine mechanics, editors and journalists, architects, shop cashiers, graphical industry workers, personal sales workers, administrative secretaries, whole/retail sales workers and conductors (87.0 mm).

Major discrepancies between systolic and diastolic blood pressure ranks were found in the clergy (1/21), chemical processing workers (46/8), and physicians (12/65). Diastolic blood pressure rank was only correlated to systolic and MI risk score ranks, Table 7.

In women, age adjusted mean diastolic blood pressure was 82.4 mm, ranging from 79.7 mm to 83.5 mm, Table 59. Crude diastolic blood pressure varied from 79.6 mm to 83.6 mm, the occupation means were virtually identical with the age adjusted values. The lowest age adjusted diastolic pressures were found in nurses (79.7 mm), auxiliary nurses and teachers (80.2 mm). Farm wives (83.5 mm), house wives and hotel/restaurant workers (82.3 mm) had high diastolic pressures. No major discrepancies between the rankings of systolic and diastolic blood pressure were found in women. Diastolic rank correlated positively with systolic rank and negatively with income rank, Table 8.

4.8.3 Serum cholesterol

In men, including groups A, B, and C (Table 60) the mean cholesterol was 7.00 mmol/l. There were occupational differences in age adjusted mean serum cholesterol in both men and women. The cholesterol difference between the lowest and highest occupations was 1.05 mmol/l. The ten occupations with the lowest mean cholesterols were primarily in the academic sphere, such as architects (6.52 mmol/l), lawyers, physicians, students, dentists, natural scientists, teachers, religious workers, and public administrators (6.79 mmol/l). Most of the ten occupations with the highest mean cholesterol levels were low status positions, including the unemployed. The highest cholesterol occupations were reindeer herders (7.67 mmol/l), fishermen, ship officers, food processing, miners, seamen, unemployed, unskilled construction workers, plumbers and hotel/restaurant workers (7.15 mmol/l). Median cholesterol occupations were post/telecommunication, (6.97 mmol/l), plastic and other production, carpenters, building painter, and iron/metal workers, (7.01 mmol/l). Cholesterol rank correlated positively with all risk factor ranks except diastolic blood pressure, and negatively with mortality rank, Table 7.

In women, the mean serum cholesterol was 6.94 mmol/l. The age adjusted difference from the highest to the lowest occupation mean was 0.75 mmol/l. Adjusting for county and age (Table 61) reduced the difference to 0.45 mmol/l. In women, the age adjusted serum cholesterol varied from 6.58 mmol/l in teachers, (n=414) to 7.33 mmol/l in the food processing industry (n=267). When adjusting for county in addition to age, the cholesterol means were 6.63 mmol/l in teachers, 7.03 mmol/l in food processing and hotel/restaurant workers, and 7.08 mmol/l in industrial and manual workers. Two occupations were now ranked higher than the food processing workers. Food processing is an occupation typical of Finnmark women, and mean cholesterol levels were much higher in Finnmark.

In women the same pattern was seen as in men, high status women had lower mean cholesterols than low status women. The five lowest cholesterol means were found in teachers, administrators, artists and students, shop cashiers and nurses. The shop cashiers (n=810) had low cholesterol in spite of the low-skill position. The five highest means were found in house wives, cleaning workers, food processing workers, hotel/restaurant workers and industry/manual workers, $p<.001$. Teachers, artists and students and administrators had the three lowest means, both when adjusted for age and age+county. Food processing, industry/ manual, cleaning, and hotel and restaurant workers had the four highest mean cholesterols. One-way analysis of variance (ANOVA) was significant both when analyzing the age adjusted and the age and county adjusted means. (Each risk factor value was multiplied by the expected mean based on age and county and divided by the total mean, the ANOVA was then done on these "adjusted" data.) Cholesterol rank was correlated to systolic blood pressure, triglyceride and MI risk score ranks, Table 8.

4.8.4 Serum triglycerides

In men (Table 62) the mean serum triglyceride level was 2.35 mmol/l, the range between the lowest and highest occupation mean was 0.84 mmol/l. The ten lowest levels were found in physicians (1.84 mmol/l), lawyers, chief engineers, architects, administrative secretaries, dentists, university lecturers, staff administrators, seamen and unspecified leaders (2.12 mmol/l). The ten lowest triglyceride levels were almost the same as the low cholesterol occupations, the one exception was seamen (n=111), notable because they were among the top ten cholesterol occupations. Their mean of 2.09 mmol/l was below the population mean of 2.35 mmol/l, whereas their cholesterol of 7.20 mmol/l was above the population mean. Note also that the occupation with triglyceride rank of 11 was fishermen (n=728), a large discrepancy from their high cholesterol rank. The ten highest mean triglycerides were the clergy (2.68 mmol/l), machine operators, conductors, unemployed, plumbers, drivers, wood workers, chemical processing workers, nurses and reindeer herders (2.49 mmol/l). This corresponds well to the top ten cholesterol occupations, the occupation standing out as unexpected being the clergy, with low mean cholesterol. Male nurses had high cholesterol and high triglycerides, whereas female nurses had low lipids. Occupations with median means were accountants, natural scientists, and building painters. Triglyceride rank was positively correlated with all risk factor ranks but diastolic blood pressure, and negatively correlated with income rank, Table 7.

In women (Table 63) the total mean triglycerides was 1.72 mmol/l, the range 0.39 mmol/l. Teachers (1.42 mmol/l) artists/students, other service workers and nurses (1.53 mmol/l) were low triglyceride occupations. Industry/ manual (1.79 mmol/l), packers, auxiliary nurses and hotel and restaurant workers (1.76 mmol/l) had high triglyceride levels. Adjusting for county (Sogn og Fjordane had lower mean triglyceride values) had no impact on the occupation means. Analysis of variance on untransformed triglyceride values was significant, as was an ANOVA based on ln transformed triglyceride levels (data not shown). Triglyceride rank was correlated with all risk factor ranks but diastolic blood pressure and inactivity ranks, and negatively (n.s.) correlated to income rank, Table 8.

In women, the serum lipid rank pattern was different from that of the systolic blood pressure ranks, although teachers had low rank and food processing workers had a high rank in both. In men, with the exception of hotel/restaurant workers and reindeer herders, the lipid ranks were similar to the blood pressure ranks.

4.8.5 Cigarette smoking

Overall 47.1% of the men (Table 64) were daily smokers of cigarettes. Per cent smokers by occupation ranged from 4.2% to 72%. The ten lowest smoking proportions were in the clergy (4.2%), physicians (16.4%), natural scientists (19.1%), dentists, teachers, lawyers, health professionals, university lecturers, vocational teachers and architects (28.9%). Median smoking proportions were seen in conductors (45.1%), fine mechanics, and shop cashiers (46.4%). The highest proportion of smokers were found in fishermen (72.0%), reindeer herders, seamen (64.1%), ship officers, smelter workers, hotel and restaurant workers, building painters, dock workers and food processing workers (58.5%). X^2 test (H_0: equal cell proportions) was highly significant, $p<0.001$, as was an analysis of variance. The clergy again showed discrepant results, with a low smoking proportion and high mean triglycerides. Usually a positive correlation is found between smoking and triglyceride levels. Smoking rank was correlated with all risk factor ranks but diastolic blood pressure, and negatively correlated to income rank, Table 7.

The cigarette smoking rate in women (Table 65) was 35.8% daily smokers. Teachers had the lowest smoking rate (18.8%), followed by farm wives and nurses (22.1%). The highest smoking rate was found in packers (54.8%), followed by food processing workers (53.7%) and industry and manual work (49.1%). X^2 (H_0: equal cell proportions) was 538.3 with 18 d.f., $p<0.0005$. Smoking rank correlated with cholesterol, triglyceride and MI risk score ranks, Table 8.

4.8.6 MI risk score

In men (Table 66) the mean MI risk score level was 57.3, ranging from 25.6 to 98.1. The index includes a factor of 5 for male gender, making male MI risk scores 5 times higher than female at identical smoking, cholesterol and blood pressure levels. The ten lowest mean MI risk scores were found in the clergy (25.6), physicians, lawyers, natural scientists, university lecturers, chief engineers, teachers, dentists, and health professionals (41.0). The median MI risk score levels were found in business administrators (54.8), plastic production workers and carpenters (55.3). The highest MI risk scores were found in fishermen (98.1), reindeer herders, ship officers, seamen,

hotel and restaurant workers, construction workers, the unemployed, food processing workers, plumbers and building painters (67.5). Analysis of variance was based on ln MI risk score, and was highly significant. MI risk score rank correlated positively with all other risk factor ranks and with mortality rank, negatively with income rank, and there was no association between MI risk score and attendance ranks, Table 7.

Female MI risk scores ranged from 5.3 to 12.3 if adjusted for age only (Data not shown), and from 5.5 to 10.7 if simultaneously adjusted for age and county (Table 67). Smoking rates and mean cholesterols were higher in Finnmark and are part of the MI risk score calculation. The three lowest occupations were teachers (5.3 age adjusted / 5.5 age and county adjusted) nurses (5.9/5.9), and technical/science (6.8/7.1). The occupations with the highest age adjusted means were food processing (12.3), industry and manual work (10.8) and cleaning work (9.6). When county was simultaneously adjusted for, the three highest means were found in industry/manual work (10.7), food processing (9.9) and hotel restaurant work (9.5). The cleaning women were moved from rank 17 to 14, and textile industry workers from 11 to 15, otherwise small changes were caused by the additional adjustment for county. Analysis of variance was based on ln transformed MI risk score values, and was highly significant, $p<0.0005$. MI risk score rank was positively correlated with cholesterol, triglyceride, systolic blood pressure and smoking ranks, negatively with income rank, and not to mortality rank, Table 8.

4.8.7 Physical inactivity

The percentage of men (Table 68) reporting no leisure time physical activity, i.e. "sits, reads, watches TV," was 20%, and increased with decreasing status. The ten lowest inactivity percentages (i.e.the highest activity levels) were seen in jurists (11.2%), traffic control workers, architects, chief engineers, military personnel, university lecturers, natural scientists, chemical processing workers, conductors, and in physicians (13.4%). Median inactivity levels were found in plumbers (18.6%) and iron/metal workers (18.7%). The ten occupations with the highest inactivity levels were the clergy (31.3%), whole/retail sales workers, the unoccupied, hotel and restaurant workers, drivers, farmers, personal service workers, ship officers, reindeer herders, and farm workers (23.8%). Inactivity rank was weakly associated with systolic blood pressure and mortality, more strongly with cholesterol, triglycerides, smoking and MI risk score ranks, and was negatively correlated to income rank, Table 7.

The proportion of females (Table 69) reporting no exercise was 23.2%. The lowest inactivity level was found in technical/scientific work (15.3%), nurses and teachers (16.6%). The highest inactivity levels were seen in packing workers (31.0%), food processing workers, and farmers (28.2%). Inactivity rank was positively correlated to systolic blood pressure rank and negatively to income rank, Table 8.

4.9 MORTALITY: COUNTY DIFFERENCES

4.9.1 Mortality by county, all cause groups

Mortality data and socioeconomic data were available for non-attenders to screening as well as attenders. Causes of death in this total population was similarly distributed between the counties in men (Table 70) although gastrointestinal cancers may be over-represented in Sogn og Fjordane. Lung cancer (n.s.) and hepatic cirrhosis deaths were more common in Oslo. (Binomial test of equality $p<0.05$). Violent deaths were comparatively more frequent in Finnmark, and suicides in Oppland. 75% of the deaths were in Oslo men, mostly due to the older age of these men. Of the 4323 deaths in men, 1496 were deaths from CHD and 99 were sudden deaths, the sudden deaths have been included with CHD deaths in the analyses. Other cardiac or vascular diseases killed 236 men, and 196 men died of stroke or subarachnoid hemorrhage.

In women, small numbers may conceal associations between causes of death and county, but CHD deaths were more common in Finnmark, and breast cancer non-significantly higher in Sogn og Fjordane than in Finnmark, Table 71. Of 543 female deaths, 56 were from CHD and 9 were sudden deaths. Other cardiac disease killed 29 women, stroke and subarachnoid hemorrhage 51. Breast cancer killed 53 women, i.e. almost the same number as CHD. Follow-up time in Finnmark women was one year longer than in Sogn og Fjordane, and two years more than in Oppland.

4.9.2 Mortality from CHD by education and county

CHD mortality decreased with increasing education (Figure 43 and Figure 44). The loglinear mortality trend coefficient was -0.34 (95% CI -0.41 to -0.26) when education was grouped as 7-9 years of education=1, 10-12 years=2, and 13 or more years=3. This means that the mortality of men with 10-12 years of education is only 72% of the mortality rate of men with 7-9 years of education. The gradient with education was steepest in Oslo, where CHD rates were 4.0/1000 Obs.years in men with the lowest education and only 1.5 deaths/1000 Obs.years in men with 13 or more years of education. In both Sogn og Fjordane and Finnmark, mortality levels were higher in men with 13+ years of education compared with 7-9 years, but the 13+ education groups are small, only 225 men in Finnmark and 377 men in Sogn og Fjordane. Sogn og Fjordane and Finnmark had the lowest mortality rates in men with 10-12 years of education. Oppland CHD mortality was lower than in Oslo, but followed the same pattern, i.e. decreasing mortality with increasing education.

The loglinear coefficient is halved if calculations are based on attenders only, Figure 44. The difference in mortality between the total invited population and the attending men is greatest in Oslo, this is also the county where attendance was lowest. The pattern was, however, the same in the total as in the attending population, i.e. Oslo and Oppland mortality decreased for every level of education, whereas in Sogn og Fjordane and Finnmark mortality increased from 10-12 years to 13+ years.

4.9.3 Mortality from Stroke by education and county

Stroke and subarachnoid hemorrhage mortality, jointly called stroke in this study decreased with increasing education (Figure 45 and Figure 46). Stroke deaths were few, only 195 in all invited and 92 in all attending men. 53% of the stroke deaths oc-

curred in the 25% who were non-attenders, whereas 38% of the CHD deaths were in non-attenders. The loglinear trend coefficient β is similar if based on all invited, β=-0.30 (95% CI -0.51 to -0.09) or attenders only β=-0.35 (95% CI -0.68 to -0.03). The RR of stroke, when comparing education of 10-12 years with 7-9 years, was 0.74 in the total material and 0.70 in attenders. Numbers were small, and the county specific mortality rates show no consistent trend with education, the point estimates are shown in the figures.

4.9.4 Mortality from all causes by education and county

All cause mortality decreased with increasing education in the total invited population and in attenders (Figure 47 and Figure 48). In the total invited population mortality was 9.5/1000 Obs.years in men with 7-9 years of education, and only 4.4/1000 Obs.years in men with 13+ years of education. The log-linear trend coefficients were similar in the attenders (-0.30) and in the total invited population (-0.34). The decrease with education was monotonous in Oslo and Oppland, in Finnmark and Sogn og Fjordane there was no change in mortality with education in attenders, and in Finnmark a U-shaped relationship in the total invited population.

4.9.5 Mortality from CHD by class and county

CHD mortality increased with social class (Figure 49 and Figure 50), from class I (Professionals, self-employed) to Class V (Unskilled workers). The two subgroups of class III, i.e. low level non-manual (IIIn) and high level manual (IIIm) were considered as one class. Particularly high mortality rates were seen in men with missing class. Men with missing class were not included when calculating the log-linear coefficient of mortality with social class. The loglinear mortality trend coefficients, when entering class as 1 to 5 was 0.17 (95% CI 0.12 to 0.22) suggesting an RR of CHD mortality of 1.18 when comparing one class to the next. RR of CHD death between class I and V would then be $1.18^5=2.3$. In all invited, CHD mortality was 1.9/1000 Obs.years in Class I and 3.6/1000 Obs. years in class V. In the attending men, the results were similar, but class specific CHD mortality rates were lower.

4.9.6 Mortality from stroke by class and county

Stroke mortality increased with social class (Figure 51 and Figure 52), although class III (low level non-manual and high-level manual) had lower stroke mortality than class II (intermediate non-manual). There were few stroke deaths, and 53% occurred in non-attenders to screening. Mortality rates in class I (professionals) was 0.23/1000 Obs.years whereas mortality in class V (unskilled workers) was 0.55/1000 Obs.years in the total invited population. The loglinear mortality coefficient over social class coded as 1 to 5 in all invited was 0.20 (95% CI 0.07 to 0.34), in the attending men the coefficient was nearly the same, 0.18, but not significant (95% CI -0.01 to 0.38).

4.9.7 Mortality from all causes by class and county

All cause mortality increased with social class, Figure 53 and Figure 54. Particularly high all cause mortality was seen in men with missing social class, i.e. non-attenders to the census or with no or unclassifiable occupation. Mortality rate in men

with missing class was 17.1/1000 Obs. years in the total invited population, and 11.3/1000 Obs.years in the attending men. Men with missing class information were not included when calculating the log-linear trend. The log-linear trend coefficient with social class, coded as 1 to 5 was 0.18 (95% CI=0.15 to 0.20). RR between adjacent classes was 1.20, and RR was 2.5 when comparing class I with class V, (1.20^5). In the attending men the loglinear coefficient was 0.15 (95% CI=0.11 to 0.19). 46% of all deaths occurred in non-attenders to screening.

4.10 MORTALITY BY EDUCATION AND INCOME

4.10.1 Number of deaths, attenders and nonattenders

The total number of male deaths in all invited was 4324, of these 2202 occurred in attenders. There were 1595 deaths from coronary heart disease and sudden death in men, 975 of these in attenders to screening. A greater fraction of deaths was in non-attenders in the low status groups, Table 72 and Table 73. Of the 84 CHD+SD deaths in men with no income, only 28 occurred in attenders. In all socioeconomic groups studied, non-attenders had about twice the mortality rate of attenders. From this may be inferred that no different health selection (health measured as mortality) for attendance operated in the low and in the high status groups. If only the unhealthy in the low status groups, and the healthy in the high status groups attended the screening, different health selection could be a problem. However, mortality is higher in non-attenders in all socioeconomic groups.

In women, Table 74 and Table 75, there were only 56 CHD+SD-deaths in attenders, and all cause mortality was used in the analyses. There were a total of 543 deaths, 420 of which occurred in attenders. Mortality was higher in non-attenders, but the excess mortality in non-attenders was less than in men.

4.10.2 Mortality by education and income, adjusted for age and county

The coronary heart disease and sudden death rate in attending men (Table 76) was 2.47/1000 observation years, this rate corresponds to the standardized mortality ratio (SMR) of 100. Mortality ratios decreased with income, SMR was 240.4 in the 0-income men and 49.6 in the highest income group (earning 280000 NOK/year or more). When education was also adjusted for, the SMRs became 203.4 and 71.8. Adjusting for age, the SMR in the low education men was 115.7, and in the high education men 52.4. When income was also adjusted for, the SMRs were 106 and 71.6. The joint effect of moving from high education/high income, SMR=42.5 to low education/no income, SMR=257.6, was a 6-fold increase in mortality rates. The men with 0 income had particularly increased mortality, Figure 55, this will be discussed in more detail later. The linear trends of SMR with education or with income were significant at $p<0.001$. Education and income effects were significant also when the other was adjusted for. The rare education/income combinations had few deaths, e.g. high education/low income.

In women (Table 77 and Figure 56) the all cause mortality rate was 2.38/1000 observation years, this figure corresponds to SMR=100. The rate of CHD and sudden death (Table 78 and Figure 57) was 0.31/1000 years of observation. In some combinations of education and income there were few deaths. In Table 77 all educations of

13 or more years were grouped, in Figure 56 further collapsed into 11 or more years of education. No linear effect of neither income nor education on female mortality rates was evident. There may be curvilinear associations, but numbers were small. When looking only at CHD and SD there were even fewer deaths, the rates are presented in Table 78 and Figure 57.

4.10.3 CHD mortality by education and income, adjusted for age and MI risk score

In men the effect of income and education on CHD was computed (Table 79) adjusting for age and MI risk score. The risk score adjustment would remove at least some effect of cigarette smoking, serum cholesterol and systolic blood pressure. MI risk score adjustment reduced the mortality gradients by income and education, and the difference may suggest the benefit to be expected if the lower socioeconomic groups achieved medium risk factor levels. Mortality rates still decreased with income, (Figure 58) SMR from 186.9 to 61.1. When education was also adjusted for, the drop was from 179.6 to 76.0. Mortality decreased with education from 106.1 in the low education men to 68.4 in the high education men, reduced to 102 to 86.2 when income was also adjusted for. The joint effect of moving from high education/high income, SMR=57.7 to low education/no income, SMR= 195.3 was a 3-fold increase in mortality rates. The men with 0 income changed least when adjusting for the risk factor levels. This may mean that other causes of CHD deaths operate in this group, e.g. symptoms suggesting or manifest CHD.

4.10.4 Income by cause of death

The mean income was below average for all who later were to die during follow-up, except men dying of prostate cancer, leukemia/myeloma/lymphoma or malignant melanoma, Table 80. Extremely low income was found in the 7 men later dying from multiple sclerosis, and also men later dying from urogenital disease other than prostate cancer, gastrointestinal ulcer, and infections had low incomes. Mean income in men dying from CHD was 146300, in men dying from "Sudden Death," the mean income was 131000.

In women, Table 81, the income differences were smaller, and there was a considerable "dilution" from 0-income earners. Women dying from multiple sclerosis, infections and diabetes had very low incomes. Women surviving follow-up had a mean income of 44000, eight causes of deaths had higher mean income than this. As in men, myeloma, leukemia or lymphoma cases had higher income than survivors, as did women later dying from subarachnoid hemorrhage. Few female deaths preclude significant differences.

4.10.5 Mortality in men with no income

The large excess mortality in men with no income is highlighted in Table 82. The age adjusted SMR of men with no income was compared with that of the total population (SMR=100). This was done separately for each cause of death, not only cardiovascular diagnoses. The 0-income men had SMR>100 for all causes studied, except brain tumor, (SMR=79, 1 death). CHD mortality made up a smaller percentage (22%) of all deaths than in the total male population (35%). The high SMR of 182 in spite of this lower percentage underscore the high mortality in this group. There may be a

shift toward "sudden death" in these men, SMR=465. In 0-income men, 238 deaths occurred in non-attenders, 91 in attenders to the cardiovascular screening. Hepatic cirrhosis (SMR=404), violent deaths (SMR=460), unknown causes (SMR=560), ulcer (SMR=923), and pneumonia (SMR=730) were more likely causes of death in 0-income men, than in the total male population. High non-attendance and a large proportion from Oslo in this group unfortunately means that questionnaire information about sick-leave and disability pension was missing in most of these men.

4.11 MORTALITY BY SOCIOECONOMY, STRATIFIED BY MI RISK SCORE

4.11.1 Education

MI risk score was stratified into 7 levels. Within each MI risk score level, the age adjusted mortality tended to be higher in men with only 7-9 years of education, compared to men with 13+ years (Table 83 and Figure 59). This pattern was consistent in all MI risk score levels up to 100. At higher MI risk scores the pattern was less clear. This was also the level at which individual intervention was initiated. Taking men with 7-9 years of education as the reference group, men with 13+ years of education had a relative risk (RR) of dying from heart disease of 0.65 (95% CI=0.51-0.82). Men with 10-12 years of education did not differ significantly from men with 7-9 years, RR=0.94 (95% CI 0.81-1.09). Assuming a Poisson distribution of the error term, and modeling Observed/ Expected number of deaths in the three education groups (7-9=1, 10-12=2, 13+=3) gives a log linear trend coefficient = -0.16 (-0.26 to -0.07). This corresponds to an RR=0.86 when comparing 7-9 years of education with 10-12 years, and RR=0.72 when comparing 7-9 with 13+ years of education.

4.11.2 Income

CHD mortality by income level was calculated for seven different MI risk score levels, Table 84 and Figure 60. At all MI risk score levels, men with no or missing income had the highest mortality. At MI risk score higher than 100, the medium and high income men had the same mortality rate. If CHD mortality is set to 1 in no-income men, the RR of dying from ischemic heart disease was 0.65 (95% CI 0.46-0.93) in men earning from 1 to 160000 NOK. The high income men (income 160000+) had an RR=0.52 (95% CI 0.46-0.60). Numbers were small in the no income group, and MI risk score levels were collapsed when plotting the data for this group. Whenever the number of deaths was less than 20, the number is shown.

4.11.3 Social Class

Social class was based on the British Registrar's classification. The unoccupied, military and students were not included. At all seven MI risk score levels used in the stratified analyses, social classes I and II show the lowest CHD mortality rates, and (at all but the highest MI risk levels) classes IV+V the highest, Table 85 and Figure 61. Using classes IV+V as the reference group, the RR for classes I+II was 0.75 (95% CI 0.63-0.92), and the RR for class III (n+m) =0.88 (95% CI 0.76-1.00). Social class was consistent in its relation to CHD mortality at nearly all levels of MI risk score.

4.11.4 Treiman prestige score

Men with no occupation, and thus no Treiman prstige score, were included with Treiman scores less than 20 in Table 86 and Figure 62. At all but the highest MI risk score level, the low Treiman group had the highest mortality rates. Using the low status occupations (prestige scores below 20) as the reference, the RR for medium status occupations (20-49) was 0.70 (95% CI 0.52-0.94). The high status occupations (prestige score 50 or greater) have the lowest CHD mortality rates at all MI risk levels, compared with the low status group, RR=0.52 (95% CI 0.44-0.62). Treiman prestige score was the socioeconomic marker that produced the greatest mortality differences in the stratified analyses, but the RRs are similar to those based on income (Figure 60).

4.12 MORTALITY BY SOCIOECONOMY, MULTIVARIATE ANALYSES

4.12.1 CHD by socioeconomy, men

Cox proportional hazard analyses[68] were used to estimate the impact of each socioeconomic factor on CHD mortality. The socioeconomic variables were entered alone, with risk factors, and with the other socioeconomic variables. The cutpoints of the socioeconomic variables were identical with those used in Table 83 to Table 86. The coefficients adjusted for age but not for MI risk score, are given in Table 87, part 1. The relative risk associated with an increase in one "unit" or step of the independent variable is the exponentiated coefficient, $e^{coefficient}$.

When the CHD mortality rate in men with education of 7-9 years was set to 1, the age adjusted CHD mortality was only 0.69 of this in men with 10-12 years of education, and 0.48 in men with 13 or more years of education. When income, class and Treiman prestige score were entered with education, the education coefficient remained significant, but the RR (10-12/7-9 years) was reduced to 0.81.

If the CHD mortality of men with income of 1-159999 NOK/Year is set to 1, then men with 0 income had an age adjusted mortality 1.6 of this, reduced to $\frac{1}{0.79}=1.3$ when education, class and Treiman were entered with income.

When CHD mortality in men in class I+II was set to 1, men in class IIIn+m had an age adjusted CHD mortality 1.32 of this, and men in class IV+V had a mortality rate of $(1.32)^2 = 1.74$ of the mortality in class I+II. When education, income and the occupation-based Treiman was entered with class, the RR was reduced to 1.04 and was not significant.

When CHD mortality in men with medium Treiman prestige scores of 20-49.9 was set to 1, the age adjusted mortality in men with lower Treiman score was 1.7 of this. When education, income and class were entered jointly, the RR was reduced to 1.2, and was not significant, p=0.10.

4.12.2 CHD by socioeconomy, men, adjusted for MI risk score

CHD mortality coefficients by socioeconomic factors, adjusted for age and MI risk score, are given in Table 87, part 2. These coefficients should be compared to those calculated in the stratified analyses shown in Table 83 to Table 86. The Cox regression coefficients were larger than those obtained from a stratified analysis, some reasons for this will be considered in the discussion. Not surprisingly, adjusting for

MI risk score besides age reduced the strength of the relationship between socio-economy and CHD mortality.

Setting CHD mortality in men with education of 7-9 years to 1, the age and MI risk adjusted CHD mortality was 0.81 of this in men with 10-12 years of education, and only 0.66 in men with 13 or more years of education. Entering income, class and Treiman prestige score with education, the RR of CHD when comparing 10-12 years of education with 7-9 years was reduced to 0.92 and was not significant.

When the CHD mortality of men with income of 1-159999 NOK/Year was set to 1, then men with 0 income had an age and MI risk score adjusted mortality 1.4 of this, and men earning 160000 or more had a mortality rate 0.74 of the rate in medium income men. When education, class and Treiman are entered with income, the RR was reduced to 1.2 and 0.84, but remained significant.

Setting male CHD mortality in class I +II to 1, men in class IIIn+m had an age and MI risk score adjusted CHD mortality 1.17 of this, men in class IV+V had a mortality of 1.37. When education, income and Treiman prestige score were entered with class, the RR was reduced to 1.0.

Setting CHD mortality in men with medium Treiman prestige scores (20-49) to 1, gave an age adjusted mortality of 1.45 of this in men with lower Treiman scores. When education, income and class were entered jointly, the Treiman prestige score RRs were reduced to 1.2 and 0.84, no longer significant.

MI risk score remained significant when entered jointly with the socioeconomic factors, the RR of the highest to the lowest MI risk score group was $(1.53)^6=12.8$.

4.12.3 CHD by socioeconomy, stratified by county, men

In Table 88, Group A, B and C (see paragraph 3.2.4) and stratification by county, were added to the Cox models described in the previous paragraphs. The effect of group A/B is large. However, except for a reduction in the impact of income on CHD mortality in men, these additions to the model gave nearly the same coefficients as the models with no stratification by county nor group A, B or C adjustments. County differences in the relationship between socioeconomic factors, and greater proportion of men with cardiovascular disease or symptoms therefore seem to play only minor roles in explaining the mortality gradients with education, income, class and Treiman.

4.12.4 CHD by socioeconomy, women

Cox proportional hazard models[68] were used to estimate the impact of each socio-economic factor on CHD mortality in women. There were only 56 deaths from this cause in the 16031 women, and only 18 CHD deaths in women working outside the home. The socioeconomic variables were entered alone, with risk factors, and with other socioeconomic variables. In women the gradients were smaller than in men, and only rarely significant, Table 89.

Neither education, income nor Treiman prestige score was a significant predictor of female CHD mortality when each was entered with age. In contrast to the finding in men, mortality in women decreased, although non-significantly, with social class I to V. Social class was coded as in men, leaving out all homemakers with no social class in the original coding system. If mortality in classes I+II is set to 1, mortality in class III was 0.79 of this and mortality in class IV+V only 0.63. In an alternative

analysis of social class in women, homemakers (no class) were compared to the working women (class I to V). This showed a significantly increased mortality in homemakers, RR= 2.0.

Entering education, income, Treiman and class (I to V) jointly gave nonsignificant coefficients for all. When homemakers were compared with the other women, they had a significantly increased mortality. In women, therefore, the occupation based social status indicators had a mortality effect in the opposite direction compared with men.

Adding MI risk score, adjusting for group ABC and stratifying by county did not change the socioeconomic mortality coefficients in women, Table 90. The RRs associated with group A/B and with MI risk score were larger than those found in men. MI risk score cutpoints were the same as in men, divided by the gender factor of 5. Women in each category would therefore have the same average smoking, cholesterol and blood pressure as men in the same category.

4.13 MORTALITY BY OCCUPATION

4.13.1 Number of deaths by occupation in the total population

Numbers of deaths (all causes) were small in some of the 65 occupations after the initial recode, but are presented to allow comparisons with the risk factor means and with other studies of mortality by occupations. As may be seen in Table 91, all 65 occupations had at least 3 deaths when the total invited population is used. Occupations with less than 10 deaths were architects, religious workers, university/college lecturers, dentists, male nurses, natural scientists, and health professionals other than physicians and nurses. The common denominator was that the occupation was rare, and in addition had low mortality rates.

4.13.2 CHD mortality by 18 main occupations in attenders, men

To achieve greater number of deaths in every occupation, and to allow comparison with the Nomesco follow-up of mortality in the Nordic countries[49], the occupations were regrouped. The recode was described in paragraph 3.7.4, and follows as closely as possible the Nordic follow-up. In Table 92 and Figure 62, the age and county adjusted SMRs from CHD + SD are shown, in the figure as deviations from the SMR of 100 in the total population. The lowest CHD mortality (SMR=51) was seen in the pedagogical group, including all teachers. Business and public executives (SMR=55) and scientific and technical work (SMR=63) also had low CHD mortality. CHD mortality rates were highest in the unoccupied (SMR=196), followed by light industry (SMR=145) and drivers (SMR=132). Adjusting for MI risk score in addition to age and county, reduced the mortality differences, but the ranking remained largely unchanged. Occupations with marked increase in mortality when adjusting for MI risk score were teachers, scientists, and the humanities, suggesting that a major part of the low mortality in these occupations was due to low risk factor levels. Occupations with a marked decrease in mortality when adjusting for MI risk score were drivers, hotel and restaurant workers and fishermen, suggesting that smoking, cholesterol or blood pressure in these occupations cause major parts of the excess mortality. The low mortality in high level executives was not changed after MI risk score adjustments, neither

was the high mortality in the unoccupied. In these groups, other determinants of CHD mortality may be more important than MI risk score.

4.13.3 Stroke mortality by 18 main occupations in attenders, men

There were only 93 stroke deaths in attenders, but attenders were used in the analyses to be able to compare the age and county adjusted mortality with the age, county and MI risk adjusted mortality, Table 93 and Figure 64. MI risk score was constructed to predict first occurrence of myocardial infarction, and therefore adjusting stroke mortality for MI risk score would not be expected to be fully adequate. However, smoking, blood pressure and serum cholesterol are major risk factors for stroke. No stroke deaths were observed in the humanities and related occupations. Surprisingly, the occupation with the lowest stroke mortality was drivers (SMR=38 age adjusted and SMR=34 age and MI risk score adjusted.) Men in scientific and technical occupations (SMR=60), in sales work (SMR=62) and in mining, quarrying etc. (SMR=71) followed. The highest stroke rate was seen in the small "rest group", i.e. men with a known occupation, but not fitting any of the other categories (SMR=178). High stroke rate was also seen in hotel and restaurant workers (SMR=149) and in men in building and construction work (SMR=136).

4.13.4 All cause mortality by 18 main occupations in attenders, men

All cause mortality is presented in Table 94 and Figure 65, adjusted for age and county. Oslo men are presented separately, adjusted for age. The ranking of all cause mortality by occupation was very close to the CHD mortality. The lowest overall mortality in men was seen in pedagogical work (SMR=64), executives (SMR=66) and in the humanities and related occupations (SMR=66). The unoccupied had a very high mortality rate (SMR=250), and even higher in Oslo (SMR=269). The differences between high and low mortality occupations were larger in Oslo men than in all areas combined.

4.13.5 Violent death mortality by 18 main occupations in attenders, men.

A total of 281 violent deaths occurred, including accidents, suicides and homicides. Table 95 and Figure 66 shows the age and county adjusted mortality for all four areas combined, and in Oslo men separately. The lowest mortality rate from violent causes was seen in men in scientific and technical occupations (SMR=50), in executives (SMR=57) and in men in light industry (SMR=69). High mortality from violent causes was seen in the unoccupied men (SMR=249) and in process work, warehouse work etc. (SMR=163), and in fishermen (SMR=134). Some major discrepancies were seen between Oslo and the total, both Oslo transport workers (2 deaths) and drivers (4 deaths) had fewer than expected deaths. Men in light industry in Oslo (7 deaths) had higher mortality than expected.

4.13.6 CHD mortality by 65 occupations, men.

Four occupations had no observed CHD deaths among attenders (Table 96), these were physicians, dentists, nurses and religious work. Other low SMR's were found in editors and journalists (SMR=26.0), teachers, natural scientists, university lecturer, central public and local administration (SMR=42.6). Vocational teachers

(SMR=83.0), smelter workers, and staff service (SMR=87.5) had median mortality ratios. Notice the skewed mortality, median mortality ratios were below the mean SMR=100. The highest SMR's were seen in men with no occupation (SMR=196.3), textile industry (SMR=165.3), plumbers, repro/graphic industry, chemical processing, conductors etc (SMR=153.0), post/telecommunication (SMR=139.4), personal sales, drivers, and hotel/restaurant (SMR=129.9) workers. The rate of CHD and SD was 246.2/100000 observation years. The rate for each occupation may be obtained by multiplying this rate with the SMR/100. When comparing only occupations with 10 or more expected deaths, the lowest CHD mortalities were seen in business administration (SMR=55.3), engineers (SMR=65.9) and book keepers (SMR=66.7). The highest mortalities were again seen the unoccupied, textile industry workers and plumbers.

4.13.7 All cause mortality, women.

All causes of death were used since, as mentioned, there were only 56 CHD deaths. The mortality gradient in women differed from men, some low status occupations had the lowest mortality rates, Table 97. The lowest mortalities were seen in service workers (SMR=27), packing workers (SMR=46) and cleaning workers (SMR=54). The highest mortalities were in industrial work (SMR=135), technical or scientific work (SMR=134) and hotel and restaurant workers (SMR=129). Farm wives had an SMR of 74, whereas homemakers had an SMR of 113. X^2=21.0, d.f.=18, n.s.

4.13.8 MI risk score adjusted CHD mortality by 65 occupations, men.

If risk factor differences were primary in the mortality differences, then adjusting for MI risk score (Table 98) would reduce these gradients. The four occupations with no observed deaths (physicians, dentists, nurses, and clergymen), all had more than one expected death. The SMRs were low in editors (SMR=31.6), teachers, natural scientists, and central public administrators (SMR=45.2). MI risk score adjustment brought two new occupations in 9th and 10th place, i.e. reindeer herders (SMR=49.1) from 52.2 and ship officers (SMR=51.3) from 61.0. If these occupations could reduce their risk MI risk score to average levels, and the risk is reversible, this would be the expected reduction in mortality. Fishermen (SMR=89.2), loggers and farm workers (SMR=91.5) had median MI risk score adjusted SMRs. The highest CHD mortality (age and MI risk score adjusted) was observed in the unoccupied (SMR=175.2), repro- and graphical industry workers (159.0), textile industry workers, conductors, chemical processing workers, plumbers, and post/telecommunication workers (SMR=136.9). Chief engineers (SMR=134.3) would be expected to increase their SMR markedly from 95.0 if their MI risk score increased to the average.

4.13.9 MI risk score adjusted all cause mortality, women.

Adjusting for MI risk score, Table 99, was inadequate in removing the socioeconomic gradients in all cause mortality. This was not unexpected, as the risk factor loadings were calculated from CHD deaths (in men) only. Only minor changes in ranking were the result of adjustment. Service, packing and cleaning still had the three lowest SMRs, artists and students were moved to the highest SMR of 128,

followed by hotel and restaurant workers (SMR=127) and industry and manual workers (SMR=127). X^2=19.1, 18 d.f, n.s.

4.14 MORTALITY IN SPECIFIC OCCUPATIONS BY COUNTY.

4.14.1 Drivers

The 1931 male drivers had a mean income of 142600 NOK, a Treiman prestige score of 32, and 91% had 7-9 years of education. In Table 100 the mean systolic blood pressure, serum cholesterol, smoking percentage and MI risk score by county is shown, subdivided by income and education (high/low) . Finnmark drivers had blood pressure 3.5 mm higher than Sogn og Fjordane drivers. Finnmark drivers also had the highest cholesterol level (7.48 mmol/l), but the county differences were smaller than in the total population. When comparing drivers with high income only, the cholesterol differences between Finnmark and the other counties were further reduced. The smoking percentage was extremely high in Oslo drivers, 82%, higher even than the 79% smokers in Finnmark drivers. The MI risk score was highest in Finnmark drivers, 88.9, but was quite high in Oslo (66.0), Oppland (57.0) and Sogn og Fjordane (55.3). Finnmark drivers were close to the county mean MI risk score, in the other areas drivers had higher MI risk scores than the county means. There were 73 deaths from CHD in drivers, the expected number was 55.4. The CHD rate was 3.3/1000 Obs.years, and the age and county adjusted SMR compared with the total population was 132 (95% CI 104 to 168). Oslo drivers had particularly high mortality (4.0/1000 Obs.years), significantly higher than Oppland (1.8/1000 Obs.years.) In all counties, low income drivers had higher mean MI risk score than high income drivers. Education differences were less consistent.

4.14.2 Fishermen

There were virtually no fishermen in Oslo and Oppland. In Finnmark and Sogn og Fjordane, Table 101, there were 726 fishermen. Mean income was 99000, 35 (4.8%) had education beyond 7-9 years. Fishermen had a Treiman prestige score of 30.

Finnmark fishermen had higher blood pressure, higher cholesterol and similar smoking rates compared with Sogn og Fjordane fishermen. In the few with 10 or more years of education, the risk factors were almost identical in the two areas. The MI risk score in Sogn og Fjordane fishermen was 70, in Finnmark 110. The Finnmark MI risk score was 1.56 of the Sogn og Fjordane risk, whereas the CHD mortality in Finnmark fishermen was 1.24 of the Sogn og Fjordane rate (n.s.). CHD mortality in fishermen did not deviate from that of the male county population.

4.14.3 Farmers

There were few Oslo farmers, therefore only the 2208 farmers in the counties are compared in Table 102. Mean income in farmers was 113700, Treiman prestige score was 47 and 25% had ten or more years of education. In all counties, MI risk scores in farmers were below the county means. The county differences observed in the total population was also seen in farmers, i.e. that Finnmark farmers had higher cholesterol, smoking rates and MI risk score than Sogn og Fjordane and Oppland. Finnmark farmers, however, had no excess mortality. The highest CHD mortality (n.s.) was

seen in Oppland farmers (2.1/100 Obs.years). Compared with the total population, the RR of CHD mortality in farmers was 0.91 (n.s.).

4.14.4 Iron and metal workers

The 2602 iron and metal workers had a mean income of 146200 and a Treiman prestige score of 39, Table 103. 23% had education beyond 7-9 years. MI risk scores in iron and metal workers were above the county mean in all areas except Oppland. Systolic blood pressure and smoking rates were similar between iron and metal workers in the different counties. Finnmark men, however, had a higher cholesterol level (7.73 mmol/l), and thereby also a higher MI risk score (133) than in the other counties, e.g. Oppland men with cholesterol of 6.84 mmol/l and MI risk score of 50. The mortality excess in Finnmark was even greater than the MI risk difference. The RR of CHD mortality when comparing Finnmark with Oppland was 2.57 (1.2 to 5.5). Iron and metal workers also had higher mortality than the total population, RR was 1.24 (95% CI 1.01 to 1.5).

5 DISCUSSION

5.1 ATTENDANCE

Attendance to the cardiovascular screening was high, Table 1, and sufficient to give confidence in the screening results. In the counties, both men and women had attendance rates of 90%. Oslo men made up 75% of the invited sample, but only about 50% of the attending men. The lower attendance (63%) in Oslo, although good compared even to questionnaire studies[70], will influence attendance in all socioeconomic groups not equally distributed between Oslo and the counties. In paragraph 5.4, I will discuss attendance by socioeconomic status and the implications of attendance differences.

5.2 SOCIOECONOMIC STATUS

5.2.1 Homemakers

Nearly all (98.5%) had some census information, but there were important differences between men and women. Because homemaking was not considered an occupation, 53% of the women had no occupation code, compared with 1.5% in men. Most women living on farms were assigned a "farm worker" code by the CBS census. The majority reported house work as their main occupation in the screening questionnaire. It would bias the socioeconomic associations if most homemakers in urban areas were left out of the occupational comparisons of women, whereas homemakers living on farms were grouped with unskilled workers. Therefore I assigned occupation codes to these women, as explained in paragraph 3.3.2.1

Social class and Treiman prestige score assignment are occupation based, meaning that 53% of the women had missing information on these two indicators as well. As described in methods, I gave women who were homemakers an occupation code, and assigned a Treiman prestige score value. Homemakers are in some tabular analyses shown as a separate class. Social class is ranked from I to V. I placed homemakers after class V, but this should not be interpreted as a continuation of the ranking, i.e. that homemaking is a lower social class than unskilled manual workers.

5.2.2 Education

Socioeconomic status was sought through several variables with different properties. Education is acquired at a younger age, before this sample was invited to screening. The reliability of reported education was examined by the CBS in an evaluation study of the 1970 census[71]. The conclusion was that the regular census had an underreporting of compulsory education as highest attained education, and conversely that too many reported longer education. Only 74% were correctly classified, the higher rates of discrepancies were found in the various levels of secondary education, i.e. 10, 11 and 12 years. Agreement had to be complete, and a finely divided educational grouping was used. When comparing broader educational groups, agreement was high. Of the 468584 aged 40-49 in 1970, 323903 said they had 7-9 years of education in the 1970 census. Of these, only 1.4% increased their education by the 1980 census. Only 3 had illogical responses, i.e. less education in 1980 than in 1970[72]. The overreporting of higher education would tend to dilute a relation between socioeconomic

status and risk factors, unless only those with low risk levels misrepresented their education.

5.2.3 British Registrar's Social class

Whereas education may be considered constant in this age group, the other socio-economic markers may change, sometimes systematically with disease. Social class membership is probably less fluctuating than income, Treiman prestige score and occupation. Social class, as described in methods, is based on occupation only, and contains 5 classes[12]:

I *(free professions, high level executive)*
II *(Intermediate non-manual, teachers)*
IIIn *(low level non-manual), combined with IIIm*
IIIm *(high level manual, supervisors)*
IV *(partly skilled workers)*
V *(unskilled workers).*

Health related movement may occur in both directions, health problems may move manual workers into supervisory or low level office work, and self-employed professionals may seek employment and less demanding work. The census was 2-8 years before the cardiovascular screening, increasing the probability of classifying according to the occupations held before any health problems occurred.

5.2.4 Occupation

The Nordic classification of occupation (NYK[55]) divided occupation very finely, and changes in occupation code would seem likely over a 16 year follow-up period. However, the occupation held at age 35-45 may be a good marker of the subjects' past and future occupation experience. They have had a reasonable career period, and it is before health problems or changing work force requirements would affect occupation choice. Kristofersen[59] has also shown that mortality by occupation was not different if based on those with the same occupation in 1960 and 1970, than if based on 1970 occupation only.

5.2.5 Treiman prestige score

Treiman prestige score is based solely on occupation, and attempts to rank occupations by prestige, or "general standing" of the occupation in the community[57]. Using Treiman prestige score excludes those with no occupation. One feature of the Treiman score is its assumed generalizability between countries. Norwegian sociologists have translated the Norwegian occupation titles and codes and assigned Treiman scores[56]. The advantage of the prestige score is the clear ranking by status, and near normal distribution properties of the rank. The lag period between the census and the screening is an advantage as described in the previous paragraph.

5.2.6 Income

The taxation data files provided income information from the same year as the cardiovascular screenings, i.e. 1972 in Oslo, 1974 in Finnmark, 1975 in Sogn og Fjordane and 1976 in Oppland. Income shows great variation within occupation, social class and education groups. Disease may profoundly affect income. This is

evident in the high mortality rates in men with no income (Table 82), and the low income in men (Table 80) and women (Table 81) who died during follow-up. However, income is a major socioeconomic indicator, and should provide extra information because it was the only socioeconomic variable from the screening year (apart from the questionnaire data). Incomes were adjusted for inflation using the price index. This will not take into account that most occupations have had larger wage increases than the price index, so called "real" wage increases. This may bias toward artificially low income in Oslo. However, the higher incomes in Oslo (and other major cities) will counteract this effect.

5.2.7 Interrelationship between socioeconomic variables

Some relationships between socioeconomic variables are structural. For example, dentists, doctors and lawyers have a university degree education. The British Registrar's social class is determined by the occupation alone, as is the Treiman prestige score. Although the independent effect of each component on risk or mortality levels cannot be fully evaluated, the relationship between socioeconomic variables is not totally predetermined. An unskilled manual worker may have a university degree, and someone with only seven years of education may be in social class I or earn a high income, Figure 1 and Figure 2. As Table 6 shows, all the socioeconomic variables were correlated, but only the structural relationship (Social class · Treiman prestige) had a correlation as high as -0.83. The correlation between income and education was 0.46 in men, and 0.34 in women. This supports the conclusion of a recent review, that the socioeconomic indicators are related, but also different[1].

In Table 4 and Table 5 the mean income and Treiman prestige score by occupation is shown. Both the great differences in mean income, and the large standard deviations should be noted.

The lowest income was seen in reindeer herders (Lapp or Sami), their low income may be partly due to exchange of goods and services, and less wage-earning work. That the unoccupied and students make little money is as expected, the other low income positions were mostly unskilled workers. One exception was farmers, their low income may stem from investment in farm equipment etc. deducted from the income. The highest incomes were also as expected. The gross income differences in Norway are less than in many western countries, and progressive taxation reduces net income differences further. Net income after taxes was the only income available in these analyses.

5.2.8 Distribution of socioeconomic status

The distribution of socioeconomic status differed by county (Table 2 and Table 3). For all indicators used, Oslo would rank highest, followed by Oppland and Sogn og Fjordane and last Finnmark.

Class membership depends on this distribution, as more will end in class V if other positions are unavailable. Small groups may deviate more from the total mean than large groups. This will tend to give the same slope between social class and risk in all four study areas. In counties with many men in class I (Oslo), there are few in class V. Even if the Oslo class I men are closer to the Oslo average risk level, the class V deviate more from the mean. In Finnmark, the few class I+II men had very low risk,

but the many class V men are close to the mean. The close similarity in slopes is evident in Figure 15 to Figure 21. In men, the same argument applies to education, Figure 7 to Figure 13. If we had had a "medium class" county, with very few in both class I+II and V, this county would be expected to show the greatest difference between class I and V.

In women, Oppland ranked highest on all socioeconomic indicators, followed by Sogn og Fjordane, and Finnmark last, i.e.the same order as in men. In Table 3, farm wives are in class IV, whereas housewives have missing data, according to the original census coding. This explains why Sogn og Fjordane had the smallest proportion of missing data, even if domestic work as main occupation was more common here than in the other counties.

5.2.9 Male-female differences in socioeconomic status

In the early 1970's, most middle-aged women in Oppland, Sogn og Fjordane and Finnmark were found in the low socioeconomic status groups. 53% had no occupation, 28% had no income, and 79% had 7-9 years of education. In Oslo with many high status positions for both men and women, only men were invited to the cardiovascular screening. This not only gives a smaller female study population, it further restricts analyses of the relationship between socioeconomic status and risk in women because the high status groups are rare.

Women's income span (Figure 6 and Table 17) was less than mens' (Figure 4 and Table 15). A woman's income may not reflect her education and abilities as much as the number of children or the availability of part time jobs. The husband will usually contribute more to the household income, and therefore her income may be expected to show less relation to her risk factor levels. If he has a low income, she may have to work extra and may seem to have a high income although the family income is low. There were almost no men fulfilling the homemaker criteria. In women, homemakers often had high risk levels, and high CHD mortality. While 0-income men with no occupation will be regarded with "suspicion," it is accepted for women to be supported by her husband. This may conceal health problems, problems that would be more visible in men.

5.3 SELECTION EFFECTS

5.3.1 Group A (diagnosis), B (symptoms) or C (healthy)

This study included all, not only the "healthy" group C. Different selection into A, B or C groups by county and socioeconomic status, and the "healthy worker effect," were the main reasons to analyze the health groups jointly. As described in methods, group A subjects reported a cardiovascular or diabetes diagnosis, whereas group B subjects had symptoms suggesting cardiovascular disease but no diagnosis. Due to the small numbers in groups A and B, this will not perceptibly influence group means unless small groups such as single occupations are compared. The mean cholesterol in group C men was 6.97 mmol, the mean cholesterol in the total male population was 7.00 mmol (Table 9). However, including groups A and B will add substantial numbers of deaths. Of the 2343 deaths in attenders, 1689 were in group C and 654 in groups A or B. Of the 975 coronary heart disease deaths and sudden deaths in

attenders, 627 were in group C and 348 in groups A or B. This highlights the high mortality in the A and B groups. In the multivariate mortality analyses, group AB/C membership was entered to adjust for any differences in proportions in groups A, B, or C by socioeconomy.

5.3.2 Group A, B or C by socioeconomy

High status men tended toward greater proportions with diagnosis, whereas the low status men had greater proportions with undiagnosed symptoms, Table 11. This will reduce the number in group C in both white and blue collar workers. On the other hand, blue collar workers with diagnosed cardiovascular disease may no longer be able to hold on to their jobs, and the number in group A may therefore be artificially low. If there was a selection effect so that those with disease or diagnosis were found in certain work groups, this should lead to the exclusion of A- and B-cases when comparing occupational groups. (The risk factor differences observed would then reflect this selection.) The general policy of trying to replace disabled workers within the company may lead to some lighter jobs showing mortality out of proportion to the risk levels.

As seen in Table 12 there was a tendency that men in classes IV and V used more nitroglycerine than classes I and II at cholesterol less than 9 mmol/l. Higher smoking rates, and more heart disease may account for this. Interestingly, more men in classes I+II took blood pressure medication at blood pressures above 160 mm, Table 13, whereas more blue-collar men used nitroglycerine at low cholesterol levels. This may be an important clue to treatment differences by socioeconomic status. High blood pressure is largely "unfelt," and requires a check-up to be found. Presumably, at least as many blue collar men should have had blood pressure medication, but unless they have symptoms they are not diagnosed.

Another explanation to the notable nitroglycerine intake by blue collar men could be that manual work precipitates pain at an earlier stage in the development of cardiovascular disease. Our results contradict this. If earlier aggravation of symptoms were the explanation, we would expect the proportions with undiagnosed high risk factors to be smaller, and the number with diagnoses higher in blue collar men compared with white collar men. We found the opposite, fewer with diagnoses and a higher proportion with high risk in blue collar men.

5.3.3 Group A, B, or C by county

Proportions reporting disease or symptoms were highest in Finnmark men, Table 9. This may be due to real differences in disease prevalence, or differences in diagnosing or reporting symptoms. The more manual labor market in Finnmark may result in symptoms and lead to the early detection of cardiac disease, or the threshold for diagnosing cardiovascular disease may be lower. If the harsher climate and harder jobs lead to earlier diagnosis in Finnmark, it would be rational to include all (groups A, B, and C) in socioeconomic comparisons. Some Finnmark men in groups A and B would be in group C in the other counties. Although Finnmark had the highest proportions in all "non-C" categories combined, the excess mortality in group C in Finnmark compared with the other counties was marked. The threshold for symptoms or diagnosis therefore, is probably not lower in Finnmark. If it were, the Finnmark group C should

be "healthier" than in the other counties. Under-diagnosing in Finnmark is possible in spite of the high proportion already in non-C groups, so that some people currently in "group C" in Finnmark would be in groups A or B in the other counties.

5.3.4 Selection of counties.

Mortality differences were used to select the counties for the cardiovascular screenings. Bias in the association between socioeconomy and risk may result from this selection of counties in the study. The previous paragraphs have described the uneven distribution of socioeconomic status and health groups across the study.

Mobility

The population in Norway moves less than in many countries. In 1970-1980 the average moving rate between counties was 25 per 1000 population. There was net movement out of Finnmark, many moving to Oslo for jobs and education, some also to the neighboring counties. Sogn and Fjordane had some loss to Oslo, Oppland had a stable population[13,73]. Of the 563586 resident in Oslo and the neighboring Akershus at the 1970 census who also participated in the 1980 census, 88% still lived in Oslo or Akershus in 1980. The comparable figures for the 492103 in "Western Norway" were 92% and for the 313336 in "Northern Norway" 90%[72]. Social mobility may stem from lack of opportunities, maybe especially in Finnmark. If higher education is obtained elsewhere, the positions where this education may be put to use would be limited. This may discourage higher education, and encourage those who achieve such education to move out of the county. If the latter operated to some extent, and the more healthy moved out, this may increase differences in risk factors and proportions reporting symptoms or disease.

Time trend

The counties were studied consecutively, Oslo in 1972-73, Finnmark in 1974-75, Sogn og Fjordane in 1975-76 and Oppland in 1976-78. Some county differences may therefore be due to population changes over time. However, rescreenings done three or five years later in the three counties did not support this[74]. The change in risk factors over time was not of sufficient magnitude to explain the county contrasts. Although e.g. serum cholesterol decreased by the second screening in all three counties, the county differences persisted.

Laboratory error

The Ullevål Hospital Central laboratory analyzed all sera, and checked through standard sera to avoid that the lab calibration should slide over time. Lab error seems an unlikely explanation for the county contrasts.

Diet differences

Diets differ between the counties[75]. Finnmark relies on fishing and fish processing as main industries. It has the highest consumption of fish, besides a markedly higher coffee intake (boiled coffee)[76]. The coffee consumption differences may explain part of the cholesterol and mortality differences between the counties[76]. Unfortunately, diet information was not available on the socioeconomic data file. Sogn og Fjordane is also a coastal county with high fish intake, but the diet contained more bread and fat than the two other counties[75]. Oppland is an inland county, with agriculture and manufacture as main occupations. The diet included more milk, potatoes, vegetables, soft drinks and beer. The Oslo population is less homogeneous, coming from other

counties and from other countries. Single person households, weekly commuters etc., make the diet different, and probably more difficult to evaluate for the "true" Oslo residents we wish to study. The water and soil qualities in Norway differ regarding to content of calcium, acidity, trace elements etc., but the effects of such differences on risk factor levels are largely unknown. However, food, beer, soft drinks etc. circulate extensively between counties, and are also imported.

5.4 ATTENDANCE BY SOCIOECONOMIC STATUS

5.4.1 High attendance in women

Female attendance rates were extremely high in all socioeconomic groups, Table 19, mostly above 90%. Differences in attendance are therefore unlikely to cause the differences observed between socioeconomic groups in women.

Nurse attendance (88%) was below average. They may already know their cholesterol and blood pressure and see little benefit in screening, or may feel embarrassed or reluctant to reveal their health habits to other health professionals. Some also may have been busy in organizing the screening. The low attendance of 66% in the "unoccupied" women, Table 19, is an artefact. Questionnaire data was necessary to assign the unoccupied to housewife or farm wife occupations. If all women without a census occupation code, i.e. the unoccupied, farm and house wives were seen together, attendance in this combination was 95%.

5.4.2 Socioeconomic gradients in male attendance

In men, socioeconomic gradients in attendance were greater. The lowest and highest socioeconomic status men had lower attendance than medium status men, Table 18 and Figure 3. Concern about representativity is warranted in the 0-income men, where attendance was less than 50%. This group had aberrant risk factor and mortality levels, Table 82.

Five of the 65 male occupation groups had attendance below 50%, i.e. physicians, seamen, the unoccupied, hotel/restaurant workers and ship officers. Seamen and ship officers may be unable to attend for obvious reasons. The unoccupied group includes non-responders to the census. These may have no proper address, may be mentally unable to answer, or be very reluctant to all kinds of questionnaires. Hotel and restaurant workers may work shifts, and periodically live at the workplace, without notifying the register about change of address. In his study of the Oslo men, Holme[34] noted the low attendance in physicians, lawyers and priests. In the counties, the priests had an attendance of 100% (21 of 21), and even lawyers and physicians had attendance higher than 60%. Speculating, attendance in high status men in Oslo may differ markedly from their counterparts in the counties because of ample opportunities for health checks, less community interest and promotion of the screening, difficult parking, or having to spend more time to get to the screening facility. The low attendance in lawyers and university/college lecturers was partly an Oslo effect. Attendance in physicians was low even in the counties (Table 18), although 66% is higher than the 23% attendance of Oslo physicians. Speculating, among reasons for non-attendance may be reluctance to attend screening led by nurses, and not wanting to hear about their smoking, weight, cholesterol etc. Some may be busy organizing the

screening follow-up, or may have extra work loads because of the screening. If only health professionals with a "good conscience" attended, the results reported for these groups will be biased. However, the physicians' smoking rates were comparable to those found in other studies of doctors[59,77]. The physicians' risk profile was also similar to those of dentists and natural scientists, although these had higher attendance rates (Table 18 and Table 64).

The observed pattern between risk factors and socioeconomy was similar when studying the four areas separately, Figure 7 to Figure 21. As is evident from Table 18, no Oslo occupation had attendance over 80%, whereas 55 of the 65 occupation in the counties had such high attendance. The low attendance in Oslo cannot be explained by the greater proportion in the low and high status groups. Attendance differences between counties persisted when comparing single occupations.

5.4.3 Attendance and biased risk gradients in men

Attendance differences may bias the relationship between socioeconomic status, risk and mortality, e.g. if the healthiest low status men and the least healthy high status men attended. However, comparing mortality in non-attending men with attending men did not indicate selection. The main pattern was that non-attenders in all socio-economic groups had about twice the mortality rate of attenders. The slope between status and mortality was somewhat steeper in the total population than in the attending population, Figure 43 to Figure 54.

Inferring from the steeper mortality gradient in the total population, one might suspect that the slopes between risk factors and socioeconomy may be steeper in the total population than in the attenders to screening. From this may be argued that attendance differences are not likely to increase the gradients. On the contrary, the very low attendance of high risk men in the lowest socioeconomic groups may lead to underestimation of the risk factor gradient with increasing status.

5.5 STATISTICAL METHODS

5.5.1 Sampling

Standard methods and well documented statistical programs[64, 67, 68] were used. The 100% "sampling" is possible in Norway due to population register, but would be difficult to accomplish in most countries. By "sampling" 100% of the underlying population, it may be argued that we studied the underlying population, not a sample. Carrying this argument further would imply that the means reported are the genuine population means, and that all calculations of standard deviations and confidence intervals may be erroneous. However, this is a one-time screening. Coming back some time later gave slightly different results[74]. Ordinary sample variation assumptions would not be valid in this context, as the repeated measurements are correlated. Repeated screenings in these counties have been done, and resampled substantial proportions of the original sample[74].

5.5.2 Cross tabulation

Cross tabulation of data imposes no structure on the data and allow curvilinear and other nonlinear patterns to emerge. However, succinct summaries of trends and differ-

ences in a table are difficult to produce. Some cells in the cross tables will have small numbers, these cells may be found in Table 14 to Table 17. Cross tabulations were age adjusted throughout with a few exceptions: Proportion of attenders, smokers, physically inactive, and dead by occupation in men. Neither smoking nor activity levels had age gradients in the 40 to 49 year age group. Attendance was more county specific than age specific, and the "true" attendance provides a better basis to evaluate the other tables. Testing of trends and differences was done through regression analyses, which also summarize the relationship between the socioeconomic variables and the risk factors.

5.5.3 Regression

Linear regression analyses of the cardiovascular risk factors by education and income provided a basis for significance testing. The impact on risk factors, when one or both socioeconomic factor varied, could be evaluated and controlled for background variables such as county, age, and body mass index. The regression treats "control" and socioeconomic variables equally, but the terms are used to show the focus of interest.

Prediction based on age, BMI and socioeconomy could only to a limited degree find the very high and very low risk levels. Underestimating high risk levels caused almost all residuals more than 3 SD from the mean. Residuals (Observed - predicted) tended to be positive for high values of the dependent and negative for low values, and also showed heteroscedasticity. The final models were chosen to minimize this, as some basic assumptions of linear regression are violated[78]. In spite of this, linear regression is used in such circumstances, and has repeatedly been shown to be robust against breaches of its assumptions[69,79]. The coefficients never conflicted with the trends observed in the age adjusted tables, supporting the linear regression results.

5.5.4 Age adjustment of mortality

The age differences were small, all subjects were between 40 and 49 years. The indirect method of age adjustment was used. The standard population was the composite of the subgroups analyzed, this will remove the distortion from shifting adjustment bases in indirect adjustment, at least when comparing only two subgroups[80].

Age adjustment by the indirect method has been criticized[81]. When the standard population of the indirect adjustment is the same as that used in direct adjustment, the methods are almost identical. If I had calculated CMF (Comparative Mortality Figures, direct adjustment[81]) rather than SMR (Standardized Mortality Ratios, indirect adjustment), the differences would be very small. Support for this is i.a. that the crude and age adjusted rates were almost identical, the main effect of age adjustment was to decrease the group differences slightly. The main advantage of the indirect age adjustment method is that it reduces random error in small groups. In addition, the method may easily be extended to allow adjustments for other group differences, such as county, MI risk score levels etc.

5.5.5 Mortality analyses

Standardized mortality ratios were cross tabulated, again not imposing any structure on the data. Judging from these cross tabulations, proportional hazards models

had to take the different mortality patterns in the counties into consideration, e.g. by stratifying by county. In some tables the standardization goes beyond the commonly used age adjustment. Number of deaths in each cell was used to calculate the expected number in age, county, or MI risk score groups. This may introduce imprecision by cross-tabulating too small numbers. However, when seen with the age adjusted tables, adjusting for MI risk score will emphasize the potential effect of risk factor changes toward the mean.

Incomplete adjustment for risk levels may leave a mortality gradient that may erroneously be attributed to the socioeconomic factor under study, see also paragraph 5.9.11. This effect seems stronger in the Cox regressions, than in the cross-tabulations and stratified analyses. In the two latter, observed and expected number of deaths is modeled stratified by risk levels. Although the mortality increase by MI risk score in Figure 61 to Figure 62 is not as steep as it "should be" when MI risk score increases, the relative mortality between high and low status groups **within** each risk level would not be influenced by incomplete adjustment. For example, when I studied men with MI risk score between 50 and 70 units, men in social class V had twice the mortality of men in social class I. This is not likely to be caused by MI risk score differences, unless men in social class I would have "real" MI risk score values lower than 50-70 and men in social class V higher than 50-70, i.e. a class-specific misclassification. Although smoking habits may be underreported to a larger extent in the high status group, this would decrease, not increase the mortality differences observed. In the Cox regressions Table 87 to Table 90, the log-linear trend coefficients between mortality and various socioeconomic variables were always higher, supporting the notion that the Cox coefficients may have been inflated by incomplete adjustments.

5.6 COUNTY DIFFERENCES

As shown in Figure 7 to Figure 21, the relationship between socioeconomy and MI risk factors was similar in all four areas. The risk factor which varied most between counties was smoking, particularly in women. Smoking decreased less with education in Sogn og Fjordane and Finnmark than in Oppland women. In men, smoking decreased less in Sogn og Fjordane and Finnmark than Oppland and Oslo. Assuming that the counties are in different stages of the smoking epidemic, this pattern is as expected. Applying models of innovation diffusion[82], the smoking habit is first adopted in central areas "early adopters", last in the peripheral areas "late adopters". Smoking cessation follows the same order, Oslo and Oppland quit first, Sogn og Fjordane and Finnmark last. The difference in male and female smoking and quitting may be a natural result if men were "early adopters", and women "late adopters".

5.7 SPEARMAN'S CORRELATION OF RANKED OCCUPATION

As described in methods, the 65 occupations in men, and the 19 occupations in women were ranked by their mean risk factor, income, Treiman prestige score and mortality levels. If occupations were inconsistently ordered by mean risk levels, these correlations would be insignificant. However, strong correlation patterns emerged. Treiman prestige score and income correlated negatively with all risk ranks and with mortality ranks. Except the correlation with diastolic blood pressure, the rank corre-

lations between risk factors and income and Treiman ranks were high, above 0.50, and significant at $p<0.01$. The ranking of occupations based on mean cholesterol was significantly correlated with rankings based on all other risk factors, and with mortality rankings. Even after adjusting CHD mortality for MI risk score, there was a significant correlation between socioeconomic rank and mortality rank. This suggests that socioeconomic differences in factors other than smoking, blood pressure and cholesterol are of sufficient magnitude to correlate with mortality rank.

The fewer occupations in women required higher rank coefficients to reach significance. In women as well as in men, occupation ranks based on risk level means were significantly correlated to income and prestige ranks, and to the other risk factor ranks.

The rank correlations of male occupations were stronger than the rank correlations between municipality means in Finnmark[83], and stronger than the intercorrelation between many risk factors[74]. The 1979 report[83] from the Nordic Council for Arctic Medical Research shows rank correlation coefficients between the municipalities ranked by proportion of men with income from work and risk factor means. Negative rank correlations with cholesterol ranks (-0.32) and triglyceride ranks (-0.36) and positive correlation with smoking ranks (0.25) were shown. If the Finnmark communities were ranked by proportion employed in fishing, the cholesterol rank correlation changed sign, from -0.32 to +0.26. The rank correlation coefficients in the present study is based on individual occupation membership, and were stronger than the county based occupation membership in the Nordic council study. However, the same general pattern is clear, unemployment is associated with high risk levels, and fishermen have higher cholesterol levels than the mean.

5.8 INCOME, EDUCATION, OCCUPATION AND RISK FACTORS

With a data set of this size, most visible differences will be statistically significant, even when quite small. Clinicians and health workers may feel that such differences are of little relevance. However, even small differences in the mean levels of a risk factor in a population may carry markedly increased mortality and morbidity for that population. A small increase in a population mean may lead to substantially greater fractions with risk factor levels above clinical cut-points, and thus in need of intervention or treatment.

5.8.1 Blood pressure

Education and income

Systolic blood pressure decreased with increasing education and income, 4 mm in men (Table 20) and 10 mm in women (Table 22). The association was strong in women, and without BMI in the regressions, the coefficients were even stronger (data not shown). In men education was the stronger predictor, and the income effect was only apparent at higher educations. In women education and income play more equal parts, but also here the income gradients increased with education. 0-income women, mostly homemakers, had higher systolic blood pressure than women with own income.

Diastolic blood pressure decreased with income, 2 mm in men (Table 24) and 3 mm in women (Table 26). In men diastolic pressure decreased with education in the

medium income groups, but not in the 0- and high-income men. In women there was virtually no education gradient.

Systolic and diastolic blood pressure gradients were different in men and women. In women the socioeconomic gradient of systolic blood pressure was strong, in men the diastolic blood pressure gradient was more prominent.

Occupation

In both men and women, high status occupations tended to have lower systolic and diastolic pressure, (Table 56 and Table 57). A peculiar discrepancy was the difference between the systolic rank (13) and diastolic rank (65) in physicians. Speculating, this may be due to nurse uneasiness when measuring physicians' blood pressure. If they did not listen properly for the disappearance of the Korotkoff sounds, they may have recorded a higher diastolic blood pressure. However, physicians may have a genuinely elevated diastolic pressure. Reindeer herders (Lapp or Sami), had particularly low systolic and diastolic blood pressure. Hotel and restaurant workers, who had high cholesterol, triglyceride and smoking proportions, were unexpectedly in the lower blood pressure range. Many manual occupations were among those with high mean blood pressure levels, maybe implicating isometric work or lack of control as causes of elevated blood pressure.

Women in high skill jobs had lower systolic and diastolic blood pressure than women in unskilled occupations. Farm wives, house wives and food processing workers had the three highest systolic pressures, and farm wives, house wives and hotel/restaurant workers had the highest diastolic blood pressures. Women also showed the greatest income gradients in blood pressure. It is possible that some exposure common to these "domestic service" low income occupations may predict blood pressure.

Systolic and diastolic blood pressure are related to CHD mortality, but diastolic blood pressure has been reported as a better predictor of cardiovascular mortality in younger sugbjects[84]. Blood pressure may be related to diet, through salt[85] and obesity, and to life style factors such as seeking medical attention and exercising[86]. Isometric work increases blood pressure during work[87]. If long term pressure increases as well, this could be one explanation for the higher blood pressure seen in the low status groups, and in men with heavy physical work. Differences in treatment rates are unlikely to contribute to the observed differences, as so few were on treatment, Table 13. The regressions of blood pressure on education and income include BMI and treatment for high blood pressure, but even with these factors accounted for there was an association. Socioeconomic gradients in female systolic and male diastolic pressure were of unexpected magnitudes, and may perhaps be a clue to the genesis of essential hypertension.

5.8.2 Serum cholesterol and triglycerides

Education and income

Cholesterol decreased with increasing income and education in men (Table 28 and Figure 27). In men the income gradient was almost exclusively between 0 income and the rest, the 0 income men also show the steepest education gradients. The joint effect of education and income on cholesterol was for men a decrease of 1.0 mmol, carrying

approximately a 30-50% reduced risk of dying from cardiovascular disease[53]. In women (Table 31 and Figure 29) there was a slight tendency of decreasing cholesterol by education. The effect of income was not consistent.

Triglycerides decreased with both income and education in men (Table 33 and Figure 30), again most of the income effect was between 0 and the rest. Education, but not income, was associated with lower triglycerides in women (Table 35 and Figure 31). The tabular analyses based on untransformed triglycerides show greater differences than regression with log triglycerides as dependent variable. Time since last meal was included in the regression analyses, and was strongly associated with triglyceride levels. The large variability of triglyceride measurements[88] may be seen from the jagged curves and large standard deviations.

Serum cholesterol and triglycerides increase with a rich diet, high in saturated fats. In a study of the Tromsø population[89] it was shown that men and women with high level of education used low fat milk and vegetables daily to a greater extent than low education groups, and that alcohol intake increased with education. Even so, the particularly high triglyceride level in 0-income men may to some degree reflect very high alcohol use[90], although some studies have shown lower triglyceride levels in men with high alcohol consumption[91]. Other causes of high lipid levels that may be linked with socioeconomy are exercise and smoking. Lately, cholesterol has achieved public attention, and it may be a high status habit to have it checked and treated. As the screening took place before 1980, drug treatment of hypercholesterolemia was not likely to occur to any extent, and not selectively in the high status groups.

Occupation

Cholesterol means were lower in the high status occupations. All academic occupations were in the lowest quartile of cholesterol means. Occupations handling food, such as food processing and hotel and restaurant work, were among the high cholesterol occupations in both men and women. Occupations entailing travelling and meals away from home, e.g. fishermen, ship officers, seamen, construction workers, and drivers, were among high cholesterol occupations. Reindeer herders, noted because of very low blood pressure levels, had the highest observed mean cholesterol of 7.67 mmol, but all lived in Finnmark where the mean cholesterol is high.

A similar pattern was observed in women. Women in industrial and manual jobs had the highest mean cholesterol, followed by homemakers and women in the food processing industry. High cholesterol means were also observed in women doing cleaning or working in hotels or restaurants. A common denominator may be diet, including coffee.

Mean triglyceride levels were low in all academic groups except the clergy. This may be due to a small group artefact. Speculating, there may be some factor related to clergy work, for example the church coffee or sedentary leisure time that further research may identify. Some occupations characterized by travelling, which had high mean cholesterol, had low triglyceride levels. Among these were sailors and fishermen, but not drivers. Reindeer herders had high triglycerides as well as high cholesterol, in contrast to the general Finnmark pattern of high cholesterol and low triglyceride levels.

In women the triglyceride gradients were small, but again the high skill occupations such as teachers, students, nurses and technical and scientific staff had low mean triglycerides. Manual workers, women in the packing industry, auxiliary nurses and women in hotels and restaurants had higher mean triglycerides. The general pattern of high risk in low status groups was again confirmed.

There may be room for reducing the high cholesterol levels observed in some occupations involving travelling and irregular hours. This would require better availability of healthy low fat food. Employers providing cafeteria food should see the challenge and possible profit in popular, yet wholesome food. Since many low status groups have no real choice regarding their diet, little effect may be anticipated from public food education programs.

5.8.3 Smoking

Education and income

In men, smoking decreased markedly with income and education. The income effect differed by county, being strongest in Oslo and weaker in Finnmark. Smoking used to be a high status habit in men, but is now increasingly associated with low socioeconomic status. In the 1950's the largest proportions of cigarette smokers were in the high status groups. The low status groups, especially industry workers and farm workers, used chewing tobacco or snuff. In 1954, the smoking rate in Norwegian physicians was 75%, whereas the male population rate was below 46%[77].

The different picture in women, that smoking increased with income, may be a natural consequence if they are at a different point in the smoking "epidemic," and if the natural course of this "disease" is difficult to shorten. This may explain also that the income gradient was weaker in Sogn og Fjordane and Oppland than in Oslo, and weaker still in Finnmark. Trend-setters in Oslo first started the smoking habit and then the non-smoking trend, and the point in time where smoking in high-status groups started to decrease may therefore be more recent in Finnmark. However, the CHD epidemic has not shown this pattern, Finnmark has had the highest CHD mortality since 1960.

Cigarette smoking is a behavioral risk factor, and one where social factors should be more important than genetic factors. Smoking was also the risk factor with the strongest association with socioeconomic variables in this study.

Occupation

Smoking was the variable with the most marked gradient with occupation. There was an 18-fold increase in smoking prevalence from religious work to fishermen. All the academic occupations, including teachers, health professionals, and public administrators were among largely non-smoking occupations. All occupations with high prevalence of smoking were low-status, an exception being ship officers. If arranging the occupations by income, Treiman status or any other ranking based on socioeconomic status, this would be highly correlated to the ranking based on per cent daily smokers of cigarettes, Table 7. The clergy and the physicians may under-report their smoking habits because they feel it is particularly stigmatizing, but the smoking prevalences of physicians and the clergy agree with other studies of smoking habits[77,92]. Women in technical and scientific occupations had higher percentages of smokers than

farm wives, higher than the artist/student group. In women, smoking was more common in administration and office work than expected from the corresponding ranks in men. The smoking prevalence increased with income in women, whereas the opposite occurred in men. Female teachers and nurses rarely smoked, as could be expected from previous studies[93,94]. Again, these occupations may be suspected of underreporting their smoking.

5.8.4 Non-smoking

Our results support that men and women are at different points in the evolution of the smoking habit. The percentage of never-smokers was i.a. much higher in women than in men, because smoking in women was uncommon when these women were in the age when smoking usually starts. In both men and women, the percentages of never-smokers increased with increasing education. Even in the 1950's a larger fraction of adolescents and young adults taking higher education remained non-smokers. When looking at the age distribution of smoking in the total Norwegian population 1975-1985, the smoking proportion in men was roughly equal in all age groups, from 25 to 75 years. In women, smoking decreased sharply with age. Smoking is a recent female habit, and has not yet saturated all age groups. It was therefore unexpected that per cent never-smokers in both men and women decreased with income. This may suggest that the turning-point, when smoking changed from a high to a low status habit, occurred later than about 1950-60. Women have been found less able to quit smoking than men, and many sociological and psychological reasons have been postulated[95]. At all income and education levels, the ex-smoking percentage in women was less than in men (Table 45). It was also evident that men with high incomes manage to quit smoking to a remarkable degree, Table 44, whereas high income women do worse than low income women. In both men and women the ex-smoking gradient was stronger for income than for education (Figure 37 and Figure 38). This may suggest that ex-smoking is not a result of a better understanding of information campaigns among the well-educated. Other factors related to high income may be more important, for example, social pressure and more stimulating working conditions. If this is true, less concern about the "difficulty" of information, and more concern about using the right channels or means of achieving smoking cessation is warranted.

The "quitting rate" is a measure of the proportion of ever-smokers now ex-smokers, thus avoiding the dilution of never-smokers. Quitting increased with education in both men (Table 46) and women (Table 47). Again the income effect in men and women was reversed, high income men quit smoking, high income women continue. The quitting proportions were similar in men and women, 38% in men and 35% in women. Women may be underestimated as quitters, because the crude ex-smoking proportion is low due to many never-smokers.

The observed pattern (Figure 39 and Figure 40) may be useful for strategies to reduce smoking in low status groups. For both men and women, price increases, advertizing bans and restrictions on smoking in public places may be more effective than mass information campaigns, as shown in econometric studies[96,97]. Peer pressure and doctor's advice may also be more effective in low-status groups.

5.8.5 MI risk score

Education and income

In men there was a consistent decrease (Table 48 and Figure 41) in MI risk score both by income and by education. In women the picture was less clear, although MI risk score seemed to decrease with education for middle income women. MI risk score includes factors for cholesterol, blood pressure and smoking, the latter was responsible for the peculiar pattern seen in women. (Table 50 and Figure 42). Given that log MI risk score is linearly associated with log CHD mortality, the age adjusted MI risk score difference would suggest a 3-fold difference in mortality between the low and high status men. There is a 3-fold increase in CHD mortality rates from high to low status when the 0-income men were excluded. When 0-income men were compared with high income men, there was a 6-fold mortality difference, Figure 55. Some "dilution" of the mortality gradient with MI risk score will be present, but the impact this may have on the relative risk between high and low status groups is probably small. See also paragraph 5.9.11 for discussion of misclassification bias.

Occupation

The observed differences in cholesterol, systolic blood pressure and smoking gave mean MI risk scores of 25 in the clergy and 98 in fishermen. If the association between MI risk score and CHD mortality is the same in groups as in individuals, this would suggest that fishermen had four times the CHD mortality of the clergy. Direct comparison is impossible because there were no deaths i religious work. If comparing occupations with more than 1 CHD deaths, there was a 7-fold increase in CHD mortality from editors to the unoccupied. The MI risk score ranking corresponded well to a purely socioeconomic ranking, with few exceptions. Business administrators and ship officers had higher MI risk score values than expected from their socioeconomic status. Students, wood workers and farm workers had lower MI risk score than expected. The strong socioeconomic gradient in smoking was evident in the socioeconomic MI risk score gradient.

In women the high status occupations showed the lowest MI risk scores, as expected from the smoking, cholesterol and systolic blood pressure distributions. Service workers, artists and students, and unoccupied had MI risk scores less than the overall mean. In women MI risk score increased 2-fold from the lowest to the highest, compared to the 4-fold increase by male occupation.

5.8.6 Exercise

Education and income

The questionnaire asked about leisure physical activity, divided into four categories. The analyses have concentrated on the men and women who said they were sedentary, i.e. reporting "sits, reads, watches TV" as activities. All other activity levels were considered "some activity". Finnmark men and women were less active than in the other counties. Considering the climate in Finnmark this is not unexpected. In Finnmark, men with higher status had a non-significant tendency of being more sedentary than low status men. In Oslo, on the other hand, the socioeconomic gradients were strong, and high education and income were both associated with less inactivity. Leisure exercise, particularly jogging, may be seen as a new habit, starting

in the major cities and gradually spreading to more remote areas. Following the same reasoning as for female smoking habits, the high status groups have taken up jogging in Oslo, and to some extent in Oppland and Sogn og Fjordane, but not yet in Finnmark.

Occupation

The proportion of sedentary men in each occupation varied from 11% to 31%. The occupations with low sedentary rates were not the same as the low lipid or low blood pressure occupations. Traffic controllers, military men, chemical processing workers, conductors, men in police and other surveillance work were among occupations with low sedentary rates. This is natural in the military and surveillance occupations, where a good physique is essential in job performance. However, I did not expect that some industrial occupations should be more exercise-prone than teachers, dentists, and health professionals. One explanation may be that work sites with many employees offer company athletics, e.g. a soccer team. Professionals and executives may not have the same opportunity. The occupation with the lowest exercise rates was the clergy. Speculating, it may perhaps be seen undignified for the village parson to be puffing along the road? Other occupations with high sedentary rates may have little opportunity to exercise, e.g. fishermen, ship officers and seamen. The unoccupied men should have time to exercise, but some may be unoccupied due to disease. Some low exercise occupations had physically demanding jobs, and may need rest more than exercise when off work, e.g. hotel/restaurant work, farmers, reindeer herders, mine/quarry workers.

In women, exercise was less common than in men. The three most qualified occupations had the highest exercise rates, and the very low status occupations of food processing and packing were most sedentary. The latter occupations involve static work, and musculoskeletal problems are common. Being more common in Finnmark, climatic conditions also may discourage exercise.

5.9 MORTALITY

5.9.1 Risk factors and mortality

In his doctoral dissertation[53] Tverdal has studied the impact of each risk factor on cause specific and total mortality. He followed up the same men and women as the present study through 1983, also including men in Tromsø. His study focused on risk factors and mortality, and he had neither census nor income information. The present study has not explicitly addressed the relationship between risk factors and mortality, but has relied on the study of Tverdal.

5.9.2 CHD mortality by education and income

If group MI risk score and CHD mortality follow the same pattern as for individuals, the observed differences in CHD mortality by income (Figure 54) exceeded that expected from the risk factor differences, as mentioned previously. Almost all excess mortality was seen in the 0 income men. This group had MI risk score levels 35% above the male population mean, and mortality from CHD 140% above the mean CHD mortality. CHD mortality in the low status group (but with income greater than

0) was about 3 times that of the high status group, roughly corresponded to the three times higher MI risk score level in the low status group. In the 0 income men other causes of CHD deaths were obviously present. Among these may be chronic obstructive lung disease, chronic heart disease, alcohol and substance abuse. Alcohol abuse is likely a major cause to the high CHD mortality, supported i.a. from the high mortality rates from hepatic cirrhosis, violence and unknown causes. Case fatality rate may be higher in the 0-income men. When adjusting for MI risk score the 0 income group still had marked excess mortality, whereas the education and income gradients otherwise were reduced. However, substantial differences in mortality by income and education remained. The low income groups (40-159 000) still had SMR 15% above the mean, and the high income men (>280000) SMR 39% below the mean. These mortality differences may have other causes than serum cholesterol, systolic blood pressure or cigarette smoking differences, or these factors may have different impact on mortality in different socioeconomic groups. Differences in physical activity, serum triglycerides, and BMI found in this material may explain some remaining mortality gradients. However, the mortality differences were greater than would be expected from the associations between these minor risk factors and CHD mortality.

5.9.3 Income and mortality

Very low income was found in the seven men later dying from multiple sclerosis, but also men who would later die of urogenital disease, ulcer, and infections and tuberculosis had low incomes, Table 80. This points i.a. to the economic implications of chronic disease. Mean incomes by cause of death were below the income of survivors for almost all causes. Exceptions were prostate cancer, myeloma/ lymphoma/ leukemia, and malignant melanoma. Myeloma, lymphoma and leukemia may be so rapidly fatal that no income loss was manifest in the screening year, even if some were screened shortly before time of death. The higher than average income in men dying from prostate cancer may be a chance finding, but may suggest that this disease has an inverse trend with socioeconomy, different from most cancers. Malignant melanoma is associated with sun exposure. High income men afford more travel, and may thus be exposed to more sunshine.

5.9.4 Increased susceptibility

Although high risk factor levels seem a probable cause of much of the increased mortality in the low status groups, Figure 59 to Figure 62 show that even at the same risk level there exist socioeconomic gradients in CHD mortality. Male CHD mortality was stratified by MI risk score and then plotted against education, income, social class and Treiman prestige score. These plots show that at MI risk score levels up to 100, high status groups had lower mortality than low status groups. At higher risk levels, the low status groups sometimes had lower mortality than the high status groups although numbers are small. Screenees with MI risk score levels over 100 were recalled to a consultation with their GP. Some claim that low status groups benefit more from face-to-face intervention, and perhaps some aspect of this is seen here. There may, however, be specific factors characterizing the high status groups with very high MI risk score. Assuming that they possess the necessary risk knowledge, and yet have high risk, they may be unlikely to value health considerations. Such

persons may deliberately seek risk, thrive on stress and lead a "coronary prone" life with cigarettes, rich food, high adrenaline, little health care etc. Numbers are admittedly small, and the typical pattern was that high education men had the lowest coronary mortality att every MI risk level.

5.9.5 Differences between socioeconomic markers in predicting mortality

Although great overlap existed between the different socioeconomic classifications, some differences in the relationships between mortality and socioeconomy were evident. The discrepant groups, although small, are of key interest in such circumstances. Such groups may have high education yet low income, or low status jobs and high income. In Table 76-78 and Figure 55-57 the combinations with high income and low education or low income and high education may be found. Numbers of death are small in these groups, but they seem to follow the expected pattern of mortality with income and education. No marked excess or deficit in mortality was seen in the discordant combinations. Holme et al[34] focused on "over-achievers" and "under-achievers", and showed increased mortality in both groups compared to mean achievers. He used preset categories defining normal and abnormal achievement. However, when looking at the deviations from the mean in these groups, it is not larger than what would be expected from the effect of income and education per se. No excess risk seemed to result from being an over- or underachiever.

5.9.6 Mortality by occupation in men

Crude mortality from all causes was calculated for the 65 detailed occupations, Table 91. Mortality was calculated in all invited, not just attenders, and physicians, dentists, nurses and religious workers therefore included some deaths. As found in many other studies, mortality was higher in non-attenders[98]. There was an 8-fold increase in crude mortality when moving from architects to men with no occupation. Men with no occupation had almost twice the crude mortality as the next highest occupation, dock workers. Other studies report such excess mortality as well[99], partly explained as healthy worker effects, and sometimes due to alcohol abuse[98]. The ranking of occupation by increasing mortality in all invited was very similar to the age and county standardized ranking of mortality from CHD based on attenders only, notable exceptions were physicians and real estate dealers. Physicians had very low attendance rates, and no observed deaths in attenders. Real estate dealers had SMR from CHD of 70% and crude mortality rates from all causes 113% of the mean crude mortality rate.

5.9.7 Mortality and risk differences by 18 main occupations

In the mortality analyses in Figure 62 to Figure 66, 18 "main occupation groups" were constructed, following the grouping used in the Nordic mortality follow up[49]. The codes may be found in paragraph 3.7.4. The Nordic follow-up had no information about individual cholesterol, smoking, blood pressure etc. This means that the present study allows the calculation of age, county and risk adjusted mortality.

In Figure 62 and Table 92, men in the pedagogical group (SMR=51) and in executive administrative jobs (SMR=55) had low CHD mortality, and men with no occupation (SMR=196) and in light industry (SMR=145) had high mortality. This was

also found in the mortality follow-up in the Nordic countries[49]. The group "Other occupations" is a mixture of diverse occupations, but is defined exactly as in the Nordic follow-up. It is the smallest group, with only 402 men, and this may explain the inconsistent mortality pattern, low CHD and the high stroke mortality rates. When the pedagogical group (SMR=51) is used as the reference, all occupations with SMR 93 or greater had significantly ($p<0.05$) higher mortality.

Adjusting for risk gave different patterns in different occupations. Age and MI risk score adjusted mortality in the pedagogical and scientific/technical occupations increased. This may be interpreted to the effect that low cholesterol, blood pressure and smoking were important components in the low mortality in these two occupations. High level executives had low age adjusted mortality, unchanged by MI risk score adjustment, meaning that other factors than cholesterol, blood pressure and smoking must explain the favorable CHD mortality. One suggestion may be a higher alcohol intake, this has been advocated as beneficial regarding CHD mortality. The excess mortality in drivers was greatly reduced by MI risk score adjustment, pointing to high risk factor levels as a major cause to the high mortality. MI risk score adjustment had little impact on mortality rates in the unoccupied.

Stroke mortality, Figure 64 and Table 93, deviated from the CHD pattern regarding occupation. However, there were only 93 deaths in attenders, and no stroke mortality differences were significant at $p<0.05$. No deaths were observed in the humanistic work group. Low mortality was seen in drivers (SMR=38) and in "other transport" (SMR=71). The unoccupied men had average stroke mortality, whereas building workers (SMR=136), office workers (SMR=136) and hotel and janitor workers (SMR=149) were among occupations with above average mortality.

All cause mortality by the 18 main occupations followed the same pattern as CHD mortality. The gradient between high and low status mortality was greater in Oslo than in all four study areas combined. The pedagogical group again had the lowest mortality, all occupations with SMR 90 or higher (office work) had significantly higher mortality than teachers. Several industrial occupations had markedly higher mortality in Oslo than in the combined sample. Many of these industries have closed down since the Oslo screening, and the high Oslo mortality in industrial workers may be related to unemployment.

There were three times as many violent deaths (281) as stroke deaths (93) in the attending men. These are shown in Table 95 and Figure 65, for all four study areas combined and for Oslo men separately. The lowest mortality from violent deaths was in scientific and technical work (SMR=50). If this is the reference group, all occupations with SMR=109 or above, and with more than 12 deaths had significantly higher mortality, $p < 0.05$. Transport workers and drivers had low violent cause mortality in Oslo, but high mortality in the counties, although the difference was not significant and based on only 6 deaths in Oslo. If this is not just a random occurrence, one reason may be that Oslo traffic is dense, but slow. Fatal car accidents may be relatively less common in Oslo. In the counties of Finnmark and Sogn og Fjordane, road conditions are more difficult, distances large, and speed probably often higher.

5.9.8 Mortality and risk differences by 65 occupations

The differences in CHD mortality (Table 96) from SMR=28 in vocational teachers to SMR=196 in unoccupied men were greater than expected from the MI risk score differences (Table 66). The SMR of 165 in textile industry workers with MI risk score of 57 (population mean) was also higher than expected. Although the MI risk score rank was significantly correlated to the CHD mortality rank, some inconsistencies were apparent. Business administrators had an average MI risk score, yet low CHD mortality (SMR=55). Fishermen had very high MI risk level, and average CHD mortality. Adjusting for MI risk score as well as county and age in men (Table 98), did not eliminate the differences in CHD rates. Other factors than cholesterol, systolic blood pressure and smoking habits may be associated with occupation and affect coronary mortality. As will be discussed in paragraph 5.9.11, risk factors were only measured once and MI risk score is therefore incompletely adjusted for. However, occupations such as smelter workers, machine operators, drivers, fishermen and construction workers would be expected to reduce their coronary heart disease mortality more than 10% by achieving mean risk factor levels. Jurists would increase their mortality if reverting to mean risk levels.

5.9.9 Mortality by occupation in women

In women, all cause mortality was used (Table 97), and even then only 420 deaths occurred. Attendance was so high in all female occupations that crude mortality in all invited would not differ to any extent from tables of attenders. Excess mortality in the low status women was higher than risk factor differences would suggest, but the associations between risk factor and all cause mortality are less established in women. Using occupations with more than 10 deaths only, SMR was 54 in cleaning workers, and 129 in hotel or restaurant work. Adjusting all cause mortality in women for MI risk score is questionable for two reasons. The MI risk score is based on coronary heart disease, not all cause mortality, and was constructed for male mortality. In men CHD make up about 50% of total deaths, in women only 13%. It was therefore not surprising that MI risk score adjustment (Table 99) did not change the female socioeconomic mortality pattern. The table presents a contrast to the findings in men. Again this finding agrees with most other studies, in that socioeconomic mortality gradients are lesser in women[12], at least when categorizing according to their own status.

5.9.10 Healthy worker effect

Several studies have shown that mortality differences between occupations are greater when the unoccupied are categorized with their latest occupation. This may be so because there is selective movement out of low status occupations into disability pensions with deteriorating health. The 1970 census was carried out several years prior to the start of the present mortality follow-up, which will counteract this tendency. Although some who were unoccupied at the census may subsequently have found a job, as a group they still carry an increased mortality exceeding that of any occupation.

5.9.11 Consequences of confounder misclassification

Risk factors measured once

Socioeconomic status correlated with risk factors for cardiovascular mortality. When trying to evaluate the impact of socioeconomic status on mortality, adjustments were made for risk differences. However, cholesterol, blood pressure and smoking were only measured once, and the mortality gradient associated with these factors may therefore be underestimated. The "true risk level" would have a steeper gradient with mortality. When a socioeconomic gradient is adjusted for a risk factor gradient which is underestimated, a mortality gradient will remain. This gradient, attributed to the socioeconomic factor, may stem from the risk factor being incompletely adjusted for.

Misclassification consequences

This problem has been discussed by Tverdal in his doctoral dissertation[53]. Also, Savitz and Baron[100] provides curves for the "Per cent adjustment", or as the authors explain "the amount of confounder bias removed using the misclassified measure, relative to the total confounding bias as a function of confounder sensitivity and specificity in a case-control situation". The completeness of adjustment was rapidly lost with modest amounts of misclassification. With both specificity and sensitivity at 90% the "Per cent adjustment" was 60%, reduced to less than 20% if specificity and sensitivity were 70%. Funnemark and Tretli[88] showed that dichotomizing e.g. cholesterol at 0.85 standard deviations above the mean, will have a sensitivity and a specificity of 90%. Adjusting for this dichotomized cholesterol will then be 60% "effective".

Implications for the present study

Adjusting for a continuous variable, such as cholesterol or MI risk score should be more effective than merely adjusting for a dichotomy. To quantify the impact of inadequate adjustments regarding the risk adjusted relationship between socioeconomic variables and mortality is difficult. The socioeconomic variable is itself subject to misclassification. For instance, when the relationship between income and CHD mortality was adjusted for MI risk score, the intraindividual variation in risk score would mean an incomplete adjustment, whereas the intraindividual variation in income would bias the relationship toward the null hypothesis[53]. Thus the two would tend to counterbalance. Socioeconomic variables with less intraindividual variation, e.g. education, may be more likely to be overestimated due to inadequate adjustment. The CHD diagnosis itself may be biased by socioeconomic background. Whether high status groups should be more or less likely to receive a CHD diagnosis than low status groups is arguable.

Stratified analyses

To avoid this problem, at least regarding underadjusting for MI risk score, several analyses were carried out stratified by, rather than adjusted for, risk level. In such analyses, measurement errors on cholesterol and blood pressure and smoking habits would have to vary systematically by socioeconomic group to influence the socioeconomic gradient. Smoking habits may perhaps be systematically underreported by high status groups. If so, this would reduce the difference between high and low status groups, biasing toward no difference. When consistent excess mortality is found in the low status groups, this is less likely an artefact.

Possible future strategies

In a National Health Screening Service study[74] the "tracking coefficients," or correlations between log MI risk score of screenings I and II were between 0.68 and 0.75. The second MI risk score value tended to be lower, the mean difference was 4.2 score units in men 40-49 years attending both screenings. Recalculating the MI risk score values in an attempt to come closer to the "true" MI risk score value for the group may be possible, and the "true" MI risk score value used to adjust the socioeconomic mortality gradients. This may be adressed in future studies.

5.10 PROPOSED LINKS BETWEEN SOCIOECONOMY AND HEALTH.

As mentioned in the introduction, there are four main theories on the links between socioeconomy and health. In this chapter I will discuss these in more detail.

5.10.1 Artefact explanation.

Contracting number in low status groups

The relationship between health and class is irrelevant, both are measuring the same social phenomena. Little significance should be attached to the association between these indices. Health inequalities have not diminished, partly because the number in the poorest social class has contracted[1,12]. According to this view, although the health inequalities between classes persist, the number in the disadvantaged classes is smaller, and the inequalities are therefore less than they seem. Even if this argument were right, it acknowledges that the low status groups are disadvantaged regarding health. According to this model, the young with parents in class V entering the labor market would move to class IV, semiskilled manual work, because unskilled positions had become rare.

Proportion with low income has increased

How unequal then is the distribution of income? In the UK, both the proportion earning less than the supplementary benefit standard, and the proportion in the lowest income groups, just above the supplementary standard, has roughly doubled from 1960 to 1977[101]. The Black report[12] points to this to counteract the arguments about the contracting numbers in class V. The proportion with low lifetime income has increased in England in recent decades, and in 1980 the proportion in classes IV and V made up about 25% of the population in England and Wales.

Applicability to present study

Comparing this with the social class distribution in Oslo and the counties presented in Table 2, class V made up 12% in Oslo, 16% in Oppland, 21% in Sogn og Fjordane and 30% in Finnmark. This does not suggest a contraction of the number in class V in Sogn og Fjordane or Finnmark. The proportion in Norway in class V is higher (27%) than in England and Wales, France and Finland (5-7%). The proportion in class V in Norway was so large that Norway was excluded from a comparative study of differences in mortality[102]. The socioeconomic gradients in several risk factors and in mortality show similar patterns in all four counties, in spite of the different proportion in class V. Indirectly, this counteracts the artefact argument. Class I shows the greatest county differences.

5.10.2 Natural and social selection.

Survival of the fittest

This model sees health as the cause of the social class differences. Only those in good health are able to achieve the higher positions[103,104], whereas ill health leads to low status. Thus the low mortality in the high status group, whether it be from cardiovascular disease or perinatally, simply reflects that this is the strongest and healthiest part of the population. They do not achieve good health because of their position, but achieve their position because they are in good health. Those who remain have poor health compared to the upwardly mobile. Some[107] claim that most of the socioeconomic gradients observed are due to social mobility, others see social mobility as a minor confounder[12,105]. An argument against social mobility as the cause of social class differences is that most social mobility seems to occur in early adult life. In one study, disease was rarely a major factor in downward mobility, more so the parents' inability to maintain an economic and social foothold[106]. A variation on this theme is that the widening differences may be attributed to social mobility, but the underlying pattern of inequality in health must have other reasons[107,108]. The social mobility model cannot explain the reversal of the social gradient in cardiovascular disease, nor the decreasing gradients with increasing age[105]. Forsdahl, however, argues that a special form of upward mobility, childhood deprivation combined with adult affluence, may cause higher adult cardiovascular risk levels[109,110,111]. He has shown that men growing up in families with a difficult economic situation, had higher serum cholesterol levels at age 40-49 years. Some support of Forsdahl's theories may be found in Figure 43 to Figure 54. In these figures, mortality decreases with education in Oppland and Oslo, but not in Finnmark and Sogn og Fjordane. The 40-49 year old men in this study were born between 1923 and 1936. If Sogn og Fjordane and Finnmark are supposed to have had worse economic conditions during the 1930 recession, and if adult affluence is harmful under such conditions, this picture may appear. Number of deaths in each county is small, and other reasons may explain the different relationship in the different counties.

Healthy worker effect

The healthy worker effect[49,99], i.e. that the employed population is in better health than the unemployed, is usually regarded as a result of selection and social mobility[12,105]. Major disability or disease hinders recruitment into the work force or leads to job loss. Within the employed population a healthy worker effect may also be argued. Workers in occupations involving heavy manual labor are often in good health. Good health is required to hold a physically demanding job for long. Whether workers enter the positions with above average health, or the job makes them more healthy, cannot be evaluated from cross-sectional data. Less demanding jobs may allow less perfect health. If selection is the main mechanism, mortality differences should be present even at young ages, whereas if "training" were important, then differences should increase with age. A combination of selecting the healthiest, and discarding any with reduced health, would give mortality differences at all ages. Different combinations may operate in different parts of the labor market. Only a longitudinal study could study this in some detail, as there may be a flux into lighter jobs and unemployment following serious disease. Such a longitudinal study[99] has been started in the UK.

The data material from Oslo and the counties presented here may be linked to future censuses, enabling the study of changes in status and health over time. The present data set would be particularly useful, as many have attended cardiovascular screenings with 5-year intervals up to 4 times already. The combination of risk factor determinations at different times with census and income information is rare and may yield important knowledge.

Applicability to present study

Social mobility seems an unlikely explanation to the socioeconomic differences in Oslo and the counties. This paper has limited information about social mobility. However, if high education combined with low income or low class is downward mobility, and low education with high income or high class is upward mobility, there is no support in this study that upwardly mobile men had lower risk factor levels or lower mortality rates (Table 20 to Table 54, Table 76 to Table 78). On the contrary, the education effect on health remains strong, and high income or high class is not enough to remove the education gradients in risk factors or mortality.

5.10.3 Materialist or structuralist explanation.

Poverty causes disease

The link between poverty and the major causes of deaths, such as infections, malnutrition, and accidents is evident in the slums seen in many third world countries. The link between poverty and the modern diseases of the "western" working class is less obvious. Most segments of the population have enjoyed improved wealth, health and access to life chances. Death rates are lower, expected life span longer and the major causes of death are "life style diseases" such as cancer, heart disease, and accidents. Paradoxically - the increase in living standards is partly blamed for the increase in cardiovascular[39] and cancer deaths. Rich diets, daily smoking and sedentary lives have become affordable for all classes. In 1950 and earlier, cardiovascular disease occurred more frequently in the high status groups[32], but has since shifted to the low status groups. This change in the socioeconomic distribution of cardiovascular disease is difficult to explain with simple economic deprivation models.

Relative poverty concept

If poverty is seen as a relative concept[5,12], this may explain the persisting inequalities in health. Limited resources may disadvantage in relation to risks of illness or in factors promoting good health[112,113]. The information glut regarding dos and don'ts of health may be more confusing in the less educated groups, who may not be able to extract and implement the same health behavior as the better educated[114]. Low socioeconomic status groups may have less control regarding work load, work hours and leisure time activities, and this may make life style changes difficult. High status groups may have more expensive "health consuming activities," unattainable in the low income group. Smoking and overeating, although expensive, are cheaper than fast cars, travelling, expensive alcohol, etc[5]. This approach fits with the higher melanoma mortality in high status groups, and the higher smoking and BMI in low status groups.

Direct links

More direct physiological links have been proposed between low status and ill health. Lack of control may lead to "stress", maybe increasing adrenaline levels[115]. This may in turn increase blood pressure and nicotine excretion. An even simpler

explanation put forward in the UK, attributes the excess winter deaths in low status UK elderly to low indoor temperatures[116]. The winter excess mortality is less marked in Scandinavian countries with better housing and heating.

Susceptibility

One key issue in the relationship between socioeconomy and health is susceptibility. If perfectly adjusted for all relevant risk factors, some argue that there would be no gradient left to the socioeconomic factors. The counter-argument claims that at identical risk level, if this could be measured, the low status groups would still have increased mortality and/or morbidity rates from cardiovascular disease. The Whitehall study found that men smoking 20 or more cigarettes per day had mortality rates of 1.5% in social class I and 3.7% in class V[117]. All the men lived in greater London. This may support the increased susceptibility hypothesis, but there may be exposure factors due to low class[118], such as poor housing, urban dwelling, lack of some food items, (vitamin A), or other unknown risk factors. Poor language and coping skills may perhaps increase case fatality or misdiagnosis rates.

In Figure 59 to Figure 62, the mortality is consistently higher in low status groups compared with high status groups, even after stratifying by MI risk score levels. This suggests that low status groups have a higher susceptibility at the same risk factor level. The Cox regression coefficients were larger than those based on the stratified mortality analyses. Some of the mortality attributed to socioeconomy in this multivariate analyses may perhaps be due to inadequate adjustment.

Opposite or similar risk factor and mortality gradients

Several British studies[24,29,119] have shown that risk factors were lower in low status group. This is in contrast to the results in the Oslo study[34] and a Swedish study[98] where risk factors increased with decreasing status, as was also the case in the present study.

Childhood deprivation

Several papers by Forsdahl et al. investigated the concept that childhood economic deprivation combined with relative adult affluence is a risk factor for coronary heart disease[109,110,111]. This may be seen as a special form of social mobility, discussed in the previous paragraph, but may also been viewed as part of material or structural explanation to health differences. The childhood deprivation may be the instrumental factor, the adult affluence incidental. If childhood deprivation is a determinant of high adult risk levels, then socioeconomic gradients may diminish or reverse. The post-war generations have experienced less childhood poverty, and are now reaching "coronary age".

Time series approach

Macro-economic perspectives have also been used to predict health outcomes. Brenner[120,121] used a time series approach to fit recessions to various mortality rates. He estimated the initial, as well as the cumulative impact of recession, and the time lag between recession and mortality increases. Although intuitively this method seems to show cause and effect, much criticism has been voiced. Time series analyses have also shown the opposite effects, that high unemployment causes low mortality[122].

5.10.4 Cultural and behavioral explanations.

This approach emphasizes the importance of the individual behavior as a predictor of health and advocates personal responsibility regarding lifestyle and its health consequences[123]. People harm themselves or their children by consuming detrimental substances such as tobacco, alcohol, drugs, refined foods, or by lack of exercise or other preventive health measures. The most extreme interpretation of this model is that personal characteristics such as intelligence, physical and mental qualities determine health. For instance, smoking occurs also in the higher classes, and those who smoke may do so from personal satisfaction and well knowing about the health warnings. A less extreme view allows differences in education and training to explain behavioral differences. This view may be seen as an extension of the materialist explanation, but with greater emphasis on personal responsibility[29,39,105].

In this study of Oslo men, and men and women in the counties, we found similar patterns between behavioral risk factors and socioeconomy and between biological risk factors and socioeconomy. This point to some common factor that may determine both smoking, exercise habits, blood lipids and blood pressure. Although personal responsibility for all these factors may be advocated, this consistency may point to structural or material conditions. Even if "free choice" is the determinant of risk factor differences, "free choice" is based on information and beliefs. The description of inequalities in risk factor and mortality distribution may point to a need for better information to certain groups, with better information the "free choice" may choose differently.

5.10.5 Health care differences by socioeconomic groups.

Lack of health care is probably a minor cause of increased mortality in the low status groups. Many studies have shown that low status groups have more contacts with the health service and longer hospital stays etc. This has been found also when allowing for higher morbidity. The low status groups in many countries are less likely to seek help to prevent disease[23]. This may apply to secondary prevention of disease as well. It is possible that high status groups receive better follow-up care after serious disease, e.g. after a myocardial infarction. In one study, preventive health behavior was associated with education, age, income and social participation, in this order[112]. Low status groups follow population based strategies less than high status groups[34], maybe because such strategies are "for the educated by the educated".

The underlying questions of how to improve risk levels and life expectancy equally, not to mention how to achieve "equality in health," in all socioeconomic strata are not addressed in most health information strategies. To achieve equality would require that mortality increased in the high status groups, or that these groups did not improve as much as the low status groups until these "caught up". The ethical problems with these alternatives and the costs involved are difficult to assess. If modest resources may yield appreciable improvements in the health of high status groups, and much larger resources are needed to achieve very small improvements in low status health, is it right or wrong to allocate resources to where they have least effect? If public health campaigns favor the high status groups, should such campaigns be abandoned?

5.11 OTHER STUDIES ON CHD AND SOCIOECONOMY.

5.11.1 The Oslo Study.

The Oslo Study[51] was linked to the 1970 census, and Holme et al. have extensively analyzed socioeconomic factors[34,124], coronary risk factors and CHD morbidity[125] and mortality[33]. They found that MI risk score, based on cigarette consumption, cholesterol and systolic blood pressure, was twice as high in the low income compared to the high income groups[34]. Men with high incomes smoked less, and were more active during leisure hours than low income men[126]. Higher education was associated with fewer daily smokers, and with lower mean levels of triglycerides, cholesterol and blood pressure. Correspondingly, men with higher education had lower cardiovascular disease mortality. Education and income were independently associated with cigarette smoking. Regarding cholesterol, triglycerides, and blood pressure, the effect of income disappeared when controlling for education. In a 1976 paper in Lancet, Holme et al. predicted that "A rather strong socioeconomic gradient in C.H.D mortality is likely to emerge as this cohort continues to be followed up". The Oslo data material was pooled with the counties and is part of the present study.

Compared with Holme's study on Oslo men, the relationship between socioeconomic factors and risk factors may be studied in both sexes and four regions in the present study. Few studies have data including womens' own class. Compared to the findings of Holme et al., income had more impact on risk levels in the present study, significant in many regression analyses even when education was also included.

5.11.2 CBS, Norway: mortality by socioeconomic status.

Tønnesen et al. analyzed mortality by occupation in Norwegian men followed up from the 1960 census. All deaths from 1960 to 1964, a total of 58000, in men aged 30 to 81 years at census were analyzed[127]. High mortality rates were seen in seamen, miners, food processing workers, fishermen, and in severeral industrial workers. Academic and technical professions, public administrators, farmers, lumber workers and wood workers had low mortality rates.

The 1970 census was first followed up for three years[128], analyzing a total of 120000 deaths, male and female, including non-working subjects. Besides the high and low risk groups identified by Tønnesen[127], men with hotel and restaurant work had high mortality, and teachers had the lowest of all mortality rates. Occupations with high all cause mortality had high coronary and cancer mortality as well, seamen and miners being more at risk for accidental deaths. These findings are very similar to what was found in the present study.

The female mortality differences by occupation in the CBS follow-up were less than in males. Hotel and restaurant workers and cleaning workers had high mortality rates. Women in "medical, administrative, executive" positions had low mortality, as did post- and telecommunication and fine mechanical workers. This differs markedly from the all cause mortality results in the present study. I found that hotel/restaurant and cleaning women had low mortality, and the scientific/technical women had high mortality rates. The selection of counties may be a crucial factor in this discrepancy. The limited age group, the few women in high status groups, and the positive association between smoking and status may also contribute. Smoking not only causes

CHD, but also many forms of cancer. As smoking increased with increasing income in women, this may explain some of the excess all cause mortality in high status women.

5.11.2.1 The 10-year follow-up

Presentation of study

The 1970 census was reanalyzed as a 10-year follow-up[48], including a total of 2.9 million subjects, 1.4 million men and 1.5 million women. There were 386929 deaths during follow-up. Among working men, the highest all cause mortality occurred in low level non-manual work. Together with unskilled workers, this group lost the most working years. Little loss of working years occurred in high level non-manual professions, farmers and fishermen. Looking at specific occupations, the mortality rates were high in seamen and in hotel and restaurant workers. Mortality was low in teachers, engineers, and technical professions. In women the differences were smaller, the mortality rates were high in "other free professions" and low in farm wives and in medium level non-manual professions. When studying specific female occupations, the highest mortality was seen in hotel and restaurant work, and in packers and warehouse workers, whereas low mortality was seen in teachers, nurses, and farm workers.

Recoding of occupations

The CBS collapsed the single occupations in men into 37 groups, in women into 14. The regrouping used the Nordic standard of occupations[55] and attempted to achieve at least 6000 in each group. If several two-digit codes had to be collapsed, similarity in education and work tasks was sought. The 37 occupation groups also had subgroups, with these there were 57 occupations. These 57 groups were almost identical to the 65 occupational groups in the present study, but I have codes also for students, unoccupied and house workers, and have kept some of the academic professions.

Socioeconomic gradients changed with age

Non-working men had considerably higher mortality than working men, in women this difference was small. At younger ages unskilled workers (male and female) had higher mortality, this dropped to average mortality at ages over 65 years. In men, all levels of office work had mortality below the average at younger ages. However, low and medium level office work ended up with mortality rates above the average with increasing age. At ages above 55, the low level office mortality slope (mortality versus age) was significantly steeper than the slope for all occupations combined.

High and low mortality occupations in the CBS follow-up

SMR=100 in the total working male population. In men mortality rates were highest in seamen (SMR=161), and hotel and restaurant workers (SMR=140). High mortality was also seen in ship officers, (SMR=130), Dock workers, packers (SMR=120), janitor and cleaning work (SMR=116), in most industrial workers (SMRs 110-120), drivers (SMR=112), and fishermen (SMR=111). Low mortality occupations were teachers (SMR=75) technical and academic work (SMR=78), farmers (SMR=80), and forest workers (SMR=80). The latter occupation has a marked age gradient in SMR, with high mortality at younger ages and the lowest of all mortality rates at age 65+.

SMR=100 in the total working female population. In women, mortality was high in hotel and restaurant workers (SMR=112), and packers and warehouse workers (SMR=111). Female teachers had the lowest mortality (SMR=76), followed by nurses (SMR=82). "Farm worker" (SMR=85) in women often means "Homemaker living on a farm." The same pattern as described for all cause mortality applied to ischemic heart disease, and to mortality from myocardial infarction. Lumber jacks and forest workers had the lowest mortality (SMR=78), followed by physicians and dentists (SMR=81). Common office workers had the highest mortality from heart disease (SMR=132), followed by hotel and restaurant workers (SMR=128). The Nomesco researchers attributed the high office worker mortality partly to selection, because men with heart disease would transfer to lighter jobs if possible[49].

Comparing the CBS follow-up with the present study.

The CBS 10-year follow-up results are similar to the present study. The same occupations have high and low mortality rates in men. In addition, the 10-year follow-up indicate an age effect. Selection and social mobility change the relationship between socioeconomic status and mortality from age 20 until 65+. A likely explanation for the very high mortality in low level office workers in the older age groups is e.g. that some have been transferred to lighter positions for health reasons. In the present study, all were between 40 and 49 years at screening, and would be between 49 and 63 years at the end of follow-up. In women the results are slightly different from the present study, but less discrepant from the present study than the 1960 follow-up of Tønnesen[127]. The Nomesco study is larger, represent high status areas as well as low status areas, and includes all ages. Follow-up started and ended about 5 years before the present study. All these factors may explain the observed differences.

5.11.3 The Nordic study of Occupational Mortality.

Presentation of study

The five Nordic countries conducted similar census procedures in 1970/71 and established a data material of 12 million people, aged 20-64 on january 1st, 1971. All five countries followed mortality the next 10 years, i.e. until 1980, and all studies were based on individual linkage of register information for each subject. During follow-up 775000 deaths occurred, and a joint analysis was done[49].

Mortality comparison between Nordic countries

Comparing the Nordic countries, Finland had the highest male mortality and Denmark had the highest female mortality rates. The study based mortality comparisons on standardized mortality rates (SMR), where an SMR of 100 is the mortality rate in all economically active in the Nordic countries jointly, separate for men and women. In economically active men the SMR in Finland was 133, Denmark 104, Iceland 94, Norway 92 and Sweden 88. Compared with the mean mortality rate, 21000 more Finnish men died than expected. Economically inactive men had an SMR of 233. In economically active women, SMR in Denmark was 120, Iceland 108, Sweden 102, Finland 93 and Norway 89, inactive women had an SMR of 151. Approximately 3900 more Danish women died than would have been observed if Danish mortality had been 100.

High and low mortality occupations, Nordic countries combined

Combining four of the five Nordic studies (Iceland had a different occupational classification and was studied separately), the male occupation with the lowest mortality was pedagogical work, SMR=71. Technical work and military work followed with SMR=80, and religious and juridical work with SMR = 84. The highest mortality was seen in deck and engine room work, SMR= 167, followed by hotel and restaurant workers, SMR=155, mining and quarrying work, SMR=118, and packing and dock work, SMR=117. The report states in the summary[49] "although the order from low to high mortality is not exactly the same in all countries it is predominantly the same occupations that had low or high mortality in all four countries". Some differences between the total mortality may be due to different compositions of the work force. Sweden had higher proportions of the work force in technical, religious/ juridical and artistic work, Finland had more men in farming and forestry work, and in road transport. Norway had higher proportions in clerical work, in fishing and as ship officers, deck and engine crew, whereas Denmark had more men in administrative, sale, foundry, and building work. Country specific mortality from cardiovascular disease (CVD) and sudden death (SD) show similar patterns.

High and low mortality occupations, each Nordic country

In Denmark, the highest CVD mortality occurred in hotel and restaurant workers, SMR=146, followed by deck and engine room crew, SMR=119. The lowest mortality was seen in military men, SMR=65, followed by farmers/farm managers, SMR=66, pedagogical work, SMR= 78, and farm workers, SMR=82. In Finland the highest CVD mortality occurred in hotel and restaurant work, SMR=186, followed untypically by forestry work, SMR=171. The lowest mortality rates (although greater than the mean Nordic mortality) was pedagogical work, SMR=103.

In Norway, CVD mortality was lowest in the pedagogical group, SMR=71, and farmers and farm managers, SMR=76. CVD mortality rates were highest in hotel and restaurant work and ship officers and pilots, both SMR=121, and in "packing, dock work," and "other and unknown occupation, but working," both with SMR=118.

In Sweden CVD mortality was lowest in pedagogical work, SMR=67, followed by farmers and farm managers, SMR=71. Medical and nursing work, and fishing work, both had SMR of 76. High CVD mortality occurred in hotel and restaurant work, SMR=115, deck end engine room crew, SMR=105 and road transport work, SMR=104.

Iceland used different occupational groups. CVD mortality rate was lowest in farmer's work etc, SMR=50 followed by physicians and dentists, SMR=54. CVD mortality was high in unskilled workers in manufacturing, SMR=109 and in fishing and "other economically active persons," both with SMR=109.

The Nordic countries published separate reports based on shorter follow-up periods such as Denmark,[129,130] and Finland[131]. Sweden[132] conducted a 10 year follow up from 1961 to 1970, and then again from 1971 to 1980. These early reports have been followed by more detailed publications of occupational mortality within each Nordic country, including the CBS studies presented in the previous section. Again, the same occupations are found with high and low mortality rates. The country effect in the Nordic follow-up seem to be found in most occupations, just as the county effect was found in most socioeconomic groups in the present study.

5.11.4 National Institutes of Health: Mortality by industry and occupation.

The NIH publication[133] on "Mortality patterns among US veterans by occupation and smoking status", cites cause specific deaths by occupation for 293958 white men aged 31-84. Although not representative of the total US population, this study included occupations differing substantially both in status and field of work. In this study, occupations with CHD mortality rates in the higher range were truck drivers, police officers and laborers (All with SMR=112). Low mortality occupations were teachers, (SMR=92), farmers (SMR=91), electrical engineers (SMR=82) and college professors (SMR=81). It is noteworthy that teachers at all levels, and in all mortality and risk factor studies have very favourable results. In the US study, police officers had above average mortality, in the present study police officers were slightly below the average CHD and all cause mortality.

6 CONCLUSION

Most risk factors decreased with increasing socioeconomic status, the difference between the low and high status group was more marked in men than in women. In both men and women, education was a consistent and powerful predictor of low risk level, even if income was low. Contrary to the finding in men, smoking increased with income in women. Behavioral risk factors showed stronger associations with socioeconomy than lipids and blood pressure. Both smoking and exercise showed patterns consistent with diffusion theory. The observations suggest that smoking is decreasing, and physical activity increasing in the population. The diffusion of these habits is more complete in men than in women, and Oslo and Oppland is ahead of Sogn og Fjordane and Finnmark. The high status groups may be seen as "early adopters" of these trends.

The proportion with undiagnosed symptoms suggesting cardiovascular disease was higher in low status than in high status men. At high risk levels, the proportion with a diagnosed disease was higher in high status men than in low status men. This cross sectional study can only suggest that the health care system favours the detection and treatment of asymptomatic risk in high status men more than in low status men.

This study has shown that the major risk factors for cardiovascular disease are related to socioeconomic status in men, and that cardiovascular mortality and all cause mortality follow the same pattern. If differences in smoking prevalence, mean cholesterol and blood pressure levels could be eliminated, and if the risk associated with these factors was fully reversible, and the adjustments complete, then the relative risk of 3 to 1 would be expected to be reduced to 1.9 to 1 in men when comparing low income/low education with high income/high education. This corresponds well to earlier studies[18,25].

In women, CHD mortality was low, again reinforcing the fact that cardiovascular disease before the age of 65 is a male disease, and that substantial cardiovascular deaths in women only appear at ages over 70. CHD mortality (based on 56 deaths) increased with increasing status based on occupation, social class or Treiman prestige score. Single mothers, women with husbands unable to work etc. may out of necessity have high incomes, but the household may still be in a low socioeconomic group.

Men without occupation, and men with no registered income had very high mortality from almost every cause of death. This excess mortality was virtually unchanged by risk factor adjustment. Although less marked than in men, women without an occupation had a CHD mortality higher than women with an occupation outside the home.

The health profession, favored with low risk factor levels and low mortality, should in cooperation with other professions seek to develop and evaluate strategies to achieve more equality in health in the general population. Only by keeping in mind the gross inequalities in health and the different information background of the population may good health education, and good health care, be achieved.

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TABLES AND FIGURES

Index of tables and figures pages 250-255.

Table 1 Numbers with risk factors and socioeconomic variables by sex and county

County	Sex	Sys BP		Income		Education		Class		Total
		n=	%	n=	%	n=	%	n=	%	n=
Oslo	Men	16189	62.6	25050	96.6	25437	98.4	24387	94.3	25849
Oppland	Men	8562	90.8	9184	97.4	9304	98.7	8990	95.4	9425
	Women	8598	93.8	6359	69.3	9053	98.7	4225	46.1	9170
Sogn og	Men	4679	91.4	4960	96.9	5473	99.1	4954	96.8	5117
Fjordane	Women	4439	95.5	2878	61.9	4618	99.4	2421	52.1	4648
Finnmark	Men	3745	87.1	4123	95.9	4195	97.6	3961	92.1	4299
	Women	3381	90.8	2677	71.9	3660	98.3	1591	42.7	3722
Total	Men	33173	74.2	43317	96.9	44009	98.5	42292	94.6	44690
	Women	16418	93.6	11914	67.9	17331	98.8	8237	47.0	17540
Total	Total	49591	79.6	55231	88.8	61340	98.6	50529	81.2	62230

Sys BP	Screening information; Recorded systolic blood pressure.
Income	Tax data information; Registered income.
Education	Census-70 information; highest attained education registered.
Class	Census-70 information; occupation code in Nordic Standard.
%	Percentage of persons invited to screening

Table 2 Distribution of socioeconomic groups by county, men

	Oslo		Oppland		Sogn og Fjordane		Finnmark	
	n	%	n	%	n	%	n	%
Education (Years)								
7-9	11668	45.6	6521	69.7	3519	69.1	3234	76.1
10	3770	14.7	1275	13.6	772	15.2	437	10.3
11-12	4885	19.1	737	7.9	404	7.9	299	7.0
13-14	2485	9.7	405	4.3	198	3.9	123	2.9
15-16	662	2.6	126	1.3	65	1.3	42	1.0
17-18	1884	7.4	236	2.5	113	2.2	60	1.4
18+	83	0.3	4		2		-	
missing	140	0.5	52	0.5	20	0.4	53	1.2
X^2(independence)=3565, d.f.= 18, p<0.0001								
Income (1000 NOK)								
0	799	3.1	241	2.6	157	3.1	176	4.1
1-39.9	755	2.9	447	4.7	362	7.1	413	9.6
40-79.9	959	3.7	742	7.9	560	10.9	571	13.3
80-119.9	2197	8.5	1396	14.8	863	16.9	725	16.9
120-159.9	6363	24.6	2816	29.9	1312	25.6	1126	26.2
160-199.9	6311	24.4	2017	21.4	1117	21.8	769	17.9
200+	8465	32.7	1766	18.7	746	14.6	519	12.1
X^2(independence)= 3230, d.f.= 18, p<0.0001								
Br. Registrar's class								
I	1609	6..2	311	3.3	126	2.5	63	1.5
II	5213	20.2	886	9.4	515	10.1	423	9.8
IIIn	4824	18.7	2138	22.7	1198	23.4	370	8.6
IIIm	4764	18.4	1455	15.4	747	14.6	786	18.3
IV	4790	18.5	2680	28.4	1290	25.2	1050	24.4
V	3187	12.3	1520	16.1	1078	21.1	1269	29.5
Insufficient data	1462	5.7	435	4.6	163	3.2	338	7.9
X^2(independence)=2768, d.f.= 15, p<0.0001								
Treiman Prestige								
0-19.9	1224	4.7	505	5.4	173	3.4	273	6.4
20-39.9	8946	34.6	4615	49.0	2418	47.3	2600	60.5
40-49.9	6682	25.9	2722	28.9	1702	33.3	811	18.9
50+	8997	34.8	1583	16.8	824	16.1	615	14.3
X^2(independence)=2522, d.f.= 9, p<0.0001								

Table 3 Distribution of socioeconomic groups by county, women

	Oppland		Sogn og Fjordane		Finnmark	
	n	%	n	%	n	%
Education (Years)						
7-9	7016	77.0	3685	79.7	3142	85.0
10	1153	12.7	550	11.9	309	8.4
11-12	454	12.7	229	5.0	108	2.9
13-14	353	5.0	123	2.7	73	2.0
15-16	52	0.6	26	0.6	20	0.5
17+	25	0.3	5	0.1	8	0.2
missing	58	0.6	7	0.2	36	1.0
X^2(independence)=156, d.f.= 10, p<0.001						
Income (1000 NOK)						
0	2811	30.7	1770	38.1	1045	28.1
1-39.9	2137	23.3	1418	30.5	1155	31.0
40-79.9	1804	19.7	663	14.3	697	18.7
80-119.9	1173	12.8	404	8.7	503	13.5
120-159.9	817	3.6	288	6.2	235	6.3
160-199.9	331	3.6	90	1.9	59	1.6
200+	97	1.1	15	0.3	28	0.8
X^2(independence)=389, d.f.= 12, p<0.0001						
Br. Registrar's class						
I	29	0.3	7	0.2	9	0.2
II	228	2.5	84	1.8	98	2.6
IIIn	1195	13.0	496	10.7	473	12.7
IIIm	77	0.8	24	0.5	21	0.6
IV	2386	26.0	1663	35.8	669	18.0
V	310	3.4	147	3.2	321	8.6
Insufficient data	4945	53.9	2227	47.9	2131	57.3
X^2(independence)=505, d.f.= 10, p<0.0001						
Treiman Prestige						
0-19.9	1593	17.4	518	11.1	683	18.4
20-39.9	6276	68.4	3643	78.4	2547	68.4
40-49.9	733	8.0	266	5.7	294	7.9
50+	568	6.2	221	4.8	198	5.3
X^2(independence)=175, d.f.= 6, p<0.0001						

Figure 1 Number of men in main combinations of education, income and social class. (Number attended/ total number invited)

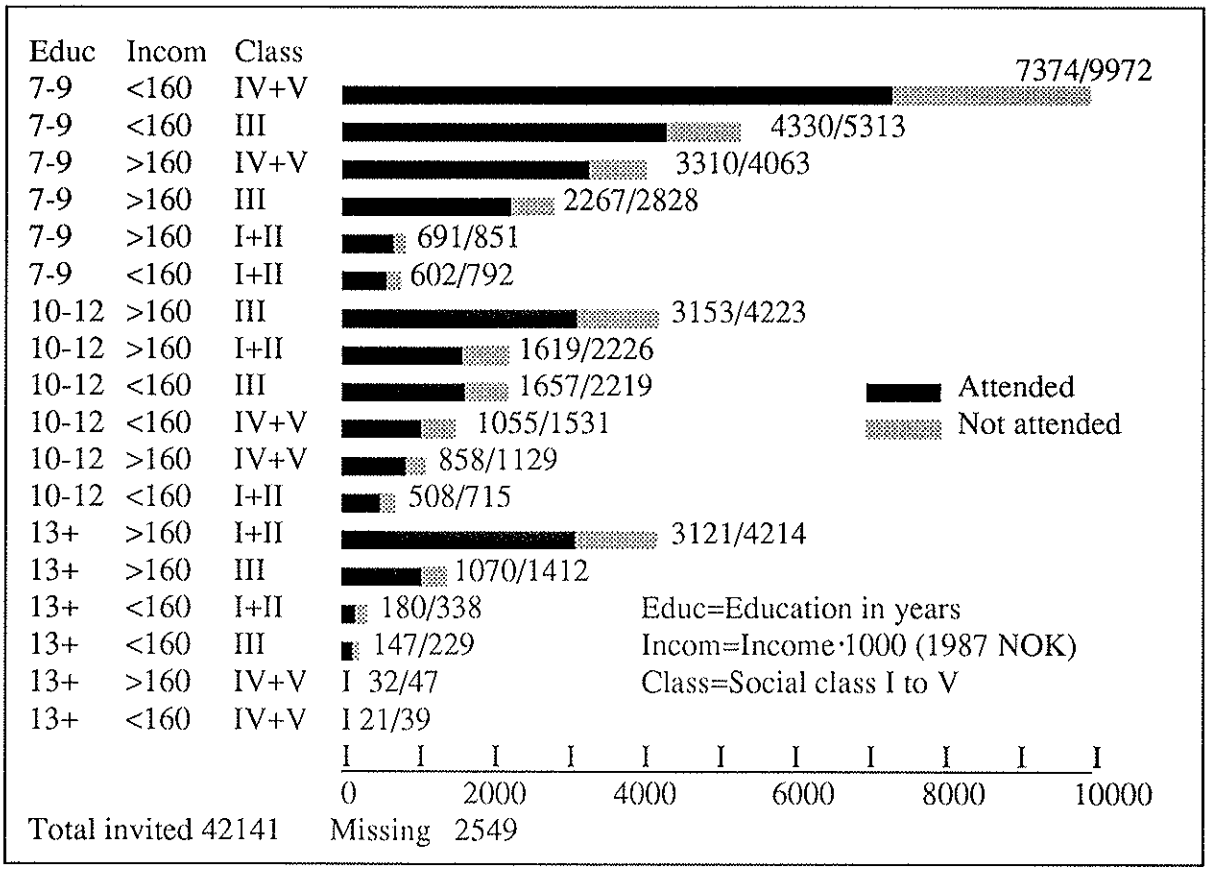

Figure 2 Number of women in main combinations of education, income and social class. Housewives included in figure. Number attended/total number invited

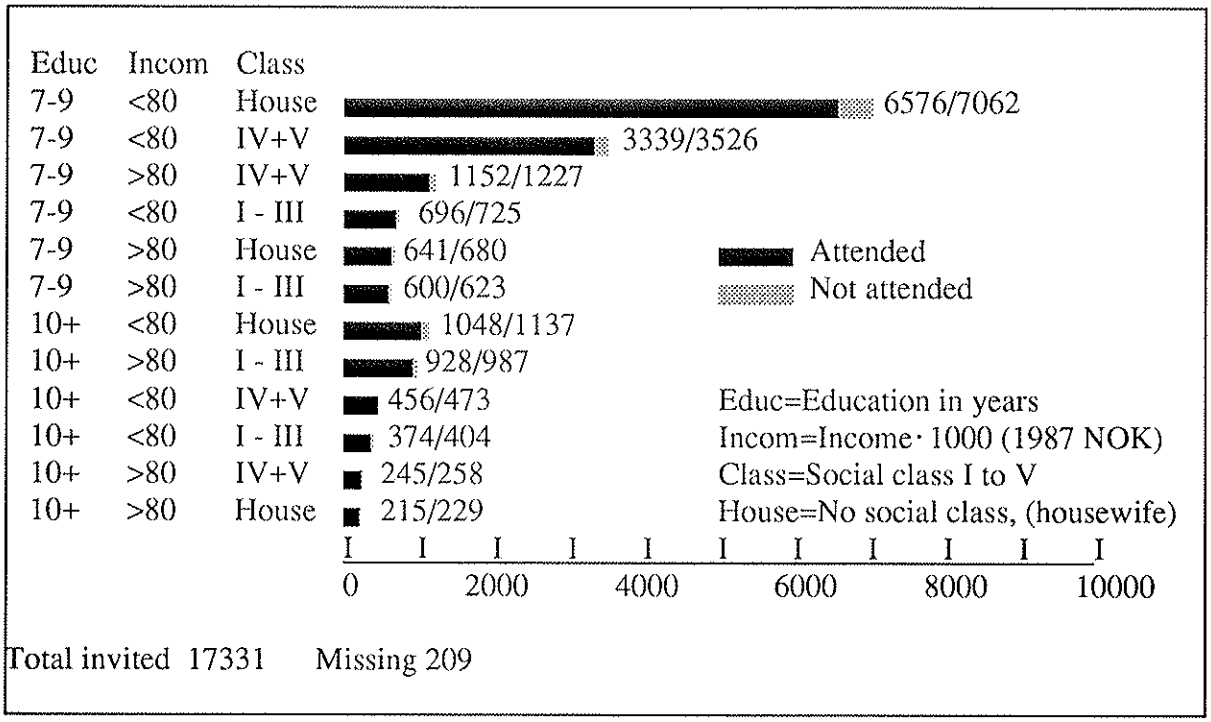

Table 4 Mean income and Treiman prestige score by occupation, men, all invited

Code	Rank Income	Rank Prestige	Occupation	Income NOK	Treiman Score	n=
Total population				165000	43	44690
242028	1	33	Reindeer herder	38700	45	100
101010	2	*1	No occupation	50200	*	1751
242110	3	5	Farm worker	77500	24	632
202630	4	*41	Students	80100	50*	87
242310	5	8	Fishing	99000	30	860
242021	6	37	Farming etc.	113700	47	2347
242410	7	2	Logger	117200	20	203
272710	8	21	Wood work	124600	39	383
282810	9	2	Dock work	126600	20	1474
272010	10	10	Textile industry	127300	32	323
292110	11	23	Hotel/restaurant	130100	40	437
282210	12	13	Food processing	130700	34	880
282523	13	7	Production, plastic etc.	130900	27	269
262110	14	6	Seamen	132100	27	275
272821	15	9	Building painter	133600	31	478
272724	16	19	Carpenter	133700	37	2182
292929	17	13	Personal service	134200	34	327
292310	18	4	Janitor, cleaning	136300	21	674
282310	19	20	Chemical processing	137000	38	275
232323	20	13	Cashier, shop	138800	34	676
262425	21	10	Driver	142600	32	2651
252929	22	13	Mine/quarry	143100	34	312
272910	23	13	Construction else	145400	34	1378
272510	24	21	Iron/metal work	146200	39	3466
202710	25	49	Religious	147400	56	78
282710	26	12	Machine operator	149900	33	1044
202410	27	35	Nurse	152700	46	98
272410	28	34	Fine mechanic	153000	45	267
272525	29	30	Plumber	153700	43	400
272310	30	26	Smelterwork	157500	41	520
262510	31	13	Conductor etc.	161500	34	458
272610	32	28	Electrician	163000	43	1581
262610	33	42	Traffic control	173200	51	154
292010	34	27	Surveillance	173600	42	603
262710	35	23	Post/telecommunication	174200	40	512
202910	36	37	Artistic	175200	49	366
282022	37	23	Repro/graphic industry	175800	40	650
232322	38	43	Shop keeper	179700	52	520
222910	39	36	Office work NEC	182400	46	2432
232010	40	31	Sales, whole/retail	188000	45	713
232210	41	37	Sales, personal	189500	47	575
222010	42	56	Book keeping	192500	66	558
202624	43	50	Vocational teacher	200000	57	595
262010	44	45	Ship officer	201700	54	349
202023	45	46	Engineer	207100	54	1811
232310	46	29	Sales, from office	210000	43	817
204026	47	44	Staff service	212000	54	297
212129	48	47.5	Other leader	215400	55	480
232110	49	37	Real estate	217300	49	302
202110	50	52	Science, natural	217700	61	159

Table 4 continued

Code	Rank Income	Rank Prestige	Occupation	Income NOK	Treiman Score	n=
301010	51	32	Military	219100	45	565
212024	52	53	Local administration	234300	62	287
202925	53	47.5	Editor, journalist	235000	55	215
212123	54	56	Adm. secretary	240500	66	309
202510	55	51	Health professional	249700	58	111
212010	56	58	Central administration	251400	67	190
204021	57	60	Accountant	259100	68	233
202623	58	54.5	Teacher	260100	65	493
202022	59	54.5	Chief engineer	277400	65	560
202021	60	63	Architect	277900	72	144
212110	61	58	Business administration	279600	67	2170
202322	62	61	Dentist	292300	70	104
202622	63	64.5	Univ. lecturer	296000	78	163
202810	64	62	Jurists	321500	71	162
202310	65	64.5	Physician	383700	78	198

* No prestige score assigned by Treiman

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between Groups	64	135·E6	2109375	279.2	<0.0005
Within Groups	44625	343·E6	7686		

Table 5 Mean income and Treiman prestige score by occupation, women, all invited

Code	Rank Income	Rank Prestige	Occupation	Income NOK	Treiman Score	n=
Total population:				43700	31	17540
292130	1	6*	House work	18000	28*	7545
242110	2	5*	Farming	18800	28*	2537
101010	3	1*	No occupation	56900	*	1809
292929	4	4	Other service	58300	27	129
282210	5	11	Food processing etc.	60800	35	291
232323	6	10	Cashier, shop	65400	34	838
282621	7	3	Packing	66500	22	91
272010	8	9	Textile industry	67900	33	270
292310	9	2	Cleaning etc.	68400	19	876
292110	10	8	Hotel/restaurant	70300	32	710
242310	11	7	Industry, manual work	75000	32	253
212010	12	15	Administration	87400	49	142
222010	13	14	Clerks	100200	45	736
202910	14	16	Artists, students*	101100	52	43
202429	15	13	Aux. nurse	104100	44	237
262710	16	12	Post and telecomm.	113400	41	267
201010	17	18	Technical/Science	123200	53	128
202421	18	17	Nurse	129300	55	201
202623	19	19	Teacher	139200	57	437

* No prestige score assigned by Treiman

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between Groups	18	20059354	1114408	669.8	<0.0005
Within Groups	17521	29151835	1664		

Table 6 Pearson's correlation coefficients between socioeconomic variables, (*numbers pairwise*), men and women

M E N

Correlation:	Education 7-18 years	Income > 0	Class I-V	Treiman
Education	1.00			
n=	*(44009)*			
Income	0.46	1.00		
n=	*(42862)*	*(43317)*		
Class	-0.61	-0.38	1.00	
n=	*(42141)*	*(41697)*	*(42292)*	
Treiman	0.63	0.42	-0.83	1.00
n=	*(42141)*	*(41697)*	*(42292)*	*(42292)*

All p-values < 0.0005

W O M E N

Correlation:	Education (7-18 years)	Income > 0	Class I-V	Treiman*
Education	1.00			
n=	*(17331)*			
Income	0.34	1.00		
n=	*(11809)*	*(11914)*		
Class	-0.49	-0.34	1.00	
n=	*(8223)*	*(6340)*	*(8237)*	
Treiman*	0.54	0.49	-0.66	1.00
n=	*(15646)*	*(10569)*	*(8237)*	*(15646)*

All p-values < 0.0005

* Homemakers, farm wives assigned Treiman prestige score, but not social class.

Table 7 Spearman's rank correlation coefficients, 65 occupations ranked by attendance, socioeconomic variables, SMR and age adjusted risk factor means, men

M E N

Rank Correlation:	Attendance	Systolic BP	Diastolic BP	Chole-sterol	Triglyce-rides	Smoking	Inactivity	MI risk score	SMR county adj.	SMR score adj.	Income
Systolic BP	0.477**	1.000									
Diastolic BP	0.118	0.494**	1.000								
Cholesterol	0.107	0.492**	0.173	1.00							
Triglycerides	0.170	0.440**	0.116	0.563**	1.000						
Smoking	0.005	0.413**	0.145	0.753**	0.434**	1.000					
Inactivity	0.057	0.320*	0.269*	0.480**	0.394**	0.531**	1.000				
MI risk score	0.113	0.524**	0.296*	0.882**	0.459**	0.879**	0.604**	1.000			
SMR, county adj.	0.239	0.519**	0.280*	0.541**	0.458**	0.563**	0.309*	0.548**	1.000		
SMR, score adj.	0.165	0.281*	0.172	0.308*	0.284*	0.363*	0.154	0.306*	0.918**	1.000	
Income	-0.232	-0.498**	-0.064	-0.616**	-0.675**	-0.680**	-0.599**	-0.603**	-0.505**	-0.293*	1.000
Treiman prestige	-0.251	-0.648**	-0.278*	-0.709**	-0.558**	-0.727**	-0.530**	-0.726**	-0.670**	-0.439**	0.845**

2-tailed Significance: $p<0.05$* $p<0.01$**

$r_s=0.26$, ($p=0.05$) $r_s=0.33$ ($p=0.01$), $r_s=0.42$ ($p=0.001$)

Table 8 Spearman's rank correlation coefficients, 19 occupations ranked by attendance, socioeconomic variables, SMR and age adjusted risk factor means, women

WOMEN

Rank Correlation:	Attendance	Systolic BP	Diastolic BP	Chole-sterol	Triglyce-rides	Smoking	Inactivity	MI risk score	SMR county adj.	SMR score adj.	Income
Systolic BP	-0.267	1.000									
Diastolic BP	-0.342	0.814**	1.000								
Cholesterol	0.142	0.575**	0.479*	1.000							
Triglycerides	0.061	0.604**	0.490*	0.763**	1.000						
Smoking	0.330	0.333	0.191	0.625**	0.612**	1.000					
Inactivity	-0.095	0.721**	0.374	0.207	0.319	0.228	1.000				
MI risk score	0.061	0.756**	0.525*	0.812**	0.854**	0.683**	0.525	1.000			
SMR, county adj.	0.209	-0.144	0.065	0.026	0.079	-0.107	-0.204	0.046	1.000		
SMR, score adj.	0.270	-0.181	0.021	-0.051	0.009	-0.151	-0.211	-0.037	0.967**	1.000	
Income	0.209	-0.697**	-0.640**	-0.498*	-0.395	-0.416	-0.590**	-0.426	0.216	0.244	1.000
Treiman Prestige	-0.063	-0.565*	-0.583**	-0.614**	-0.630**	-0.630**	-0.374	-0.512*	0.268	0.311	0.814**

2-tailed Significance: $p< 0.05$ * $p< 0.01$ **

r_s=0.48, (p=0.05) r_s=0.57 (p=0.01), r_s=0.70 (p=0.001)

Table 9 Age adjusted risk factor means and socioeconomic variables by group A,B, or C and county, men

Group	Chol mmol/l	Tri mmol/l	BMI g/cm^2	Sysbp mm	Mi risk score	Smoke %	Educat level	1987 Income (1000)	Treiman prestige	n=
Healthy(C)	29509	29507	29055	29533	29509	29529	29407	29143	28969	
Oslo	6.91	2.22	2.46	135	50	55.4	3.4	195.9	46	14308
Oppland	6.87	2.57	2.52	137	49	51.7	2.6	153.1	41	7780
Sogn og Fj.	6.86	2.18	2.48	136	51	51.5	2.6	138.4	41	4234
Finnmark	7.61	2.27	2.51	136	88	66.3	2.4	131.7	39	3212
Subtotal	6.97	2.31	2.50	136	54	55.1	3.0	169.4	43	29534
Symptoms(B)	1301	1276	1301	1301	1301	1301	1294	1277	1262	
Oslo	7.08	2.54	2.56	137	74	69.5	2.9	166.8	42	806
Oppland	7.12	2.79	2.55	135	67	63.4	2.4	130.7	39	166
Sogn og Fj.	7.04	2.44	2.52	138	82	67.0	2.5	131.6	40	117
Finnmark	7.98	2.34	2.55	137	118	75.5	2.2	110.1	36	219
Subtotal	7.23	2.53	2.55	137	81	69.5	2.7	149.7	41	1308
Diagnosis(A)	2337	2337	2296	2338	2337	2337	2323	2305	2275	
Oslo	7.22	2.60	2.54	146	88	59.3	3.2	176.5	45	1075
Oppland	7.22	3.14	2.67	145	70	46.0	2.5	138.7	40	631
Sogn og Fj.	7.21	2.52	2.61	143	64	44.5	2.5	126.3	42	330
Finnmark	7.82	2.38	2.59	145	118	65.3	2.4	114.0	38	328
Subtotal	7.30	2.70	2.59	145	84	54.5	2.8	151.0	42	2374
Unknown n=	15	15	175	1	1	229	11250	10592	10433	
Oslo	-	-	2.42	-	-	-	3.2	165.3	44	9660
Oppland	-	-	2.42	-	-	47.7	2.6	124.4	40	848
Sogn og Fj.	-	-	2.44	-	-	60.3	2.7	129.3	42	426
Finnmark	-	-	2.58	-	-	56.5	2.5	108.7	38	540
Subtotal	6.95	2.40	2.44	-	-	54.6	3.1	158.2	44	11474
Total	7.00	2.35	2.50	136.4	57	64.0	3.0	170.2	43	44690
s.d.	1.34	1.43	0.30	16.6	86	63.2	1.5	100.8	13	
Oslo	6.94	2.26	2.47	135.8	54	66.4	3.3	188.6	45	25949
Oppland	6.90	2.62	2.53	137.5	51	62.0	2.6	153.0	41	9425
Sogn og Fj.	6.89	2.21	2.49	136.6	53	55.8	2.6	141.0	41	5117
Finnmark	7.65	2.28	2.52	136.7	92	69.0	2.4	131.8	39	4299
n=	33162	33160	32802	33173	33148	33396	44274	43317	42939	

Table 10 Age adjusted risk factors and socioeconomic variables by group A, B, or C and county, women

Group	Chol mmol/l	Tri mmol/l	BMI g/cm^2	Sysbp mm	MI risk score	Smoke %	Educat level	1987 Income (1000)	Treiman prestige	n=
Healthy(C)	14519	14519	14246	14530	14514	14671	14549	10121	6934	
Oppland	6.75	1.73	2.49	133	7.6	36.7	2.1	50.9	34	7827
Sogn og Fj.	6.82	1.56	2.47	132	7.1	27.1	2.1	34.2	32	3933
Finnmark	7.39	1.71	2.55	133	11.5	47.2	2.1	44.4	35	2923
Subtotal	6.90	1.69	2.50	133	8.2	36.2	2.1	45.1	34	14683
Symptoms(B)	675	675	659	677	675	685	680	460	321	
Oppland	6.83	1.91	2.57	133	8.3	42.5	2.1	46.4	34	275
Sogn og Fj.	6.93	1.57	2.53	129	6.5	27.1	2.1	26.3	31	177
Finnmark	7.52	1.75	2.69	132	14.0	48.5	2.0	37.1	32	233
Subtotal	7.09	1.77	2.60	132	9.8	40.6	2.1	38.0	33	685
Diagnosis(A)	1208	1208	1186	1211	1206	1236	1231	791	564	
Oppland	7.17	2.24	2.77	147	12.8	29.5	2.1	38.5	33	581
Sogn og Fj.	7.27	1.96	2.73	144	11.5	17.8	2.1	33.1	32	372
Finnmark	7.99	2.22	2.86	145	20.0	42.3	2.1	35.6	33	288
Subtotal	7.39	2.15	2.78	146	14.0	29.0	2.1	36.2	33	1241
Unknown n=	0	0	30	0	0	177	871	542	418	
Oppland	-	-	2.67	-	-	29.6	2.2	41.8	35	487
Sogn og Fj.	-	-	2.83	-	-	23.1	2.1	29.3	32	166
Finnmark	-	-	2.57	-	-	52.6	2.1	35.6	36	278
Subtotal	-	-	2.64	-	-	35.6	2.1	37.6	35	931
Total	6.94	1.72	2.52	134	8.7	35.8	2.1	43.8	34	17540
s.d.	1.35	0.91	0.42	18.6	1.3	4.8	0.44	53.0	11	
Oppland	6.78	1.77	2.51	134	7.94	36.4	2.37	71.3	34	9170
Sogn og Fj.	6.86	1.60	2.50	133	7.50	26.4	2.32	54.3	32	4648
Finnmark	7.45	1.75	2.58	134	12.40	46.9	2.21	59.1	35	3722
n=	16402	16402	16121	16418	16395	16592	17331	11914	8237	17540

Table 11 Per cent in group A (diagnosis) and in group B (symptoms) by serum cholesterol level, social class and county, men

	Oslo		Oppland		Sogn og Fjordane		Finnmark	
PER CENT IN GROUP A (cardiovascular or diabetes diagnosis)								
Cholesterol ≤ 9 mmol/l	%	n	%	n	%	n	%	n
Social class I+II	5.7	4383	6.5	1045	7.3	562	7.1	380
III	6.5	6068	6.4	3217	6.9	1675	6.7	869
IV+V	6.7	4398	7.4	3542	6.7	2046	8.1	1702
Per cent in group A (chol ≤ 9)	6.3	14849	6.9	7804	6.8	4283	7.6	2951
Cholesterol >9 mmol/l								
Social class I+II	10.5	219	10.0	67	7.7	26	13.2	53
III	11.2	357	9.0	167	8.7	126	13.7	175
IV+V	9.7	321	11.9	243	10.9	119	7.6	315
Per cent in group A (chol >9)	10.5	897	10.6	470	9.6	271	10.1	543
PER CENT IN GROUP B (Undiagnosed chest or leg pain)								
Cholesterol ≤ 9 mmol/l								
Social class I+II	3.7	4383	1.1	1045	1.6	562	3.7	380
III	4.3	6068	1.7	3217	2.0	1675	4.5	869
IV+V	6.6	4398	2.0	3542	2.7	2046	5.9	1702
Per cent in group B (chol ≤ 9)	4.8	14849	1.8	7804	2.3	4283	5.3	2951
Cholesterol > 9 mmol								
Social class I+II	6.8	219	5.0	60	3.8	26	1.9	53
III	5.3	357	4.2	167	2.4	126	9.1	175
IV+V	7.8	321	4.1	243	7.6	119	8.9	315
Per cent in group B (chol > 9)	6.6	897	4.3	470	4.8	271	8.3	543
Total* in county with chol ≤ 9		14849		7804		4283		2951
Total* in county with chol > 9		897		470		271		543
% with chol > 9 mmol/l		5.7		5.7		6.0		15.5

*Total refers to total in this table, complete data on class, cholesterol and group ABC

Table 12 Per cent on nitroglycerine by serum cholesterol, social class, and county, men

NITROGLYCERINE:		Oslo		Oppland		Sogn og Fjordane		Finnmark	
Cholesterol ≤ 9 mmol/l		%	n	%	n	%	n	%	n
Social class	I+II	0.4	4383	0.6	1045	0.4	562	0.5	380
	III	0.8	6068	0.8	3217	0.9	1675	1.7	869
	IV+V	1.2	4398	1.2	3542	1.1	2046	2.6	1702
Total with Chol ≤ 9 mmol/l			14849		7804		4283		2951
Using nitroglycerine		0.8	122	1.0	77	0.9	40	2.1	61
Cholesterol > 9mmol/l									
Social class	I+II	3.3	219	-	60	-	26	1.9	53
	III	2.3	357	2.4	167	2.5	126	1.7	175
	IV+V	2.2	321	2.6	243	3.6	119	2.6	315
Total* with Chol > 9mmol/l			897		470		271		543
Using nitroglycerine		2.5	22	2.1	10	2.6	7	2.2	12
Per cent with chol > 9 mmol/l		5.7		5.7		6.0		15.5	

* Total refers to total in this table, complete data on class, cholesterol, and group ABC

Table 13 Per cent on blood pressure medication by systolic blood pressure, social class and county, men

BLOOD PRESSURE MEDICATION:		Oslo		Oppland		Sogn og Fjordane		Finnmark	
Systolic blood pressure ≤ 160 mm		%	n	%	n	%	n	%	n
Social class	I+II	2.0	4349	3.2	1028	3.8	560	2.0	402
	III	2.0	5987	2.6	3111	2.8	1655	1.8	964
	IV+V	1.8	4361	3.3	3465	3.4	2005	1.8	1834
Total* with sys BP ≤ 160 mm			14697		7604		4220		3200
Total* on treatment BP ≤ 160 mm		1.9	282	3.0	226	3.2	136	1.8	58
Systolic blood pressure > 160 mm									
Social class	I+II	15.7	255	12.2	74	10.7	28	20.0	30
	III	14.3	440	13.2	266	13.2	144	16.9	89
	IV+V	13.0	354	11.1	315	6.2	161	14.1	184
Total* with sys BP >160 mm			1049		655		333		303
Total* on BP treatment > 160 mm		14.2	149	12.1	79	9.6	33	15.5	47
Per cent with sys BP > 160 mm			6.7		7.9		7.3		8.6

Missing = 12629

* Total refers to total in this table, complete data on class, blood pressure and group ABC.

Table 14 Number invited in each education-income combination, men

Income (x1000)	Highest completed education, in years. Missing	7-9	10	11-12	13-16	17+	n=
0[1]	226	873	98	95	48	33	1373
1-39	59	1543	188	142	49	18	1999
40-79	73	2219	285	189	81	16	2863
80-119	62	4016	573	403	93	33	5180
120-159	103	8622	1628	1155	260	35	11803
160-199	67	5391	1978	1826	826	87	10175
200-279	58	1930	1209	1812	1829	801	7639
280+	33	348	295	703	920	1359	3658
n=	681	24942	6254	6325	4106	2382	44690

[1] Missing incomes are grouped with 0 income

Figure 3 Attendance (%) by education and selected incomes, men

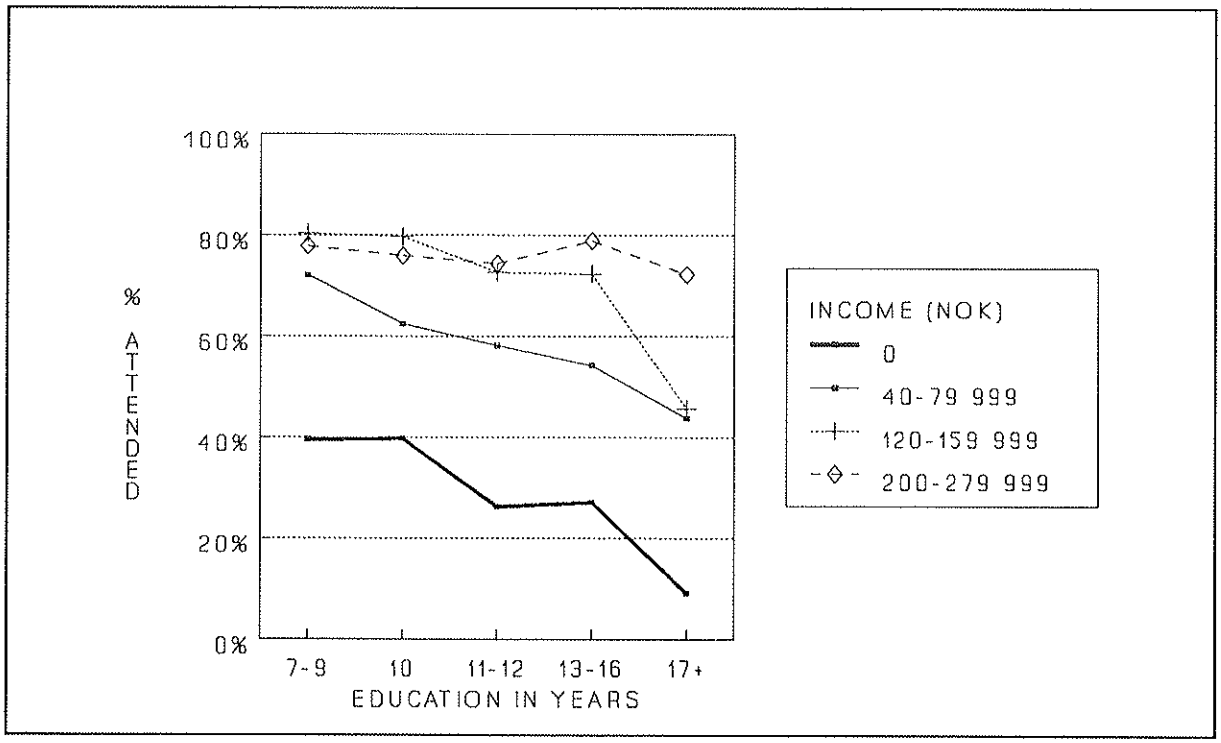

Table 15 Number attending, based on blood pressure measurement, in each education-income combination, men

	Highest completed education, in years.					
Income (x1000)	7-9	10	11-12	13-16	17+	n=
0	346	39	25	13	3	426
1-39	988	113	68	17	8	1194
40-79	1599	178	110	44	7	1938
80-119	3027	430	266	57	11	3791
120-159	6929	1298	838	188	16	9269
160-199	4419	1534	1371	672	56	8052
200-279	1503	918	1348	1443	578	5790
280+	267	187	419	655	897	2425
n=	19078	4697	4445	3089	1576	32885

Minor deviations in cell frequencies may occur for other risk factors.

Figure 4 Income distribution (% in income group) by education, men

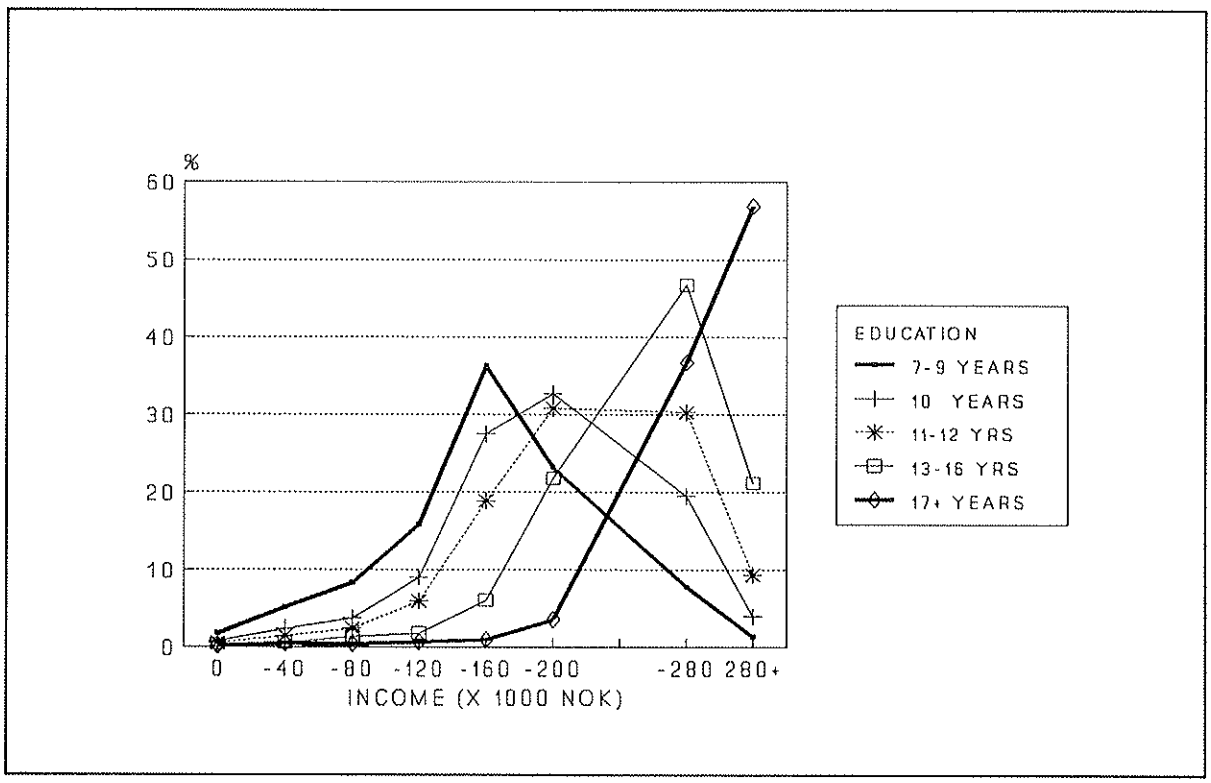

Table 16 Number invited in each education-income group, women

Income (x1000)	Highest completed education, in years. Missing	7-9	10	11-12	13+	n=
0[1]	104	4728	566	168	60	5626
1-39	44	3985	444	157	80	4710
40-79	25	2600	358	117	64	3164
80-119	17	1539	273	134	117	2080
120-159	14	825	278	114	109	1340
160-199	2	148	81	79	170	480
200+	3	18	12	22	85	140
n=	209	13843	2012	791	685	17540

[1] Missing incomes are grouped with 0 income

Figure 5 Attendance (%) by education and selected incomes, women

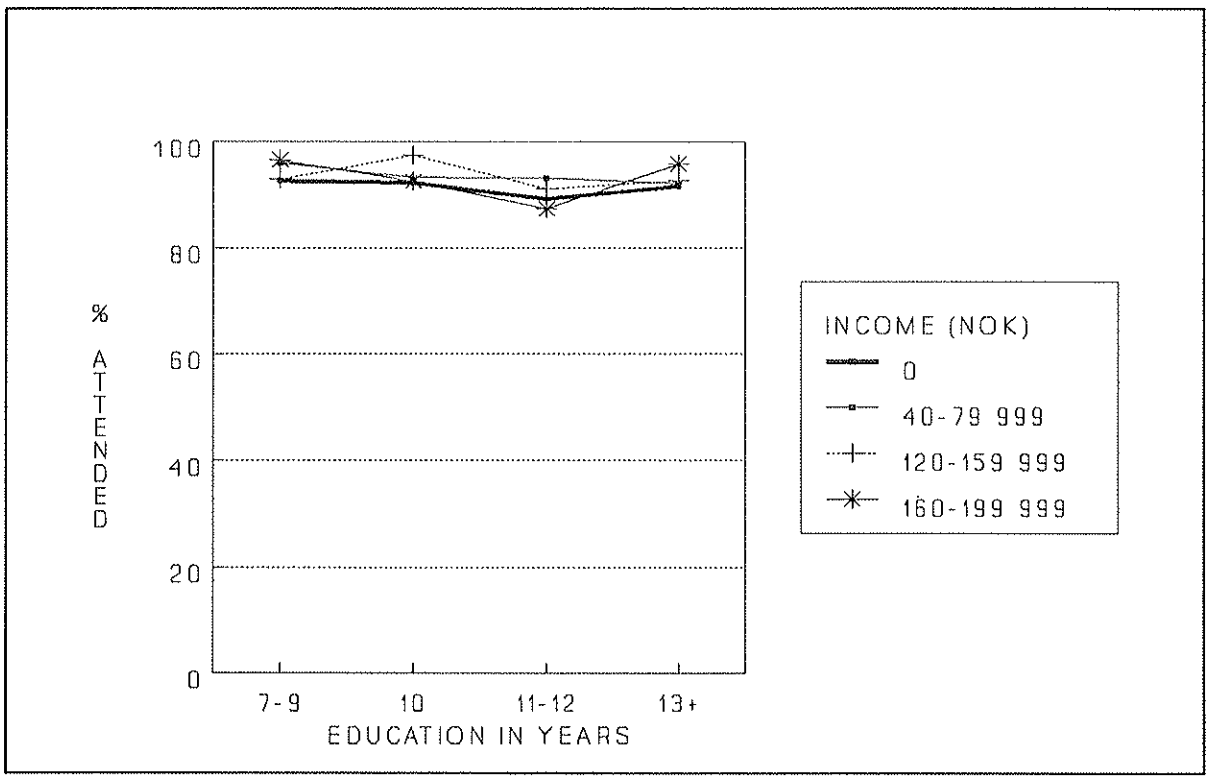

Table 17 Number attending, based on blood pressure measurement, in each education-income combination, women

	Highest completed education, in years.					
Income[1] (x1000)	7-9	10	11-12	13-16	17+	n=
0	4386	523	150	54	1	5114
1-39	3757	428	151	70	3	4409
40-79	2496	337	109	57	3	3002
80-119	1452	256	125	98	6	1937
120-159	760	276	106	104	2	1248
160-199	137	70	67	158	2	434
200-279	12	9	16	59	13	109
280+	4	1	4	3	5	17
n=	13004	1900	728	603	35	16270

Minor deviations in cell frequencies may occur for other risk factors.

Figure 6 Income distribution (% in income group) by education, women

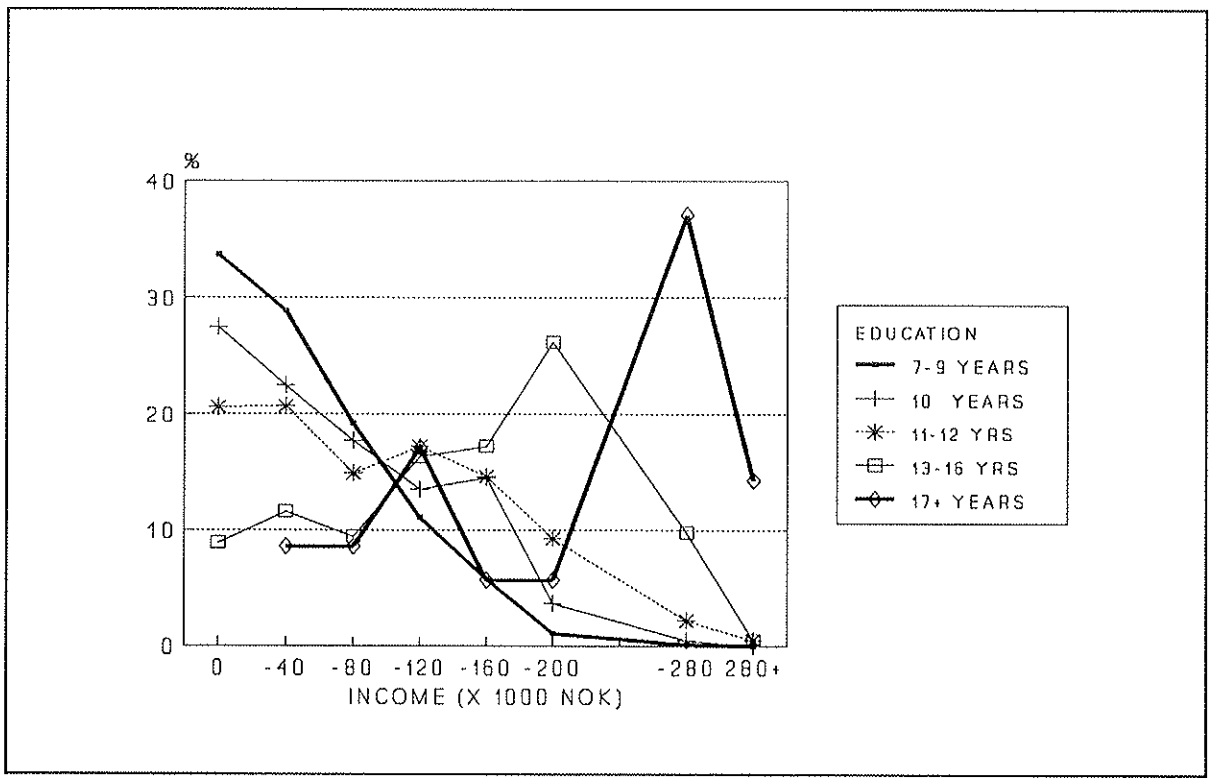

Table 18 Per cent attending and number invited by occupation and county, men

Code	Rank	Occupation	The counties %	The counties n invited	Oslo %	Oslo n invited	Total material %	Total material n attended	Total material n invited
Total population			90.1	18841	62.6	25849	74.2	33173	44690
202310	1	Physician	66.0	47	23.2	151	33.3	66	198
262110	2	Seamen	54.7	170	17.1	105	40.4	111	275
101010	3	No occupation	68.5	705	21.4	1046	40.4	636	1751
292110	4	Hotel/restaurant	69.7	109	40.9	328	43.7	210	437
262010	5	Ship officer	59.8	204	34.5	145	49.3	166	349
202925	6	Editor, journalist	83.3	30	48.6	185	53.5	118	215
202810	7	Jurists	* 8/9	9	52.9	153	54.9	89	162
202630	8	Students	74.3	35	42.3	52	55.2	48	87
202622	9	Univ. lecturer	* 2/3	3	56.9	160	57.1	92	163
301010	10	Military	72.2	180	51.4	385	58.1	304	565
202910	11	Artistic	93.2	74	53.1	292	61.2	224	366
202710	12	Religious	*21/21	21	47.4	57	61.5	49	78
262710	13	Post/telecommunication	89.4	198	44.7	320	61.7	319	518
292010	14	Surveillance	92.1	126	57.0	477	64.3	383	603
282523	15	Production, plastic etc.	88.4	69	56.5	200	64.7	168	269
282810	16	Dock work	91.8	390	57.3	1084	66.4	962	1474
292929	17	Personal service	88.5	104	57.8	223	67.6	218	327
292310	18	Janitor, cleaning	92.4	223	56.1	451	68.1	453	674
212110	19	Business administration	91.2	421	63.0	1749	68.5	1470	2209
204026	20	Staff service	84.3	51	65.9	246	69.0	170	297
202410	21	Nurse	87.9	33	60.0	65	69.4	61	98
212129	22	Other leader	91.4	58	66.6	422	69.6	331	480
212024	23	Local administration	83.3	48	67.4	239	70.0	201	287
272410	24	Fine mechanic	91.2	34	67.4	233	70.4	189	267
232210	25	Sales, personal	90.2	92	66.7	483	70.4	400	575
202021	26	Architect	*10/14	14	72.3	130	72.2	104	144
262425	27	Driver	92.4	1094	59.1	1557	72.8	1893	2651
232110	28	Real estate	78.1	32	72.2	270	72.9	217	302
222910	29	Office work NEC	93.7	474	68.5	1958	73.4	1764	2432
282022	30	Repro/graphic industry	96.8	63	71.0	587	73.5	484	650
202322	31	Dentist	93.0	43	60.7	61	74.0	79	104
272821	32	Building painter	91.3	184	63.3	294	74.1	347	478
232323	33	Cashier, shop	94.5	275	48.4	401	74.6	494	676
272510	34	Iron/metal work	91.2	1332	65.2	2134	75.2	2578	3466
232310	35	Sales, from office	87.5	96	73.9	721	75.5	615	817
202510	36	Health professional	*23/24	24	70.1	87	75.7	83	111
202022	37	Chief engineer	92.0	100	72.6	460	76.1	420	560
282310	38	Chemical processing	88.9	180	53.7	95	76.7	210	275
272525	39	Plumber	95.3	150	66.0	250	77.0	307	400
232010	40	Sales, whole/retail	93.4	349	61.5	364	77.1	545	713
262510	41	Conductor etc.	98.2	110	71.0	348	77.5	355	458
204021	42	Accountant	92.2	51	74.7	182	78.5	181	233
212123	43	Adm. secretary	93.2	44	76.6	265	79.0	244	309
272610	44	Electrician	93.8	632	69.9	949	79.4	1241	1581
202623	45	Teacher	91.9	259	65.8	234	79.5	391	493
272010	46	Textile industry	93.1	160	66.3	163	79.6	249	323
272910	47	Construction else	88.8	855	64.6	523	79.6	1080	1378
232322	48	Shop keeper	94.9	197	70.3	323	79.6	408	520
202023	49	Engineer	92.7	386	76.9	1425	80.3	1454	1811
222010	50	Book keeping	95.4	130	76.6	428	81.0	453	558

* Number attended /number invited

Table 18 continued

Code	Rank	Occupation	The counties %	The counties n invited	Oslo %	Oslo n invited	Total material %	Total material n attended	Total material n invited
212010	51	Central administration	98.6	69	71.9	121	81.6	153	190
202110	52	Science, natural	91.6	83	71.1	76	81.8	129	159
282210	53	Food processing	91.1	594	65.4	286	82.7	712	880
282710	54	Machine operator	92.9	692	63.4	352	83.0	843	1044
272724	55	Carpenter	92.5	1406	66.6	776	83.3	1794	2182
272310	56	Smelterwork	93.9	346	63.8	174	83.9	430	520
262610	57	Traffic control	97.1	68	74.4	86	84.4	130	154
242110	58	Farm worker	88.1	545	62.5	88	84.5	526	633
242310	59	Fishing	84.8	857	* 2/3	3	84.8	709	860
202624	60	Vocational teacher	93.2	324	75.6	271	85.2	504	595
242410	61	Logger	90.0	180	*16/23	23	87.7	176	203
252929	62	Mine/quarry	91.9	296	* 7/9	9	89.4	269	312
272710	63	Wood work	94.3	314	76.8	69	91.1	348	383
242028	64	Reindeer herder	92.0	100	0	0	92.0	92	100
242021	65	Farming etc.	96.0	2299	72.9	48	95.6	2207	2347

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between Groups	64	624.2	9.75	54.9	<0.001
Within Groups	44625	7924.8	0.18		

Table 19 Per cent attenders and numbers invited by occupation, women

Code	Rank	Occupation grouped	Per cent	n attended	n invited
Total population:			93.6	16418	17540
101010	1	No occupation	66.3	1200	1809
202910	2	Artists, students	81.4	35	43
202421	3	Nurse	88.1	177	201
292110	4	Hotel/restaurant	89.0	632	710
242310	5	Industry, manual work	91.7	232	253
282210	6	Food processing etc.	91.8	267	291
202429	7	Aux. nurse	92.0	218	237
282621	8	Packing	92.3	84	91
292929	9	Other service	93.8	121	129
292310	10	Cleaning etc.	94.3	826	876
262710	11	Post and telecomm.	94.8	253	267
202623	12	Teacher	95.0	415	437
222010	13	Clerks	95.0	699	736
201010	14	Technical/Science	96.1	125	128
272010	15	Textile industry	96.3	260	270
212010	16	Administration	96.5	137	142
242110	17	Farming	96.7	2454	2537
232323	18	Cashier, shop	96.8	811	838
292130	19	House work	99.1	7474	7545

$X^2 = 2739.0$, d.f.=18, $p < .0000$, Expected frequency < 5 in 1 of 38 cells.

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between Groups	18	164.0	9.11	180.1	<0.001
Within Groups	17521	886.2	0.05		

Figure 7 Mean systolic blood pressure by education and county, adjusted for age. Bar diagram shows blood pressure by education, adjusted for age and county, men

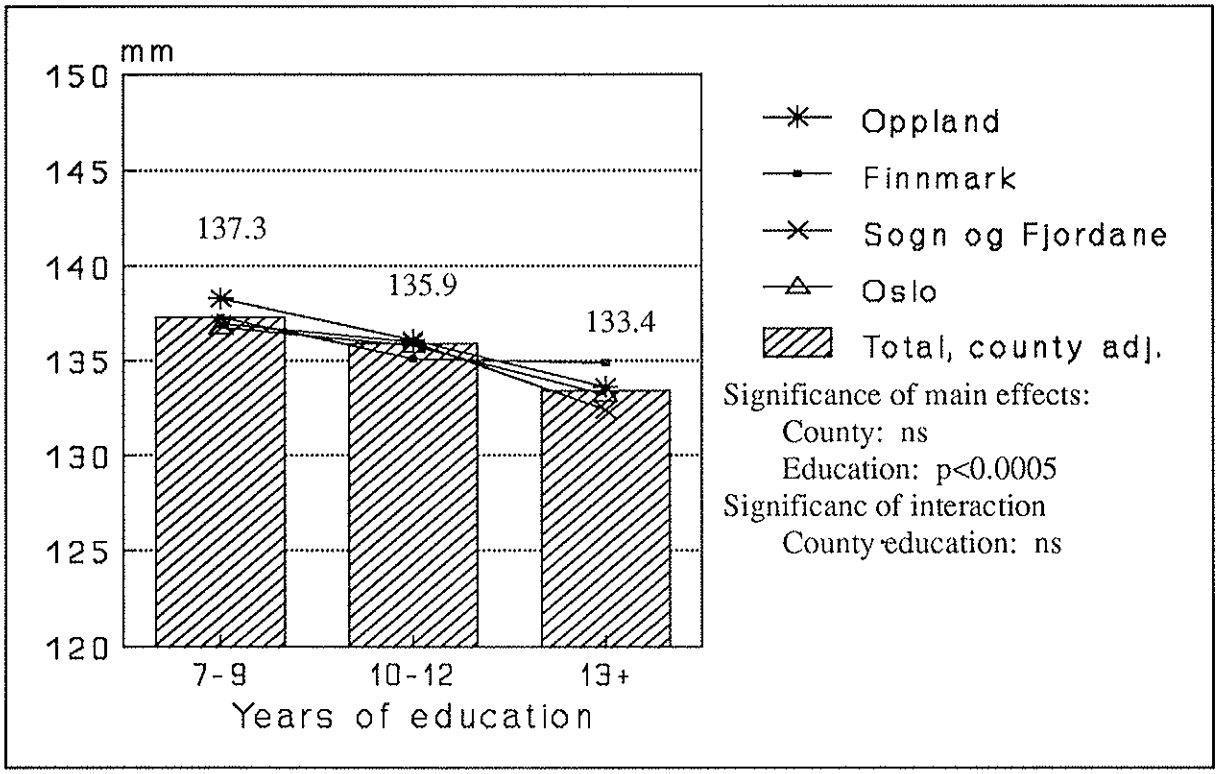

Figure 8 Mean systolic blood pressure by education and county, adjusted for age. Bar diagram shows blood pressure by education, adjusted for age and county, women

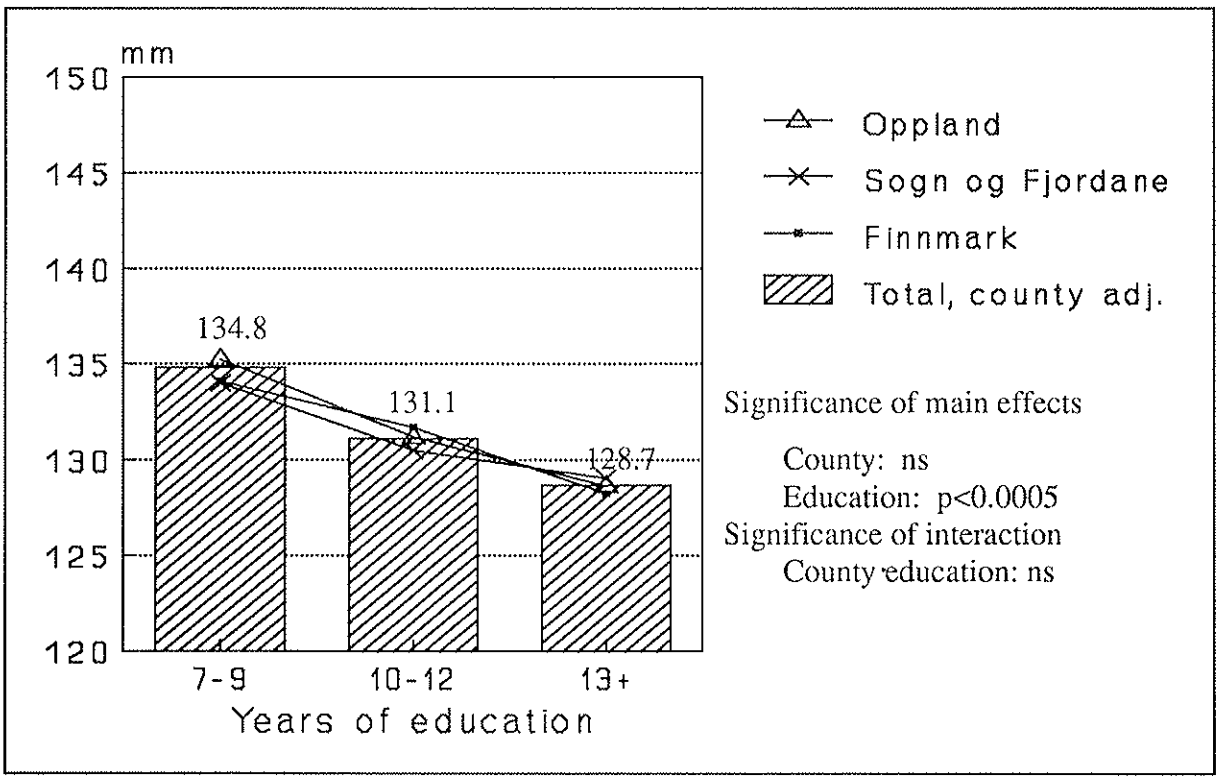

Figure 9 Mean cholesterol by education and county, adjusted for age. Bar diagram shows cholesterol by education, adjusted for age and county, men

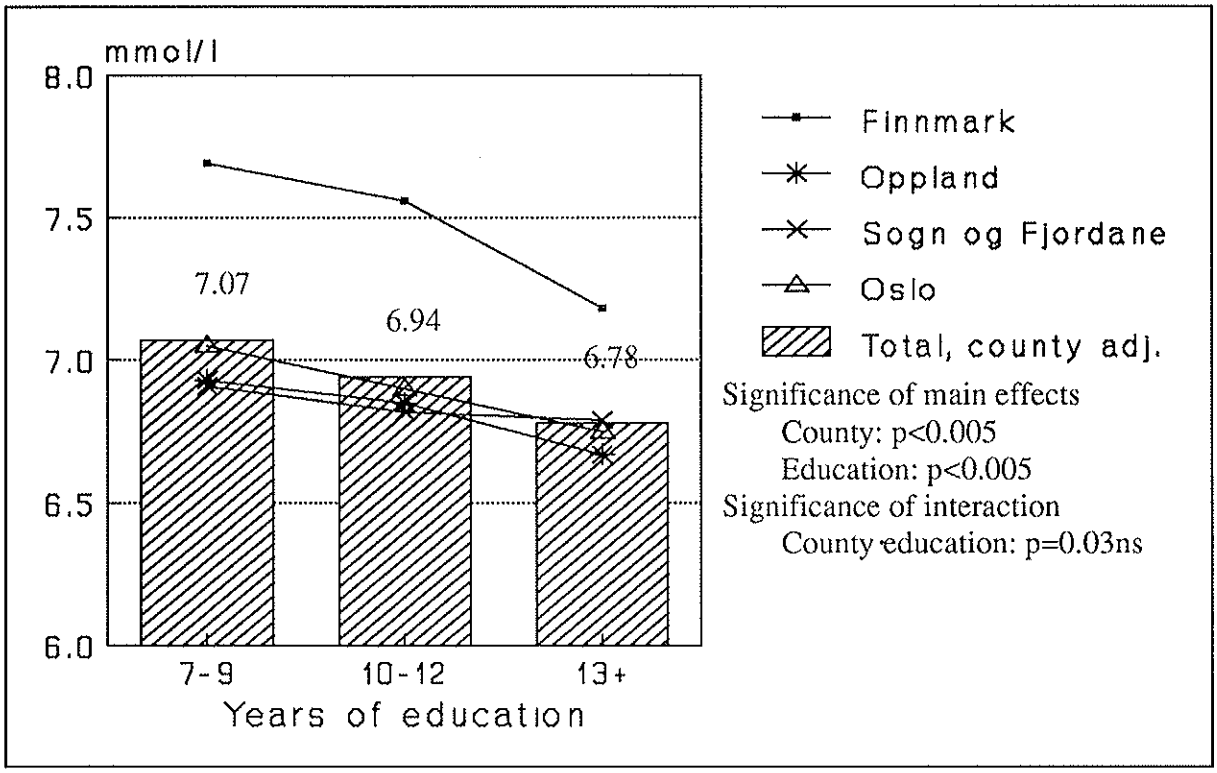

Figure 10 Mean cholesterol by education and county, adjusted for age. Bar diagram shows mean cholesterol by education, adjusted for age and county, women

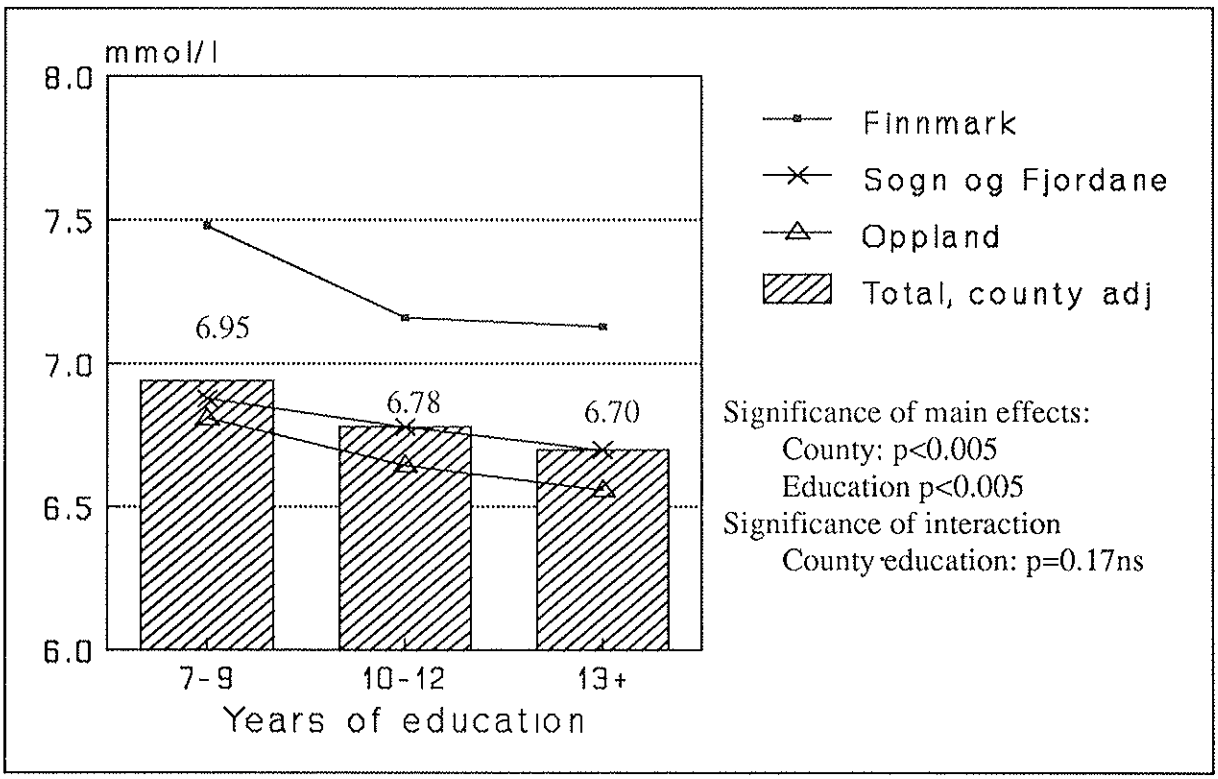

Figure 11 Cigarette smoking (per cent) by education and county, adjusted for age. Bar diagram shows smoking by education, adjusted for age and county, men

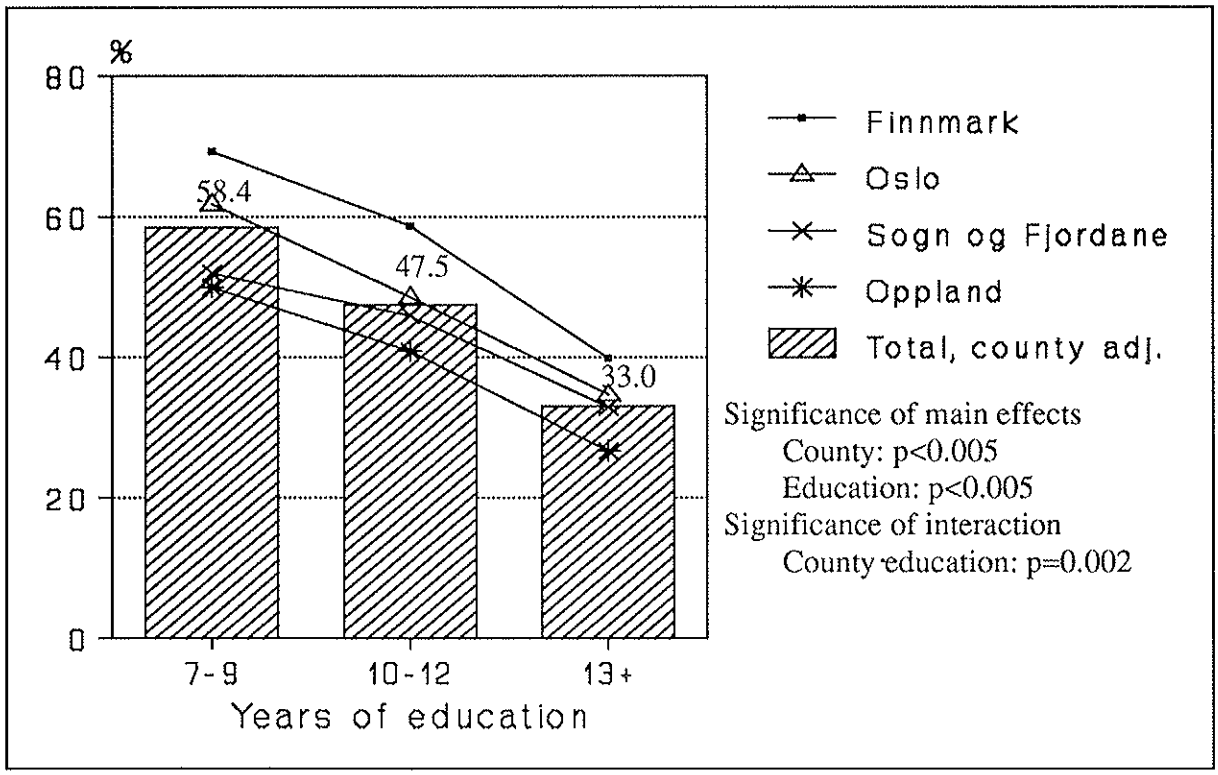

Figure 12 Cigarette smoking (per cent) by education and county, adjusted for age. Bar diagram shows smoking by education, adjusted for age and county, women

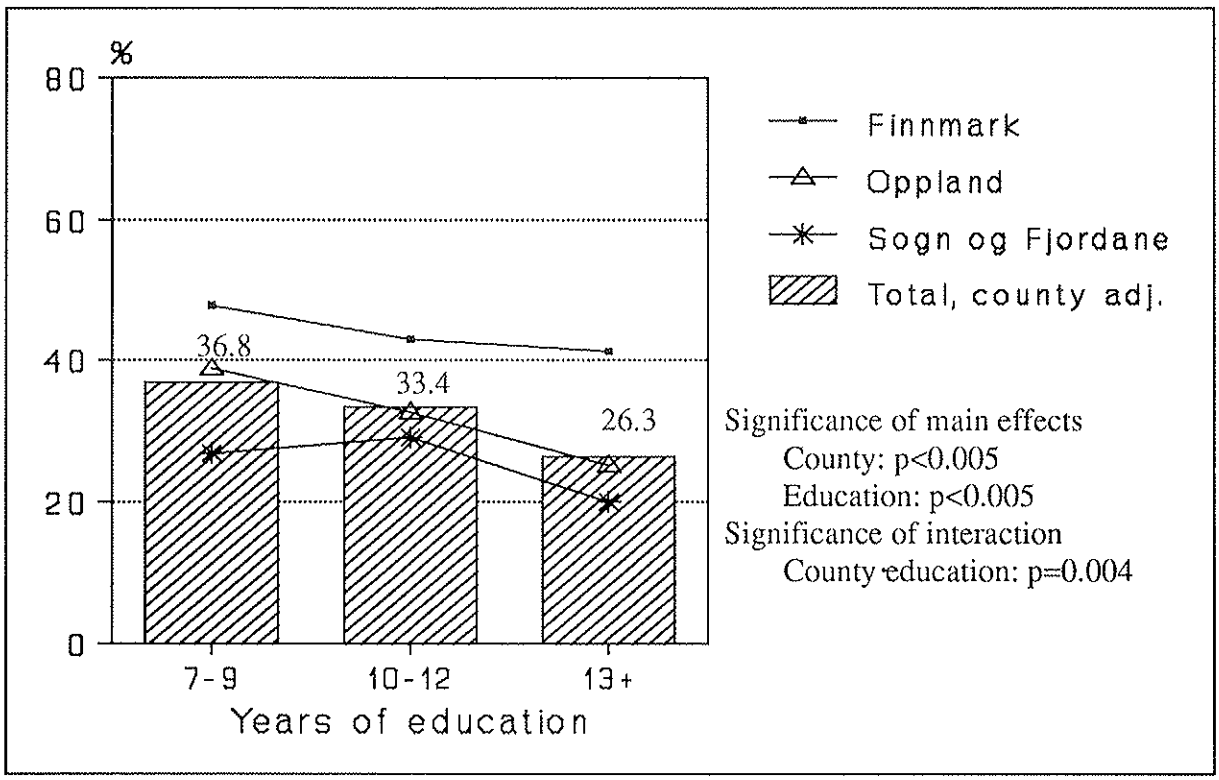

Figure 13 Mean MI risk score by education and county, adjusted for age. Bar diagram shows MI risk score by education, adjusted for age and county, men

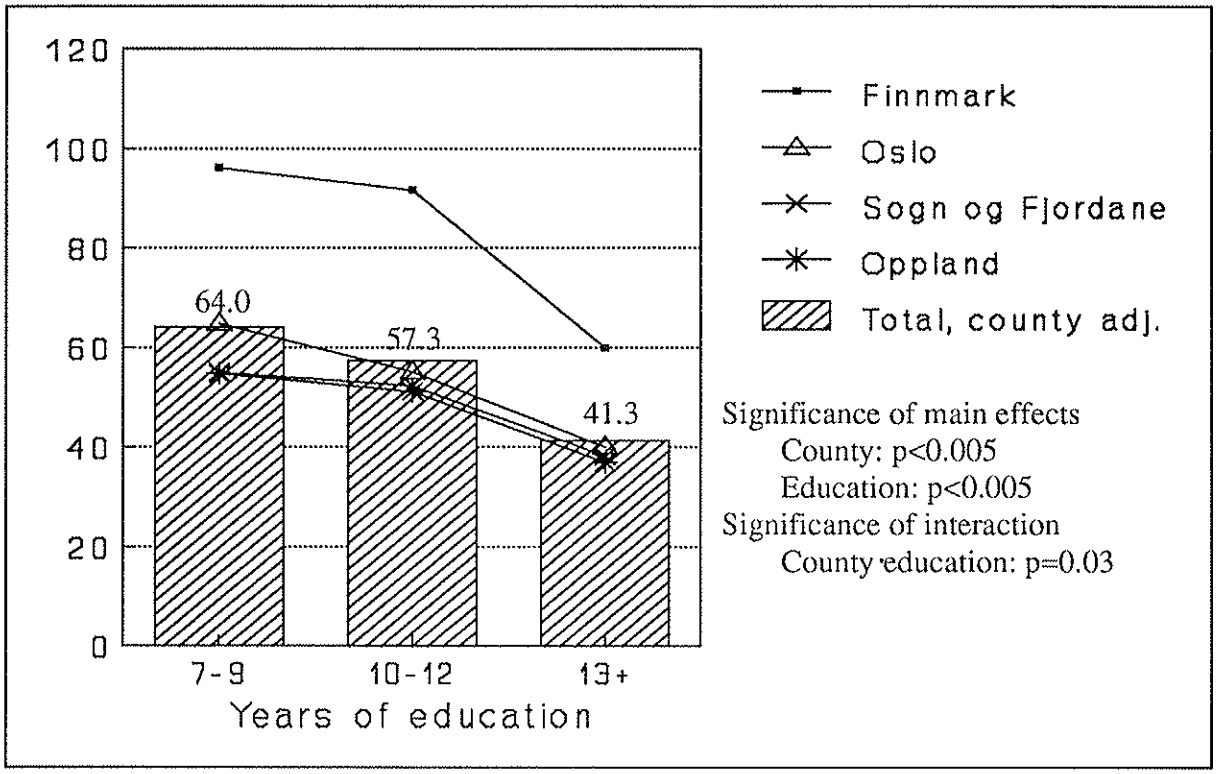

Figure 14 Mean MI risk score by education and county, adjusted for age. Bar diagram shows MI risk score by education, adjusted for age and county, women

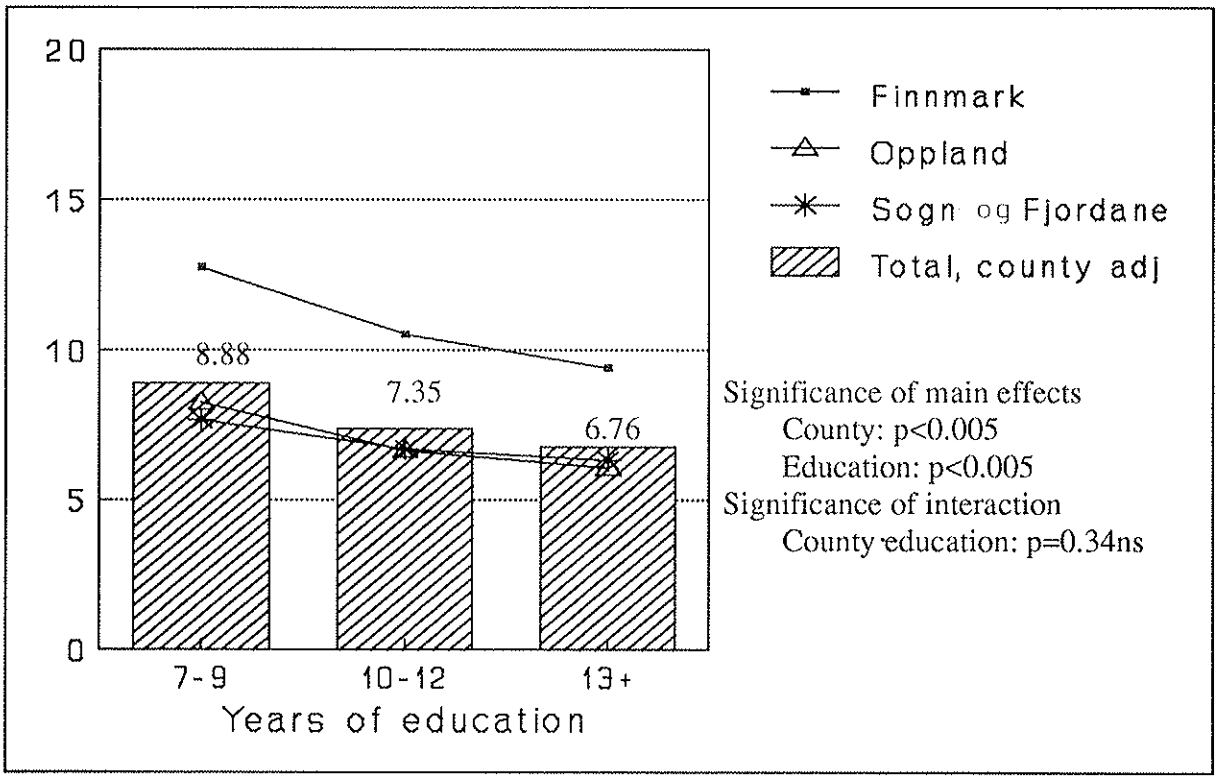

Figure 15 Mean systolic blood pressure by social class and county, adjusted for age. Bar diagram shows blood pressure by social class adjusted for age and county, men

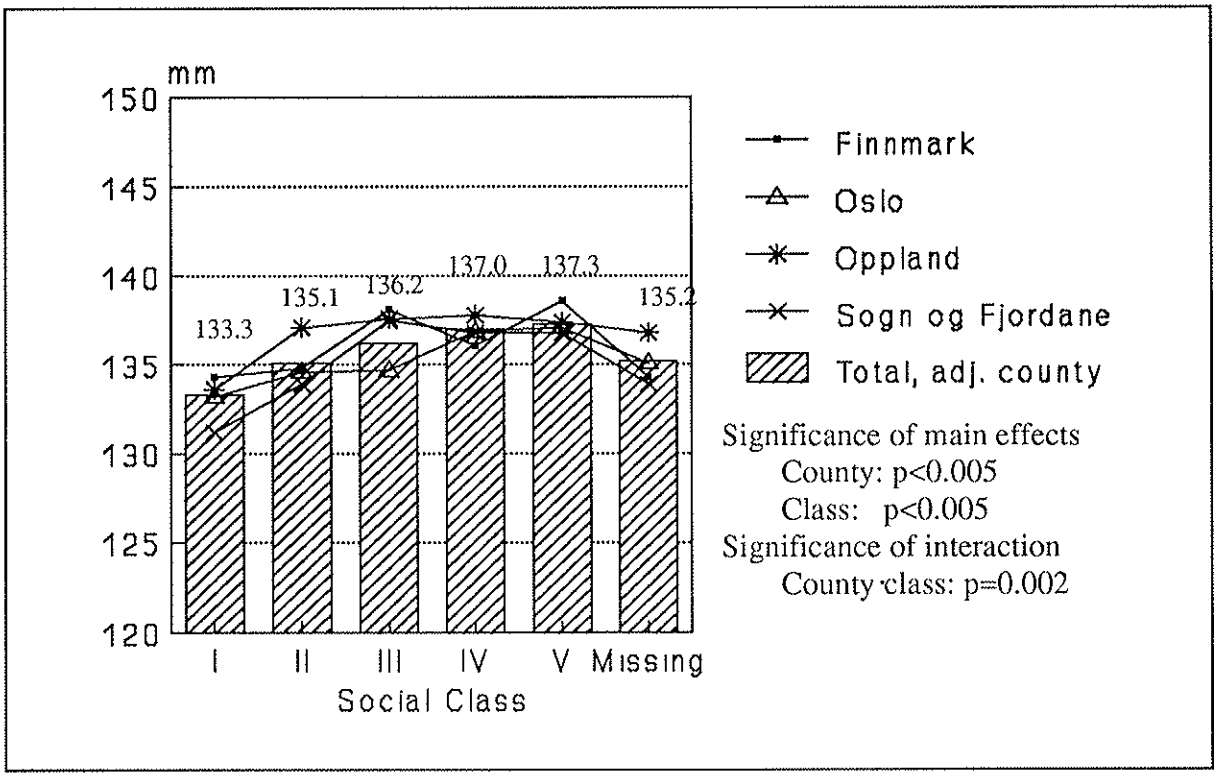

Figure 16 Mean systolic blood pressure by social class and county, adjusted for age. Bar diagram shows blood pressure by class, adjusted for age and county, women

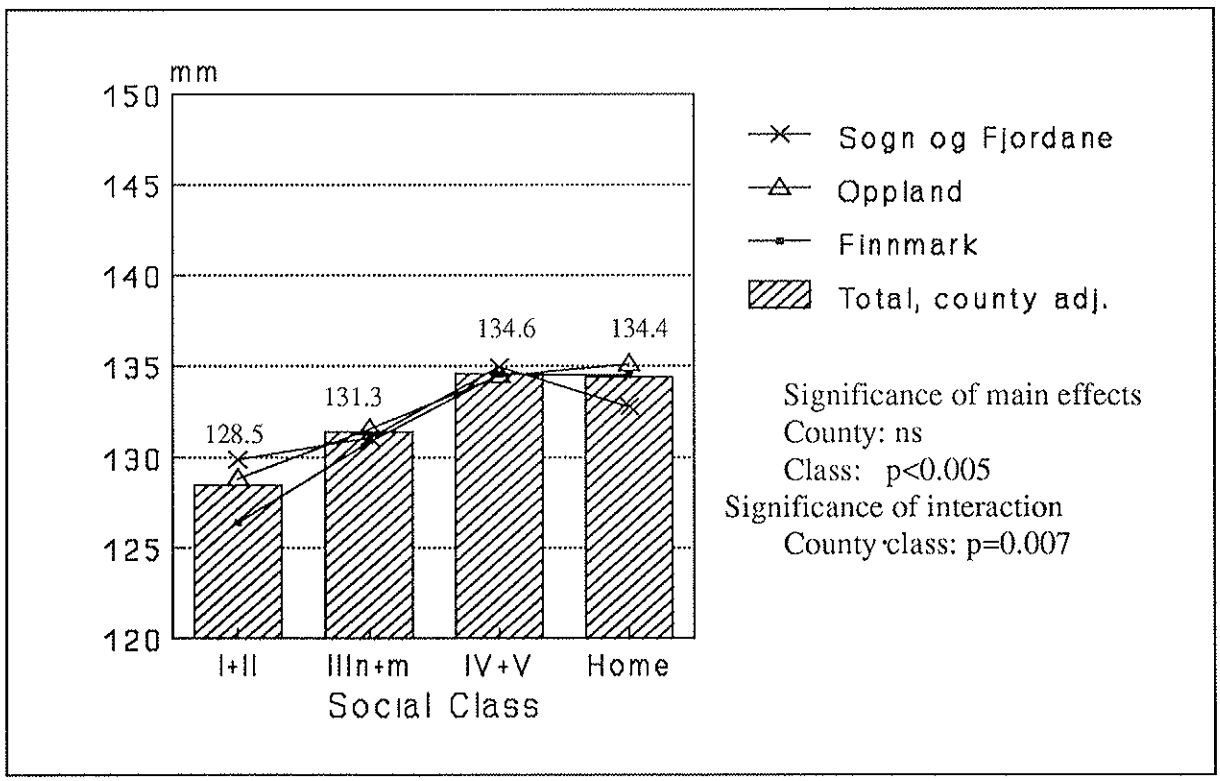

Figure 17 Mean cholesterol by social class and county, adjusted for age. Bar diagram shows cholesterol by social class adjusted for age and county, men

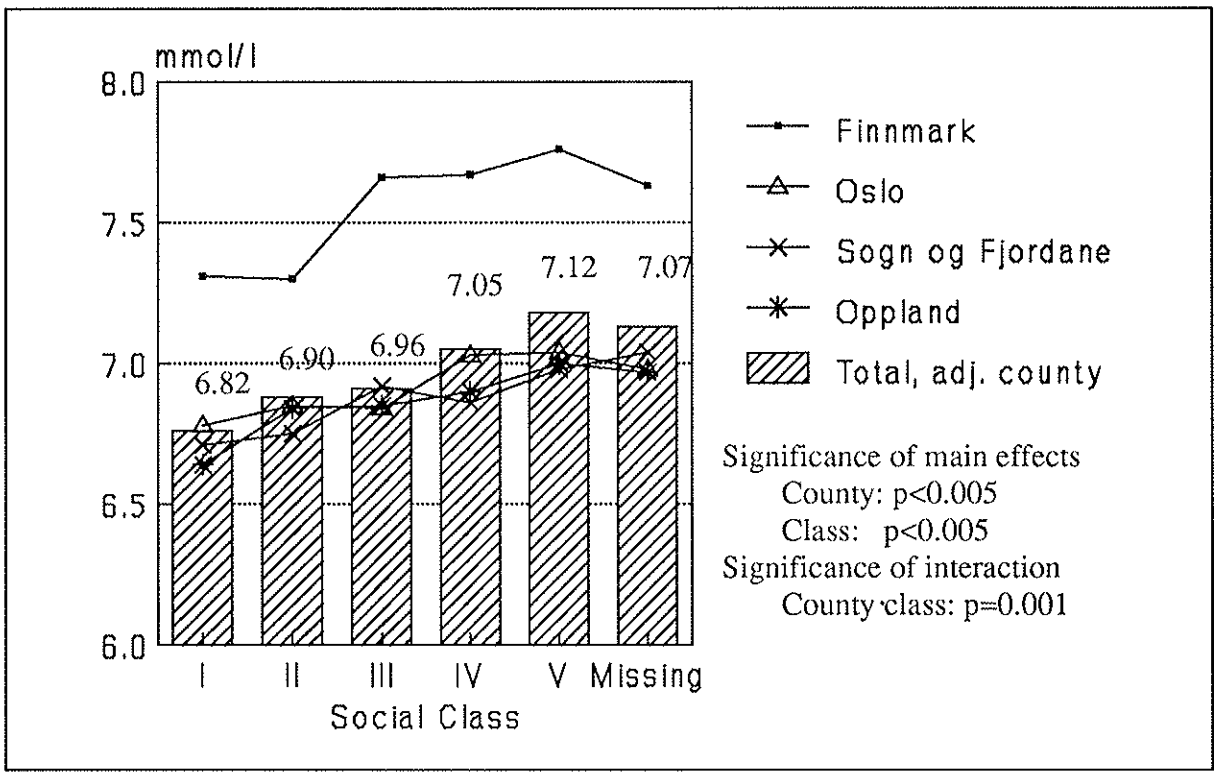

Figure 18 Mean cholesterol by social class and county, adjusted for age. Bar diagram shows mean cholesterol by social class, adjusted for age and county, women

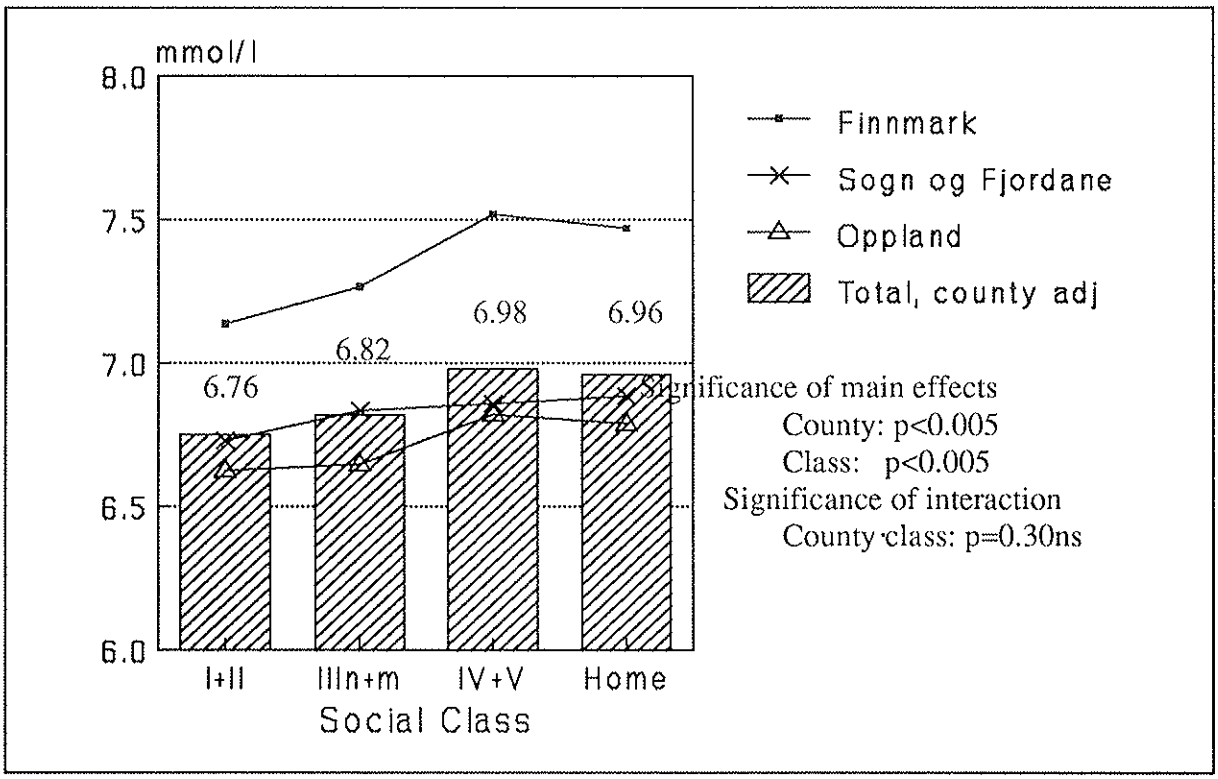

Figure 19 Cigarette smoking (per cent) by social class and county, adjusted for age. Bar diagram shows smoking by class, adjusted for age and county, men

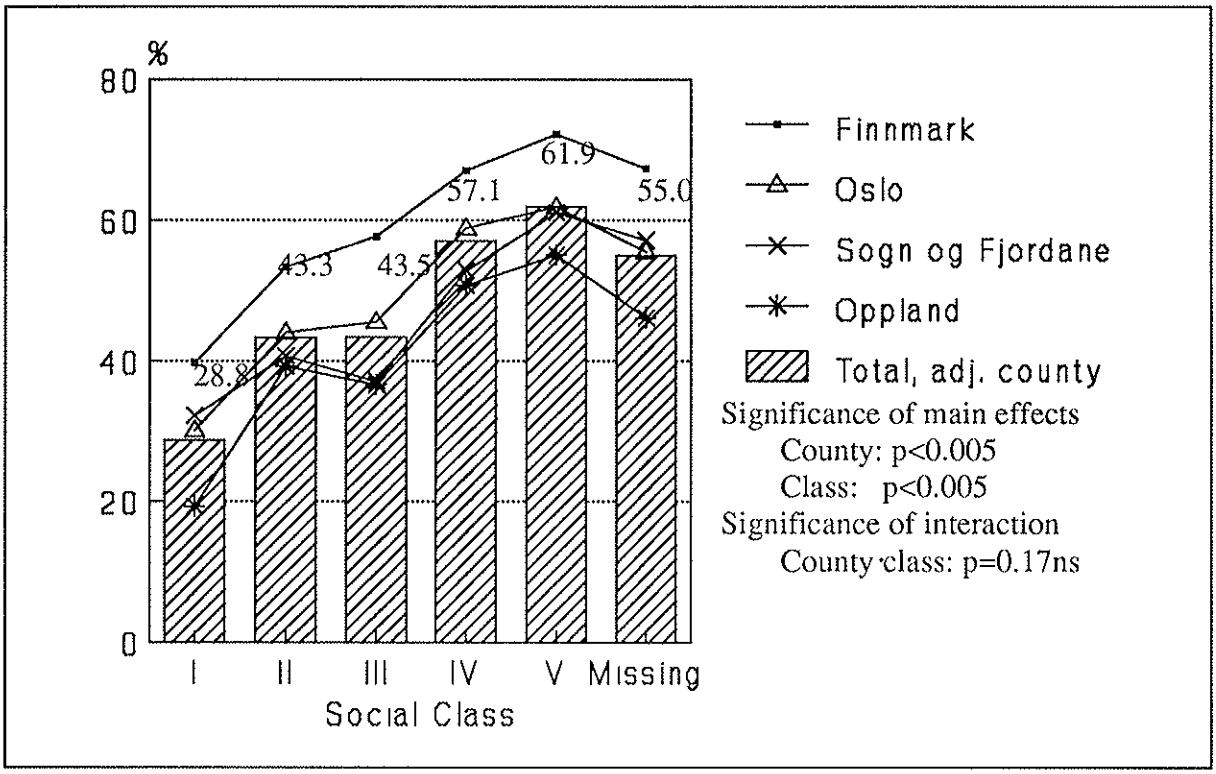

Figure 20 Cigarette smoking (per cent) by social class and county, adjusted for age. Bar diagram shows smoking by class, adjusted for age and county, women

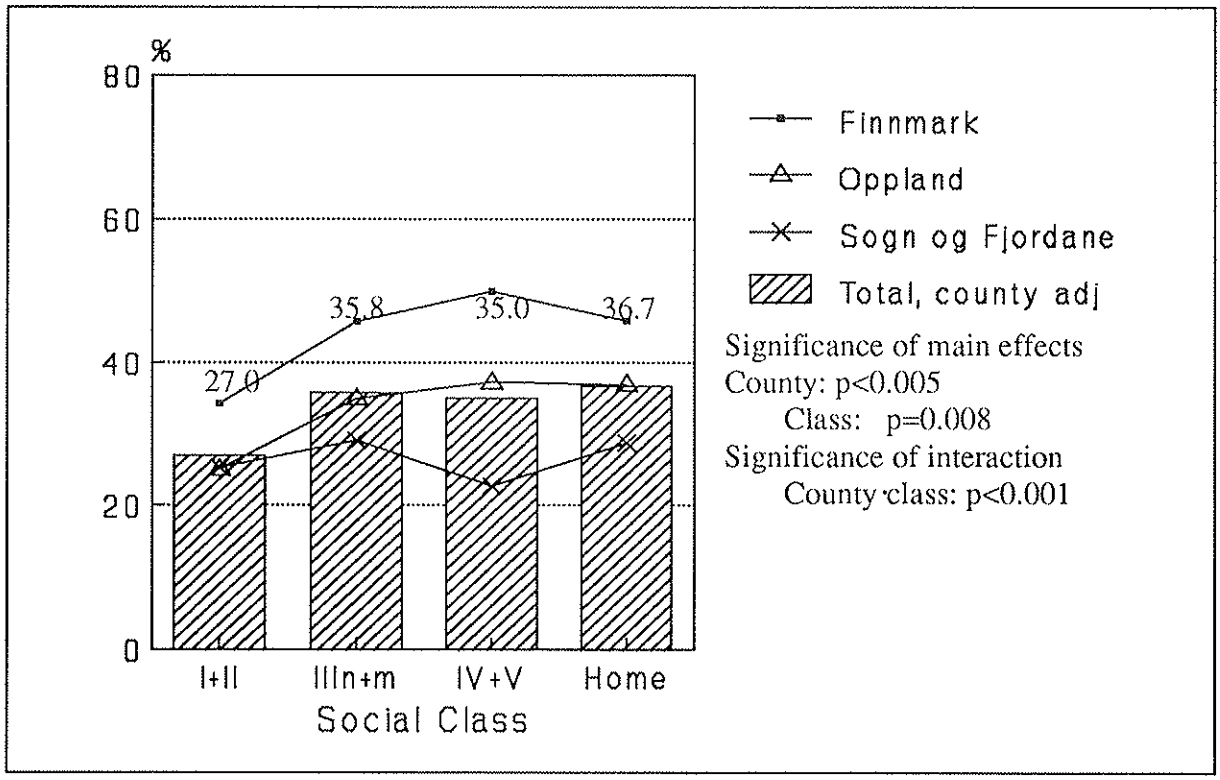

Figure 21 Mean MI risk score by social class and county, adjusted for age. Bar diagram shows MI risk score by class, adjusted for age and county, men

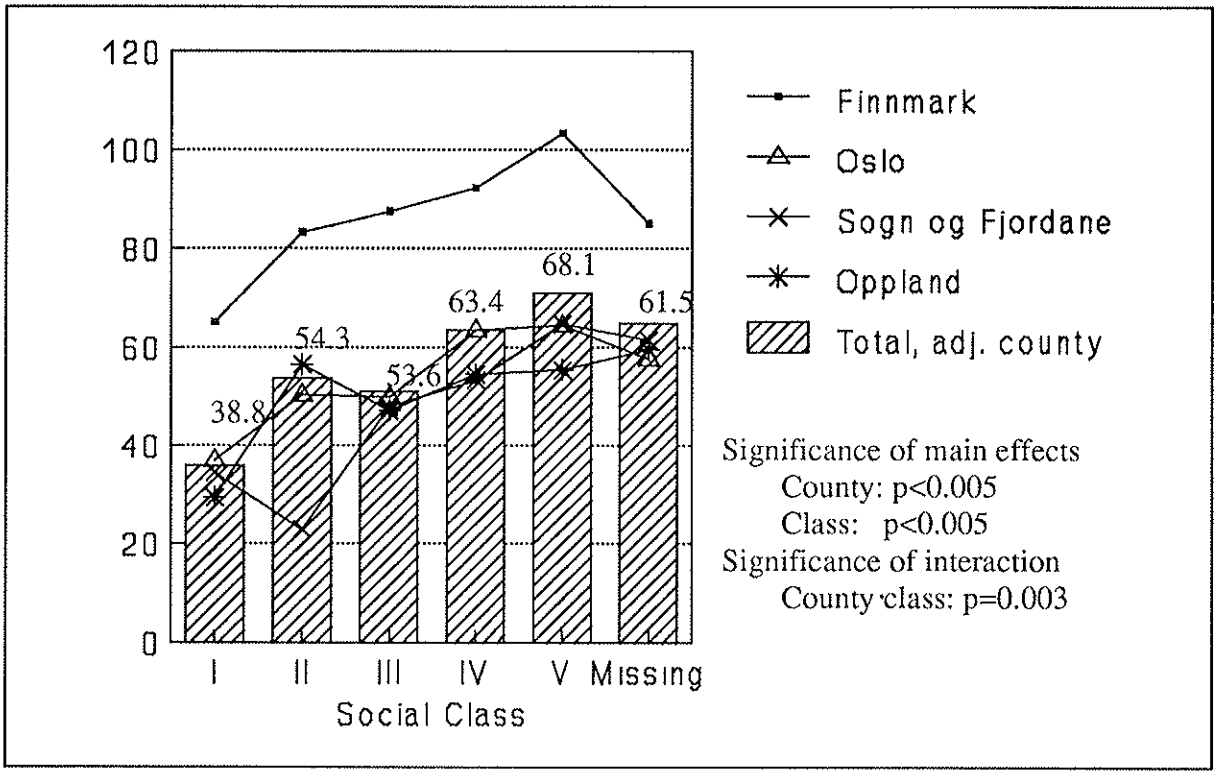

Figure 22 Mean MI risk score by social class and county, adjusted for age. Bar diagram shows mean MI risk score by class, adjusted for age and county, women

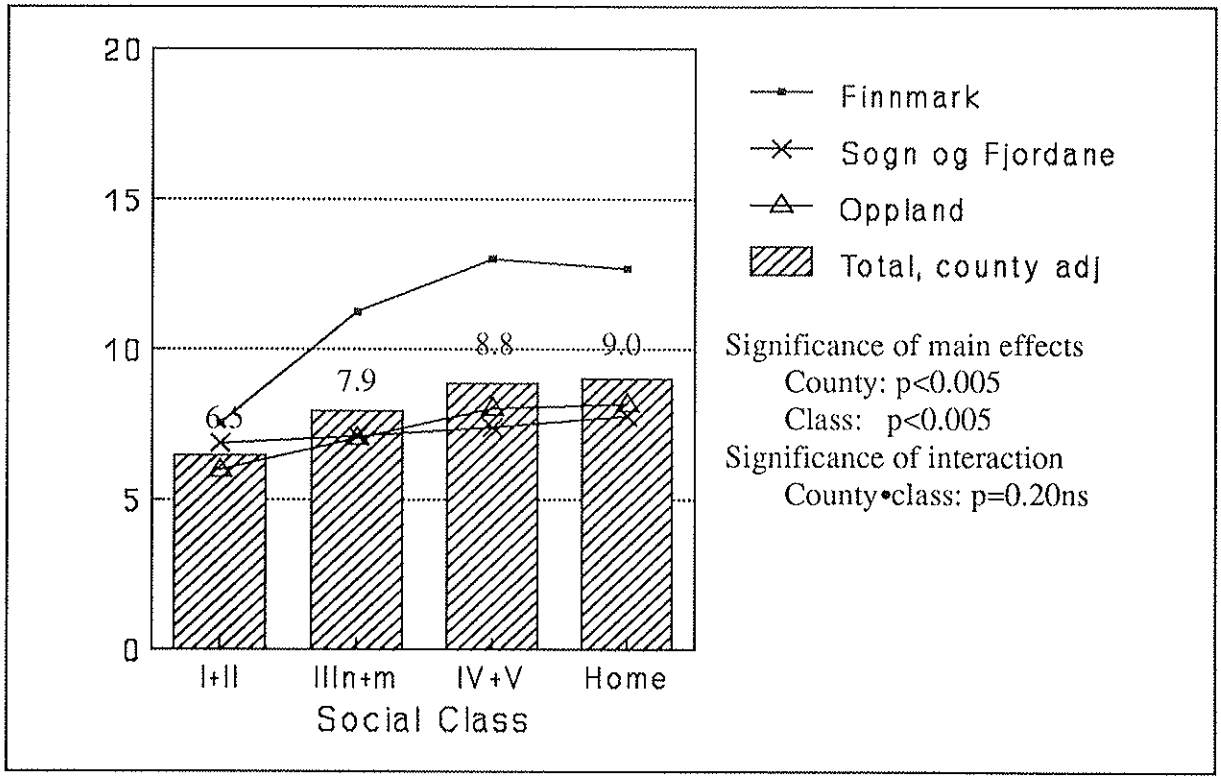

Table 20 Mean systolic blood pressure (mm) by education and income, men

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	137.7	135.4	137.8	134.8	141.0	137.5	136.8	426
1-39	139.1	136.7	138.6	134.0	137.4	138.7	138.0	1194
40-79	139.1	136.7	136.5	129.9	135.7	138.5	137.9	1938
80-119	137.7	136.5	136.3	135.7	131.0	137.4	136.8	3791
120-159	137.7	136.3	136.0	132.6	121.1	137.2	136.6	9269
160-199	136.5	135.6	136.1	134.2	135.7	136.0	136.0	8052
200-279	136.2	134.8	135.5	133.7	132.4	134.8	135.8	5790
280+	134.8	136.2	136.4	132.9	133.7	134.3	136.3	2425
Total Age[1]	137.4	135.8	136.0	133.6	133.2	136.4		
Tot. Income[3]	136.9	135.9	136.5	134.7	135.0		136.4	
n=	19078	4697	4445	3089	1576			32885

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 23 Mean systolic blood pressure (mm) by education and selected incomes, men

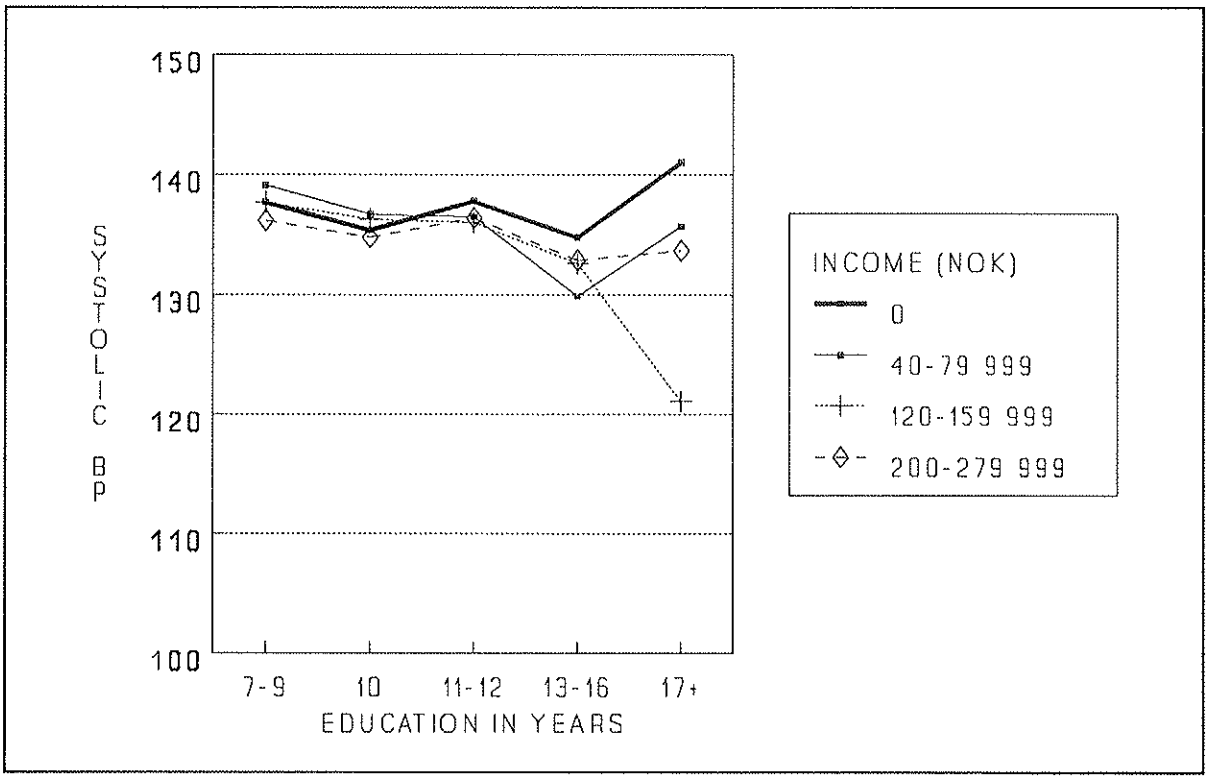

Table 21 Systolic blood pressure, linear regression, men

Descriptive Statistics:

	Mean	S.D	Label
Systolic BP	135.64	15.06	Systolic BP (mm) (< 185 mm)
Age	44.71	2.87	Age at screening (40-49 years)
BMI	2.49	0.29	Body Mass Index (g/cm^2)
Treatment BP	0.03	0.17	Blood pressure medication
Finnmark Yes/No	0.11	0.31	Living in Finnmark
Oslo Yes/No	0.49	0.50	Living in Oslo
Education 10 yrs	0.14	0.35	10 years of education
Education 12 yrs	0.14	0.34	11-12 years of education
Education 13+ yrs	0.14	0.35	13+ years of education
Income	168.13	98.34	Income in 1000 (NOK) (< 500 000)
Income 0	0.01	0.11	No income

N of Cases = 32193

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	10	680901	68090.1
Residual	32182	6624343	205.8
		F = 330.8	Signif F < 0.001

Regression analysis, dependent Variable: Systolic Blood Pressure (mm)

Multiple R	0.305
R Square	0.093
Adjusted R Square	0.093
Standard Error	14.35

Variable	Coeff.	S.E. coeff	Beta	t	p
Age	0.29	0.03	0.055	10.4	<0.001
BMI	11.61	0.28	0.226	42.1	<0.001
Treatment BP	13.38	0.47	0.152	28.4	<0.001
Education 10 yrs	-1.03	0.24	-0.024	-4.3	<0.001
Education 12 yrs	-0.47	0.25	-0.011	-1.9	0.06
Education 13+ yrs+	-2.05	0.27	-0.048	-7.7	<0.001
Finnmark Yes/No	-0.76	0.28	-0.016	-2.8	0.01
Oslo Yes/No	-0.21	0.18	-7.12E-03	-1.2	0.23
Income	-4.66E-03	9.33E-04	-0.030	-5.0	<0.001
Income 0	-0.42	0.73	-3.11E-03	-0.6	0.57
(Constant)	94.76	1.43		66.4	<0.001

Income less than 500 000, BP less than 185 mmHg.

Table 22 Mean systolic blood pressure (mm) by education and income, women

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	137.2	132.9	135.0	131.1	147.3	136.6	136.3	5114
1-39	134.5	132.3	129.3	127.8	156.8	134.0	133.7	4409
40-79	133.5	129.9	130.0	125.2	118.5	132.8	132.6	3002
80-119	132.4	130.8	127.7	127.4	129.2	131.7	131.9	1937
120-159	132.6	128.5	128.6	128.2	135.8	131.0	131.9	1248
160-199	134.8	131.8	128.2	127.6	133.5	130.7	133.8	434
200-279	133.1	125.9	122.6	126.8	121.8	126.2	131.6	109
280+	135*	172*	130*	132*	128*	133.2	135.6	17
Total Age[1]	134.9	131.3	130.0	127.7	129.0	134.0		
Tot. Income[3]	134.7	131.6	130.8	129.9	134.2		134.0	
n=	13004	1900	728	603	35			16270

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.
* 5 or less in cell

Figure 24 Mean systolic blood pressure (mm) by education and selected incomes, women

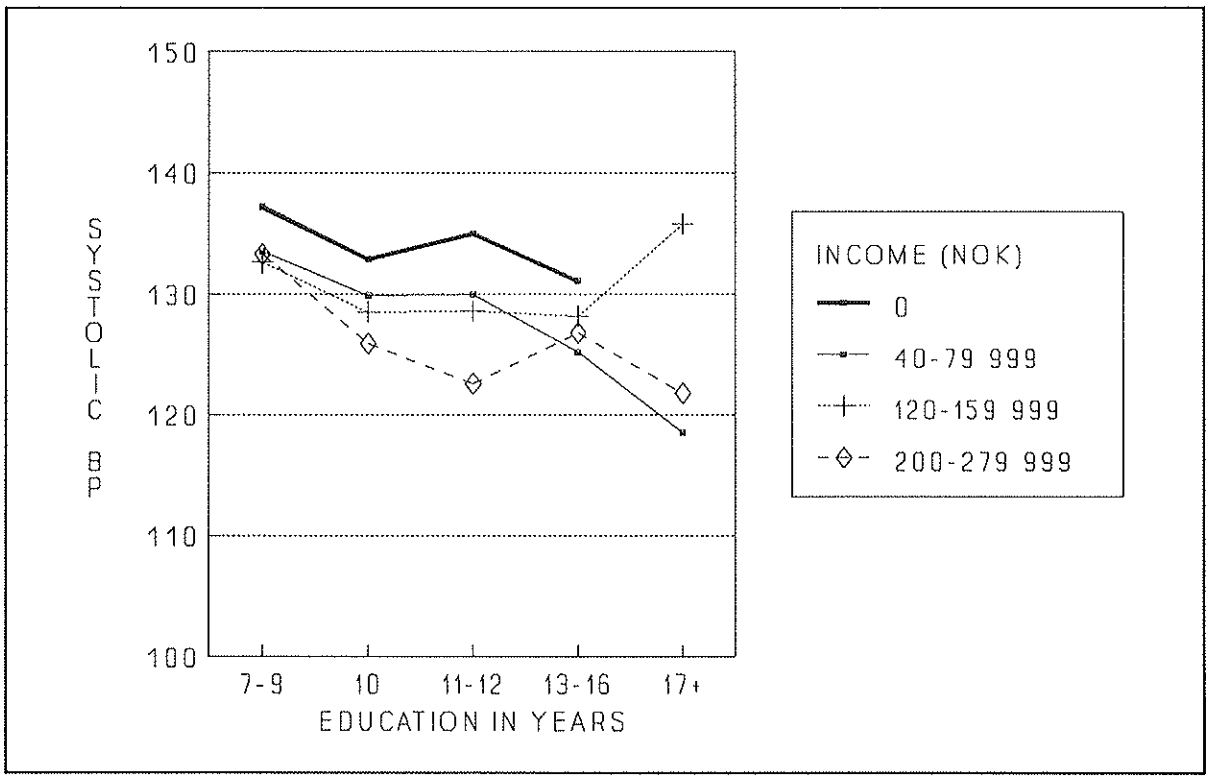

Table 23 Systolic blood pressure, linear regression, women

Descriptive Statistics:

	Mean	S.D.	Label
Systolic BP	133.80	16.60	Systolic BP (mm) < 185mm
Age	44.69	2.87	Age at screening (40-49 years)
BMI	2.50	0.42	Body Mass Index (g/cm^2)
Treatment BP	0.05	0.21	Blood pressure medication
Finnmark Yes/No	0.20	0.40	Living in Finnmark
Education 10 yrs	0.12	0.32	10 years of education
Education 12 yrs	0.04	0.21	11-12 years of education
Education 13+ yrs	0.04	0.19	13+ years of education
Income	44.01	52.25	Income < 300000
Income 0	0.31	0.46	No income

N of Cases = 15805

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	9	562744.3	62527.1
Residual	15795	3791529.5	240.0

F = 260.5 Signif F < 0.001

Regression analysis, dependent variable systolic blood pressure (mm)

Multiple R	0.36
R Square	0.13
Adjusted R Square	0.13
Standard Error	15.49

Variable	Coeff.	S.E. Coeff	Beta	t	p
Age	0.77	0.04	0.134	17.9	<0.001
BMI	8.76	0.30	0.220	28.7	<0.001
Treatment BP	12.15	0.59	0.156	20.5	<0.001
Education 10 yrs	-1.63	0.39	-0.032	-4.2	<0.001
Education 12 yrs	-2.73	0.61	-0.034	-4.5	<0.001
Education 13+ yrs	-4.04	0.68	-0.047	-6.0	<0.001
Finnmark Yes/No	-1.15	0.31	-0.028	-3.7	<0.001
Income	-9.64E-03	3.05E-03	-0.030	-3.2	<0.001
Income 0	1.55	0.33	0.043	4.8	<0.001
Constant	76.39	2.03		37.7	<0.001

Income less than 300 000, BP less than 185 mm

Table 24 Mean diastolic blood pressure (mm) by education and income, men

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	88.0	87.5	89.9	92.0	83.0	88.2	88.0	426
1-39	87.9	87.3	88.8	86.4	89.8	87.9	87.8	1194
40-79	87.0	86.8	86.5	83.0	76.5	86.7	86.6	1938
80-119	86.6	86.4	86.4	87.8	80.8	86.5	86.4	3791
120-159	86.4	86.6	86.1	85.2	79.1	86.4	86.3	9269
160-199	86.0	86.5	86.4	86.3	87.0	86.2	86.1	8051
200-279	86.3	86.3	86.3	85.4	85.3	86.0	86.2	5790
280+	85.7	87.0	87.1	85.1	85.8	85.9	86.4	2424
Total Age[1]	86.5	86.5	86.4	85.6	85.6	86.3		
Total Income[3]	86.4	86.6	86.6	85.8	85.9		86.3	
n=	19077	4697	4445	3089	1575			32883

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 25 Mean diastolic blood pressure (mm) by education and selected incomes, men

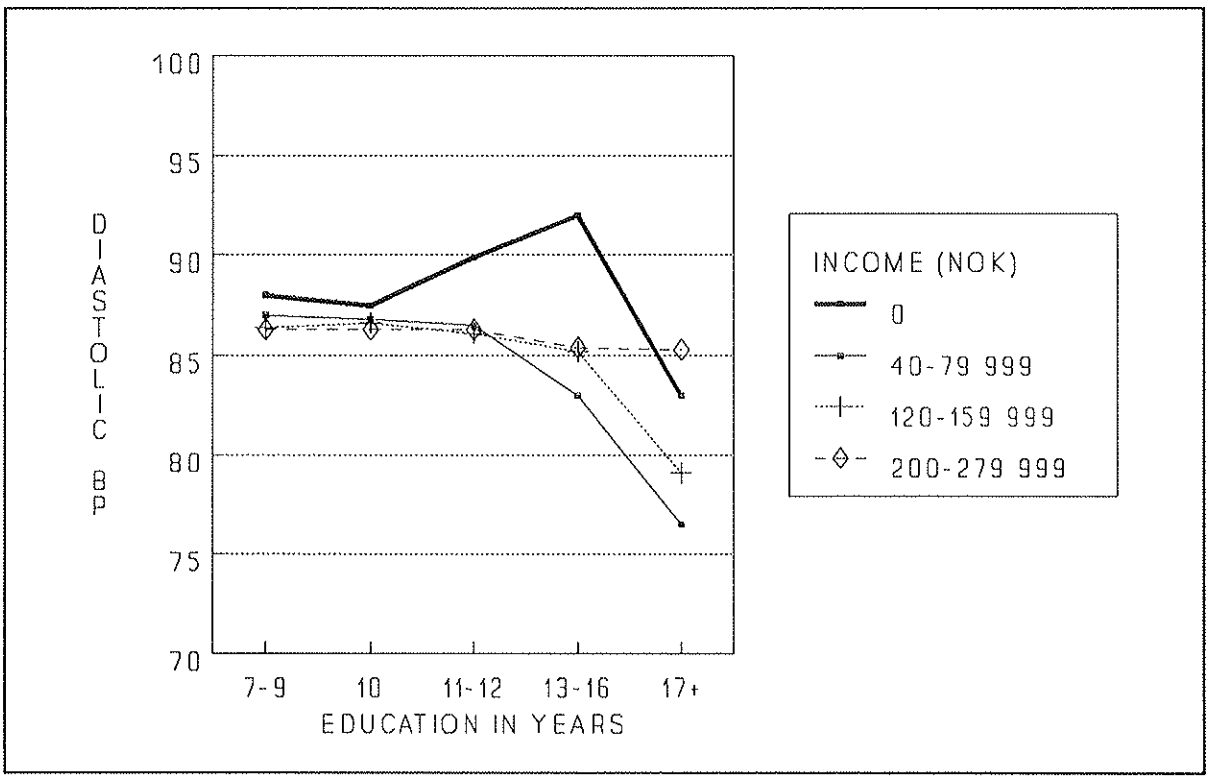

Table 25 Diastolic blood pressure, linear regression, men

Descriptive Statistics:

	Mean	S.D	Label
Diastolic BP	86.24	10.78	Diastolic BP (mm) (<130 mm)
Age	44.72	2.87	Age at screening, (40-49 years)
BMI	2.50	0.30	Body Mass Index (g/cm^2)
Treatment BP	0.03	0.17	Blood pressure medication
Finnmark Yes/No	0.11	0.31	Living in Finnmark
Oslo Yes/No	0.49	0.50	Living in Oslo
Education 10 yrs	0.14	0.35	10 years of education
Education 12 yrs	0.13	0.34	11-12 years of education
Education 13+ yrs	0.14	0.35	13+ years of education
Income	164.89	74.03	Income 1000 NOK, (<500 000)
Income 0	0.01	0.11	No income

N of Cases = 32385

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	10	547962.4	54796.2
Residual	32374	3214728.2	99.3
		F = 551.8	Signif. F < 0.0

Regression analysis, dependent variable diastolic blood pressure (mm)

Multiple R	0.38
R Square	0.15
Adjusted R Square	0.15
Standard Error	9.97

Variable	Coeff.	S.E. Coeff	Beta	t	p
Age	0.19	0.019	0.050	9.8	<0.001
BMI	10.72	0.190	0.294	56.6	<0.001
Treatment BP	12.24	0.320	0.198	38.3	<0.001
Education 10 yrs	0.25	0.167	8.22E-03	1.5	0.13
Education 12 yrs	0.05	0.178	1.47E-03	0.3	0.79
Education 13+ yrs	0.05	0.196	1.48E-03	0.2	0.81
Finnmark Yes/No	-0.17	0.190	-4.88E-03	-0.9	0.37
Oslo Yes/No	1.86	0.125	0.086	14.9	<0.001
Income	-5.95E-03	9.37E-04	-.041	-6.3	<0.001
Income 0	0.90	0.511	0.43E-03	1.8	0.08
Constant	50.69	0.991		51.1	<0.001

Income less than 500 000, BP less than 130 mmHg.

Table 26 Mean diastolic blood pressure (mm) by education and income, women

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	83.8	82.8	82.3	82.7	90.6	83.6	83.4	5114
1-39	82.8	81.8	80.9	79.0	92.9	82.6	82.5	4409
40-79	81.9	81.4	80.5	79.5	76.5	81.7	81.7	3002
80-119	81.5	80.9	80.7	80.4	75.0	81.3	81.4	1937
120-159	82.1	80.1	79.9	79.7	87.0	81.3	81.6	1248
160-199	83.2	82.9	81.5	79.9	85.4	81.7	82.8	434
200-279	84.3	77.7	80.9	80.9	79.8	80.8	82.6	109
280+	79.5*	105*	79.6*	88.0*	80.6*	82.8	83.6	17
Total Age[1]	82.8	81.4	81.0	80.2	81.0	82.5		
Tot. Income[3]	82.7	81.5	81.3	80.8	82.6		82.5	
n=	13004	1900	728	603	35			16270

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.
* 5 or less in cell

Figure 26 Mean diastolic blood pressure (mm) by education and selected incomes, women

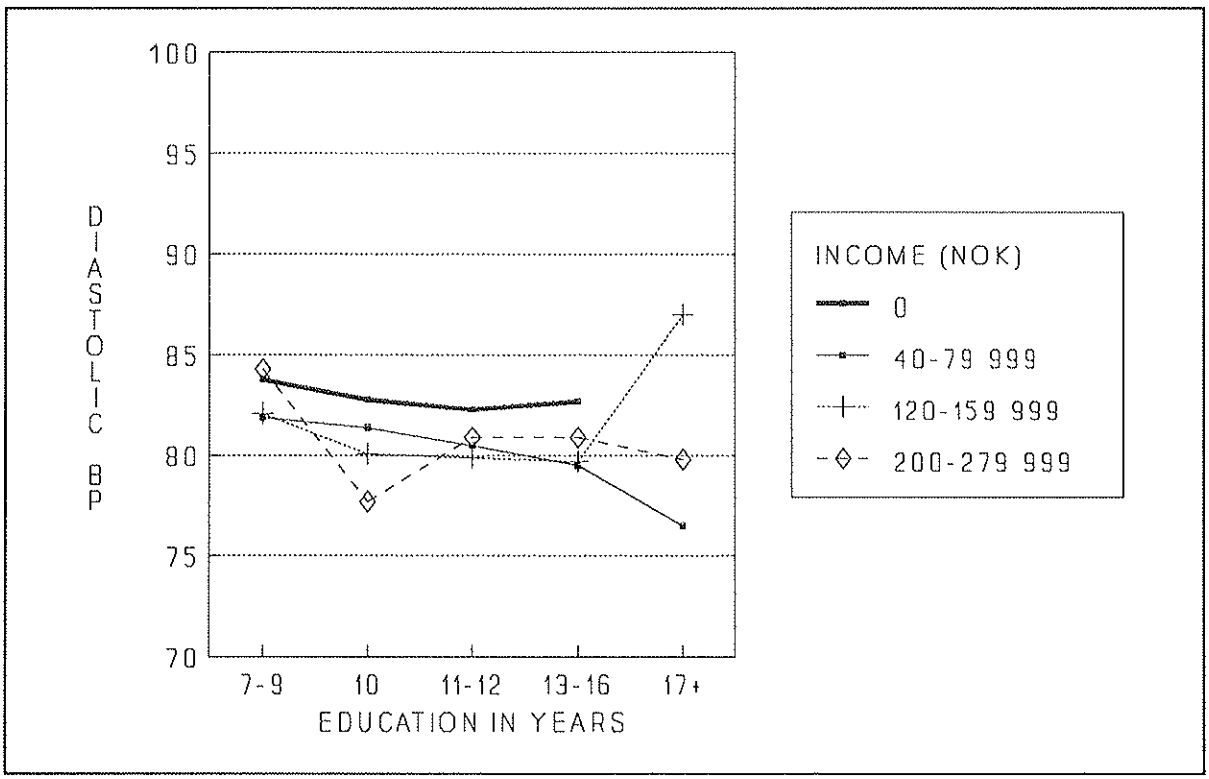

Table 27 Diastolic blood pressure, linear regression, women

Descriptive Statistics:

	Mean	S.D.	Label
Diastolic BP	82.50	10.3	Diastolic BP (mm), 60-130 mm
Age	44.72	2.9	Age at screening (40-49 years)
BMI	2.50	0.4	Body Mass Index (g/cm^2)
Treatment BP	0.05	0.2	Blood pressure medication
Finnmark Yes/No	0.20	0.4	Living in Finnmark
Education 10 yrs	0.12	0.3	10 years of education
Education 12 yrs	0.04	0.2	11-12 years of education
Education 13+ yrs	0.04	0.2	13+ years of education
Income	44.01	52.2	Income < 300 000
Income 0	0.31	0.5	No income

N of Cases = 15826

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	9	276288.2	30698.7
Residual	15816	1389765.1	87.9
		F = 349.4	Signif. F < 0.001

Regression analysis, dependent variable diastolic blood pressure (mm)

Multiple R	0.41
R Square	0.17
Adjusted R Square	0.17
Standard Error	9.37

Variable	Coeff.	S.E. Coeff	Beta	t	p
Age	0.33	0.026	0.094	12.8	<0.001
BMI	6.83	0.182	0.281	37.5	<0.001
Treatment BP	9.62	0.348	0.205	27.6	<0.001
Education 10 yrs	-0.39	0.237	-0.012	-1.6	0.10
Education 12 yrs	-0.41	0.372	-8.19E-03	-1.1	0.27
Education 13+ yrs	-0.90	0.412	-0.017	-2.2	0.03
Finnmark Yes/No	-0.85	0.188	-0.033	-4.5	<0.001
Income	-3.18E-03	1.847E-03	-0.016	-1.7	0.09
Income 0	0.56	0.197	0.025	2.9	<0.001
Constant	50.24	1.226		41.0	<0.001

Income less than 300 000, BP 60-130 mm

Table 28 Mean serum cholesterol (mmol/l) by education and income, men

	Highest completed education in years.							
Income (x1000)	7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	7.37	7.57	7.27	6.95	6.71	7.37	7.31	425
1-39	7.23	7.25	7.25	6.85	6.34	7.23	7.16	1189
40-79	7.24	7.03	6.71	6.80	6.04	7.18	7.12	1937
80-119	7.11	6.95	7.00	6.70	6.62	7.08	7.02	3791
120-159	7.07	6.92	6.92	6.79	6.72	7.03	6.98	9265
160-199	7.02	6.95	6.94	6.81	6.70	6.97	6.97	8050
200-279	7.11	6.85	6.89	6.77	6.76	6.90	6.99	5793
280+	7.04	6.98	6.90	6.82	6.70	6.83	7.00	2425
Total Age[1]	7.09	6.94	6.92	6.79	6.71	7.00		
Tot. Income[3]	7.06	6.94	6.96	6.87	6.85		7.00	
n=	19067	4694	4446	3090	1578			32875

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 27 Mean serum cholesterol (mmol/l) by education and selected incomes, men

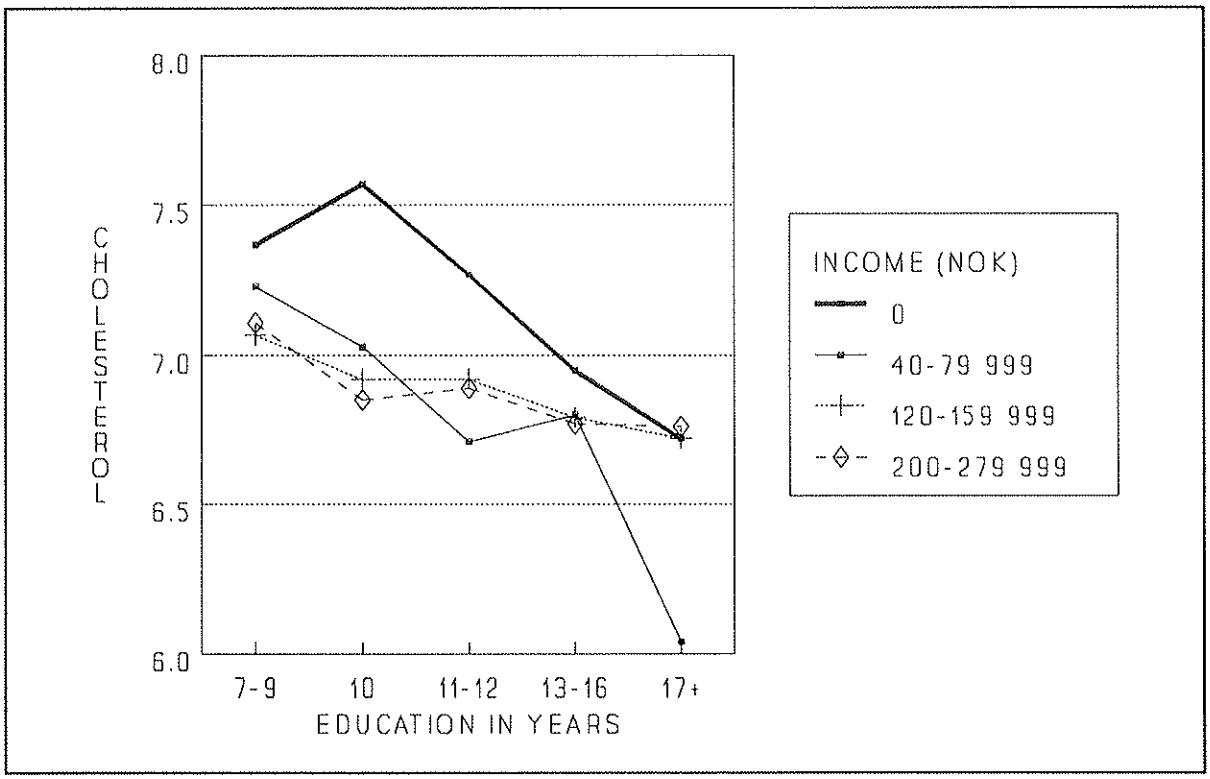

Table 29 Mean serum cholesterol (mmol/l) by education and income, men, adjusted for county, not adjusted for age.

	Highest completed education in years.							
Income (x1000)	7-9	10	11-12	13-16	17+	Total County[1]	Total Education[2]	n=
0	7.27	7.57	7.28	7.01	6.90	7.38	7.24	425
1-39	7.12	7.23	7.23	6.85	6.34	7.23	7.09	1189
40-79	7.14	7.03	6.75	6.78	6.08	7.18	7.07	1937
80-119	7.07	6.97	7.04	6.69	6.67	7.08	7.01	3791
120-159	7.06	6.93	6.95	6.84	6.66	7.03	6.99	9265
160-199	7.03	6.96	6.96	6.83	6.75	6.97	6.97	8050
200-279	7.14	6.88	6.92	6.80	6.99	6.90	6.99	5793
280+	7.06	7.02	6.95	6.88	7.01	6.83	7.01	2425
Tot. County[1]	7.07	6.95	6.95	6.82	6.76	7.00		
Tot. Income[3]	7.05	6.96	6.97	6.87	6.85		7.00	
n=	19067	4694	4446	3090	1578			32875

[1] Adjusted for county.
[2] Adjusted for county and education.
[3] Adjusted for county and income.

Figure 28 Mean serum cholesterol (mmol/l) by education and selected incomes, men, adjusted for county, not adjusted for age

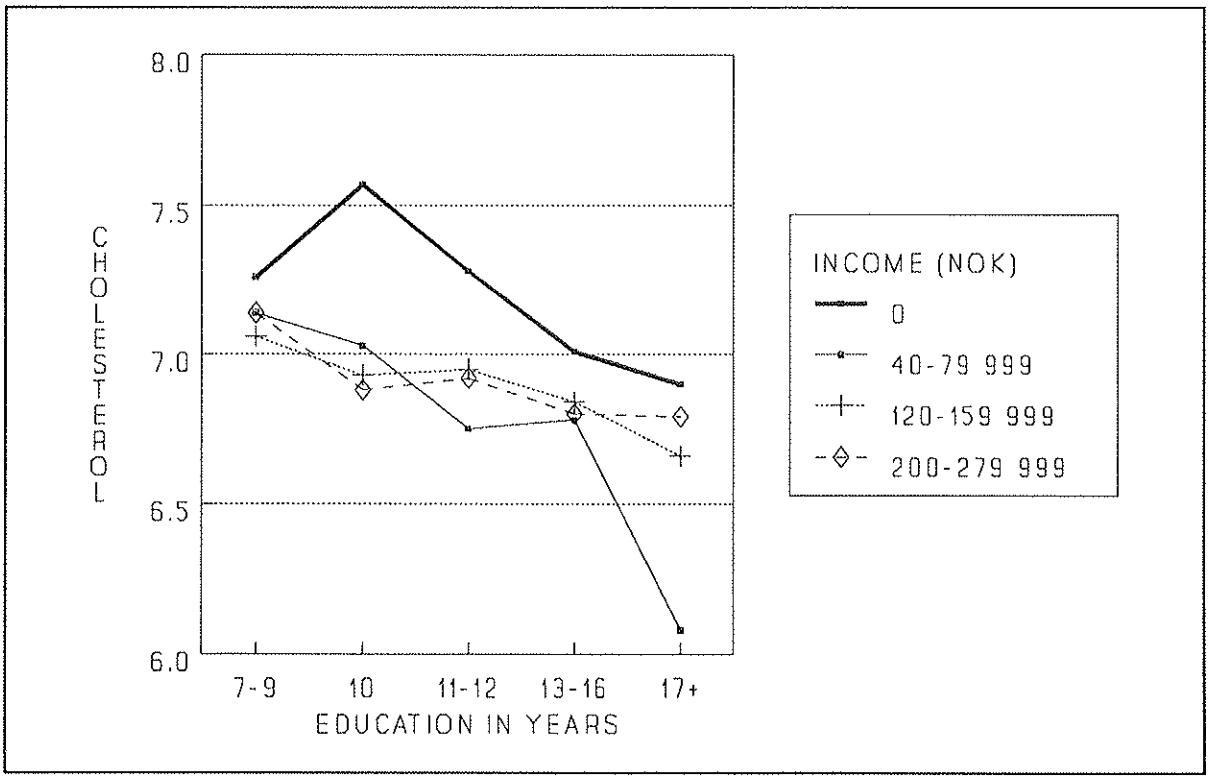

Table 30 Serum cholesterol, linear regression, men

Descriptive Statistics:

	Mean	S.D.	Label
Cholesterol	6.98	1.27	Serum cholesterol (mmol/l) (< 12)
Age	44.72	2.87	Age at screening (40-49 years)
BMI	2.50	0.30	Body Mass Index (g/cm^2)
Finnmark Yes/No	0.11	0.31	Living in Finnmark
Oslo Yes/No	0.49	0.50	Living in Oslo
Education 10 yrs	0.14	0.35	10 years of education
Education 12 yrs	0.13	0.34	11-12 years of education
Education 13+ yrs	0.14	0.35	13+ years of education
Income	164.92	74.01	Income <500 000
Income 0	0.01	0.11	No income

N of Cases = 32367

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	9	3449.2	383.2
Residual	32357	48821.9	1.5
		F = 254.0	Signif F < 0.001

Regression analysis, dependent Variable: Serum cholesterol (mmol)

Multiple R	0.26
R Square	0.07
Adjusted R Square	0.07
Standard Error	1.23

Variable	Coeff.	S.E. Coeff	Beta	t	p
Age	0.03	2.4E-03	0.07	13.2	<0.001
BMI	0.67	0.023	0.16	28.7	<0.001
Education 10 yrs	-0.09	0.021	-.03	-4.6	<0.001
Education 12 yrs	-0.11	0.022	-.03	-5.1	<0.001
Education 13+ yrs	-0.20	0.024	-.05	-8.2	<0.001
Finnmark Yes/No	0.72	0.024	0.18	30.7	<0.001
Oslo Yes/No	0.13	0.015	0.05	8.2	<0.001
Income	-2.57E-04	1.16E-04	-.02	-2.2	0.03
Income 0	0.17	0.063	0.02	2.8	0.01
(Constant)	3.87	0.122		31.7	<0.001

Income less than 500 000, Serum cholesterol less than 12mmol.

Table 31 Mean serum cholesterol (mmol/l) by education and income, women

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	6.98	6.75	6.86	6.38	6.31	6.95	6.93	5111
1-39	7.05	6.75	6.76	6.42	7.92	7.01	6.99	4403
40-79	6.97	6.75	6.56	6.66	6.89	6.92	6.91	3000
80-119	6.97	6.80	6.72	6.51	6.74	6.91	6.92	1934
120-159	6.91	6.89	6.81	6.65	5.77	6.87	6.92	1249
160-199	6.75	6.79	6.74	6.68	5.98	6.73	6.90	433
200-279	6.56	6.14	6.60	6.65	6.73	6.60	6.85	109
280+	6.8*	7.1*	6.1*	6.3*	6.8*	6.6*	6.7*	17
Total Age[1]	6.99	6.78	6.74	6.59	6.75	6.94		
Tot. Income[3]	6.98	6.79	6.78	6.68	6.91		6.94	
n=	12990	1901	727	604	34			16256

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.
[*] Adjusted for age and income.

Figure 29 Mean serum cholesterol by education and selected incomes, women

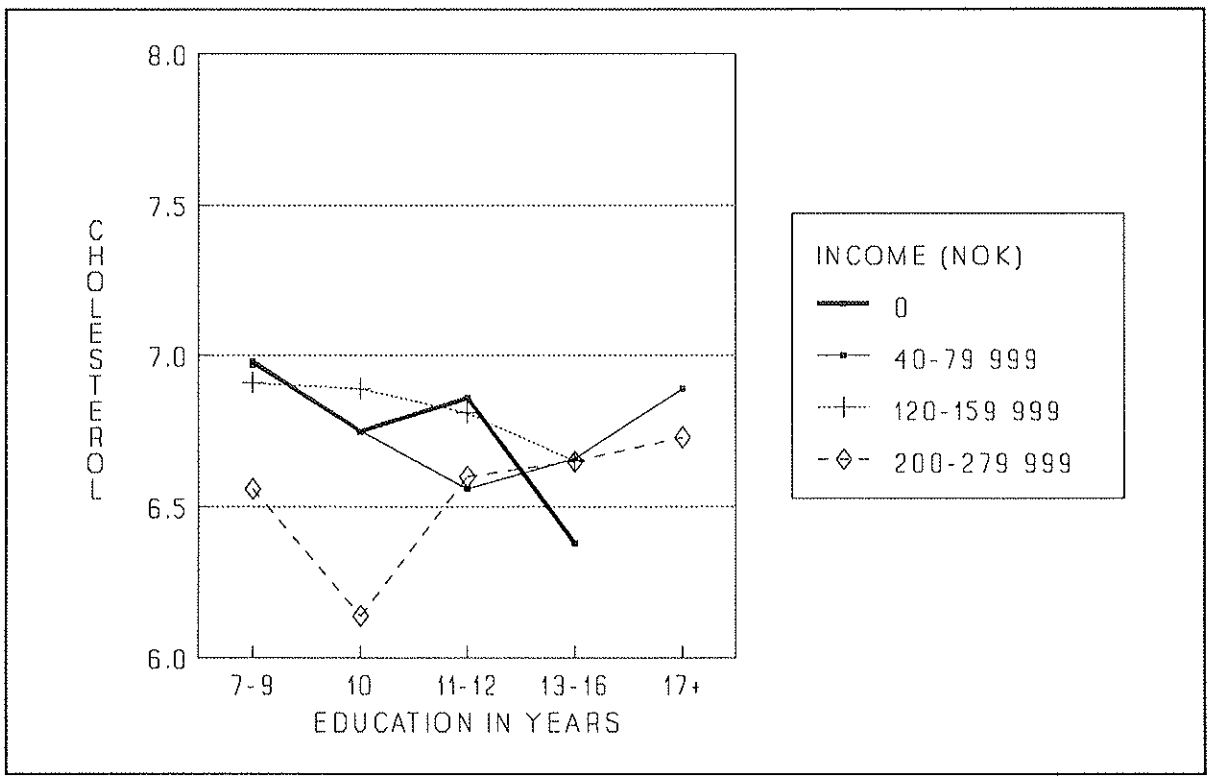

Table 32 Serum cholesterol, linear regression, women

Descriptive Statistics:

	Mean	S.D.	Label
Cholesterol	6.92	1.28	Serum cholesterol (mmol/l) (< 12)
Age	44.67	2.88	Age at screening (40-49 years)
BMI	2.52	0.42	Body Mass Index (g/cm^2)
Finnmark Yes/No	0.20	0.40	Living in Finnmark
Education 10 yrs	0.12	0.32	10 years of education
Education 12 yrs	0.04	0.20	11-12 years of education
Education 13+ yrs	0.04	0.19	13+ years of education
Income	44.04	52.21	Income·1000 (< 300 000)
Income 0	0.31	0.46	No income

N of Cases = 16013

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	8	2132.6	266.6
Residual	16004	24145.0	1.5
		F = 176.7	Signif F < 0.001

Regression analysis, dependent variable serum cholesterol (mmol/l)

Multiple R	0.28
R Square	0.08
Adjusted R Square	0.08
Standard Error	1.23

Variable	Coeff.	S.E. Coeff	Beta	t	p
Age	0.07	3.4E-03	0.17	21.8	<0.001
BMI	0.29	0.02	0.10	12.5	<0.001
Education 10 yrs	-0.13	0.03	-0.03	-4.2	<0.001
Education 12 yrs	-0.11	0.05	-0.02	-2.3	0.02
Education 13+ yrs	-0.26	0.05	-0.04	-4.8	<0.001
Finnmark Yes/No	0.58	0.02	0.18	23.8	<0.001
Income	-3.90E-04	2.4E-04	-0.02	-1.6	0.10
Income 0	-0.03	0.03	-0.01	-1.2	0.21
Constant	2.82	0.16		17.8	<0.001

Income less than 300 000, Cholesterol less than 12 mmol/l

Table 33 Mean triglycerides (mmol/l) by education and income, men

	Highest completed education in years.							
Income (x1000)	7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	2.90	2.06	2.87	2.73	2.55	2.82	2.76	425
1-39	2.47	2.41	2.25	2.77	2.13	2.45	2.40	1189
40-79	2.40	2.46	2.43	2.26	1.68	2.40	2.35	1937
80-119	2.49	2.46	2.24	2.18	2.64	2.47	2.41	3789
120-159	2.42	2.33	2.35	2.16	2.56	2.39	2.35	9265
160-199	2.39	2.31	2.27	2.12	2.28	2.33	2.32	8050
200-279	2.40	2.33	2.22	2.14	2.00	2.24	2.32	5793
280+	2.33	2.34	2.13	2.10	2.05	2.13	2.30	2425
TotalAge[1]	2.43	2.34	2.26	2.14	2.05	2.35		
Tot.Income[3]	2.33	2.34	2.13	2.10	2.05		2.35	
n=	19065	4694	4446	3090	1578			32873

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 30 Mean triglycerides (mmol/l) by education and selected income, men

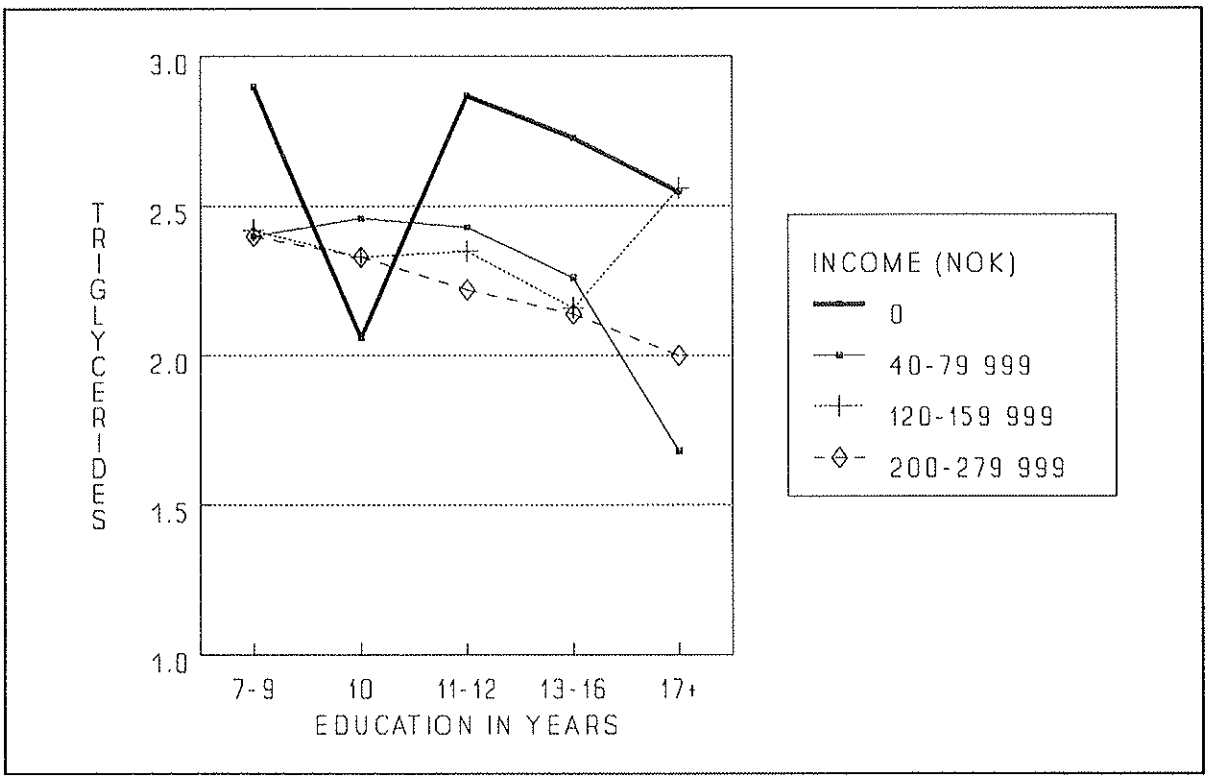

Table 34 Serum triglycerides, linear regression, men

Descriptive Statistics:

	Mean	S.D.	Label
Ln Triglycerides	0.73	0.47	Natural log triglycerides (ln mmol/l)
Age	44.72	2.87	Age at screening (40-49 years)
BMI	2.50	0.30	Body Mass Index(g/cm^2)
Time since last meal	2.50	0.30	Time since last meal, 1,2,3,4.
Finnmark Yes/No	0.11	0.31	Living in Finnmark
Oslo Yes/No	0.49	0.50	Living in Oslo
Education 10 yrs	0.14	0.35	10 years of education
Education 12 yrs	0.13	0.34	11-12 years of education
Education 13+ yrs	0.14	0.35	13+ years of education
Income	164.95	74.01	Income·1000, (<500 000)
Income 0	0.013	0.11	No income

N of Cases = 32447

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	10	922.2	92.22
Residual	32210	5872.1	0.18
		F = 506 .0	Signif F < 0.001

Regression analysis, dependent Variable: Ln Serum Triglycerides (mmol/l).

Multiple R	0.37
R Square	0.14
Adjusted R Square	0.14
Standard Error	0.43

Variable	Coeff.	S.E. Coeff	Beta	t	p
Age	0.0041	8.7E-04	0.026	4.3	<0.001
BMI	0.50	8.4E-03	0.32	58.9	<0.001
Time since last meal	-0.068	2.3E-03	-0.15	-29.2	<0.001
Education 10 yrs	-0.0024	7.5E-03	-1.8E-03	-0.7	0.48
Education 12 yrs	-0.030	8.0E-03	-0.023	-3.7	<0.001
Education 13+ yrs	-0.039	8.8E-03	-0.030	-5.1	<0.001
Finnmark Yes/No	-0.082	8.5E-03	-0.056	-10.7	<0.001
Oslo Yes/No	-0.022	5.6E-03	-0.025	-7.2	<0.001
Income	-2.7E-04	4.2E-05	-0.043	-5.2	<0.001
Income 0	0.044	0.02	0.011	1.9	0.06
(Constant)	-0.60	0.04		-13.5	<0.001

Income less than 500 000, Log transformed triglycerides.

Table 35 Mean triglycerides (mmol/l) by education and income, women

	Highest completed education in years.							
Income (x1000)	7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	1.76	1.61	1.70	1.58	1.37	1.75	1.73	5111
1-39	1.77	1.56	1.52	1.50	1.37	1.74	1.73	4403
40-79	1.73	1.65	1.53	1.64	2.49	1.74	1.70	3000
80-119	1.70	1.64	1.50	1.56	1.22	1.67	1.68	1934
120-159	1.73	1.67	1.57	1.43	0.98	1.68	1.71	1249
160-199	1.87	1.63	1.51	1.42	0.77	1.60	1.71	433
200-279	1.59	1.20	1.66	1.34	1.33	1.40	1.57	109
280+	2.27*	1.34*	1.31*	1.57*	0.98*	1.48	1.75	17
TotalAge[1]	1.75	1.62	1.55	1.48	1.30	1.71		
Tot.Income[3]	1.75	1.62	1.57	1.55	1.49		1.71	
n=	12990	1901	727	604	34			16256

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.
* 5 or less in cell

Figure 31 Mean triglycerides (mmol/l) by education and selected incomes, women

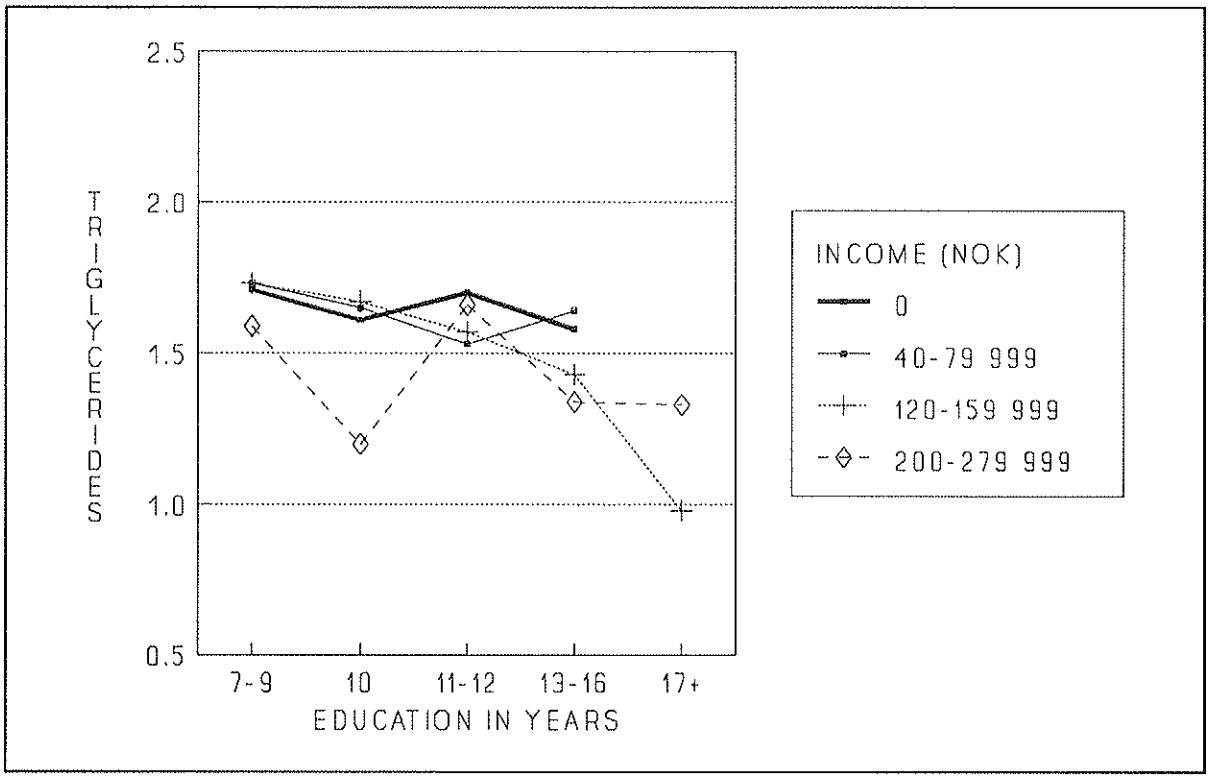

Table 36 Serum triglycerides (ln), linear regression, women

Descriptive Statistics:

	Mean	S.D.	Label
Ln Triglycerides	0.43	0.41	Natural log triglycerides (ln mmol/l)
Age	44.67	2.87	Age at screening (40-49 years)
BMI	2.52	0.42	Body Mass Index (g/cm^2)
Time since last meal	2.61	0.92	Time since last meal, 1,2,3,4
Finnmark Yes/No	0.20	0.40	Living in Finnmark
Education 10 yrs	0.12	0.32	10 years of education
Education 12 yrs	0.04	0.20	11-12 years of education
Education 13+ yrs	0.04	0.19	13+ years of education
Income	44.01	52.19	Income < 300000
Income 0	0.32	0.46	No income

N of Cases = 15902

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	9	294	32.7
Residual	15892	2390	0.15
		F = 217.2	Signif F < 0.001

Regression analysis Dependent variable ln triglycerides.

Multiple R	0.33
R Square	0.11
Adjusted R Square	0.11
Standard Error	0.39

Variable	Coeff.	S.E. Coeff	Beta	t	p
Age	0.014	1.1E-03	0.097	12.9	<0.001
BMI	0.27	7.5E-03	0.27	35.9	<0.001
Time since last meal	-0.055	3.3E-03	-0.12	16.5	<0.001
Education 10 yrs	-0.038	0.0098	-0.029	-3.9	<0.001
Education 12 yrs	-0.064	0.015	-0.032	-4.2	<0.001
Education 13+ yrs	-0.13	0.017	-0.060	-7.5	<0.001
Finnmark Yes/No	6.7E-03	7.7E-03	6.6E-03	0.87	0.38
Income	-2.8E-05	7.6E-05	-3.5E-03	-0.27	0.72
Income 0	-8.5E-04	8.1E-03	-9.6E-04	-0.10	0.92
(Constant)	-0.71	0.051		-13.9	<0.001

Income less than 300 000, natural log of triglycerides.

Table 37 Smoking any tobacco product (per cent) by education and income, men

	Highest completed education in years.							
Income (x1000)	7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	65.9	67.4	52.1	60.9	-	64.6	61.1	438
1-39	63.7	60.6	49.0	29.2	51.5	62.1	58.3	1219
40-79	63.8	51.9	58.6	45.8	37.6	61.9	58.1	1963
80-119	62.5	50.4	56.2	38.6	50.4	60.2	56.6	3819
120-159	61.7	53.1	56.7	45.3	54.1	59.7	56.7	9307
160-199	59.7	51.4	53.4	41.5	48.1	55.4	55.0	8089
200-279	58.9	48.9	47.4	41.0	37.4	48.0	53.4	5827
280+	43.8	52.6	47.3	41.5	34.4	41.0	52.0	2442
Total Age[1]	61.2	51.7	51.8	41.5	36.3	55.6		
Tot. Income[3]	58.8	51.7	54.1	47.3	46.7		55.6	
n=	19207	4728	4482	3103	1584			33104

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 32 Smoking any tobacco product (per cent) by education and selected incomes, men

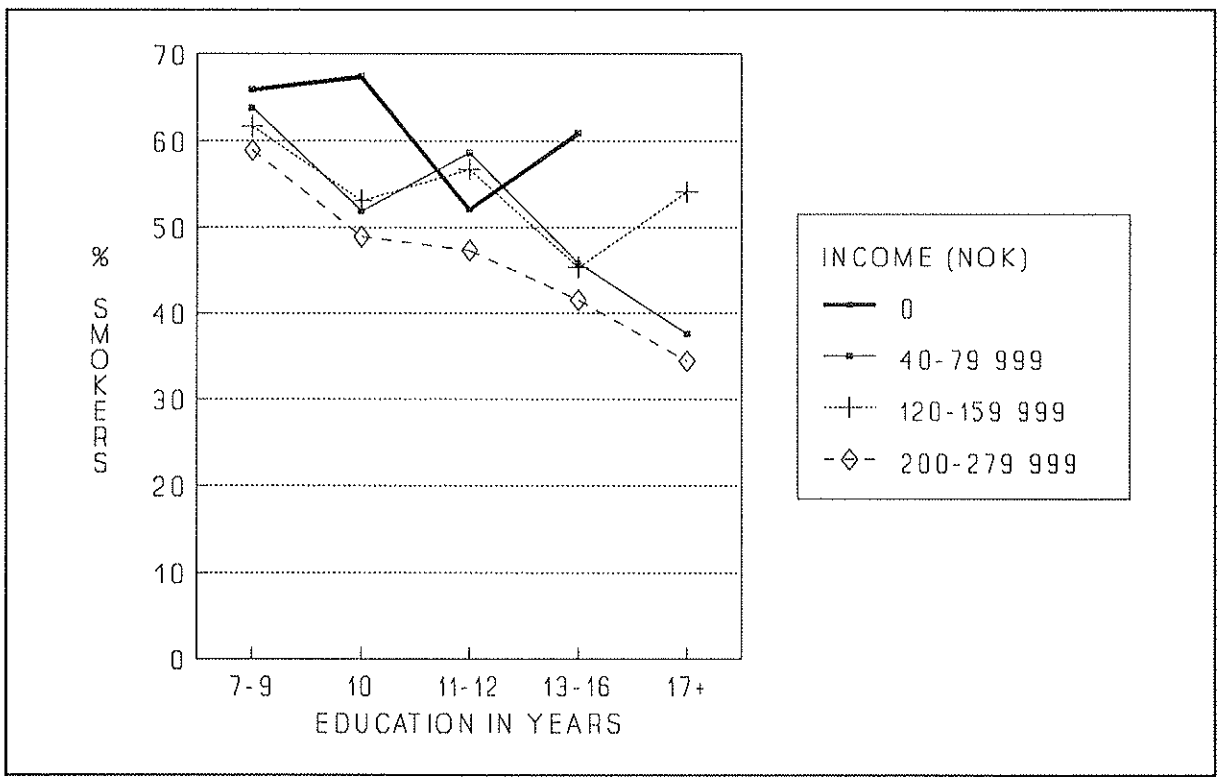

Table 38 Cigarette smoking (per cent) by education and income, men

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	59.9	52.6	44.1	53.9	0	57.7	54.0	438
1-39	56.9	51.8	43.4	23.5	37.8	55.1	51.0	1219
40-79	56.1	42.0	49.1	40.8	37.7	54.0	50.1	1963
80-119	54.4	44.0	49.4	31.1	41.7	52.4	48.6	3819
120-159	53.2	46.0	48.1	38.9	53.2	51.5	48.2	9307
160-199	50.7	43.7	45.3	33.0	39.2	46.9	46.3	8089
200-279	50.1	40.8	40.0	31.0	25.9	39.1	44.7	5827
280+	37.2	44.1	36.4	29.6	23.2	30.4	42.3	2442
Total Age[1]	52.9	44.0	43.7	31.8	25.3	47.1		
Tot. Income[3]	50.2	44.0	46.2	38.1	36.8		47.1	
n=	19207	4728	4482	3103	1584			33104

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 33 Cigarette smoking (per cent) by education and selected incomes, men

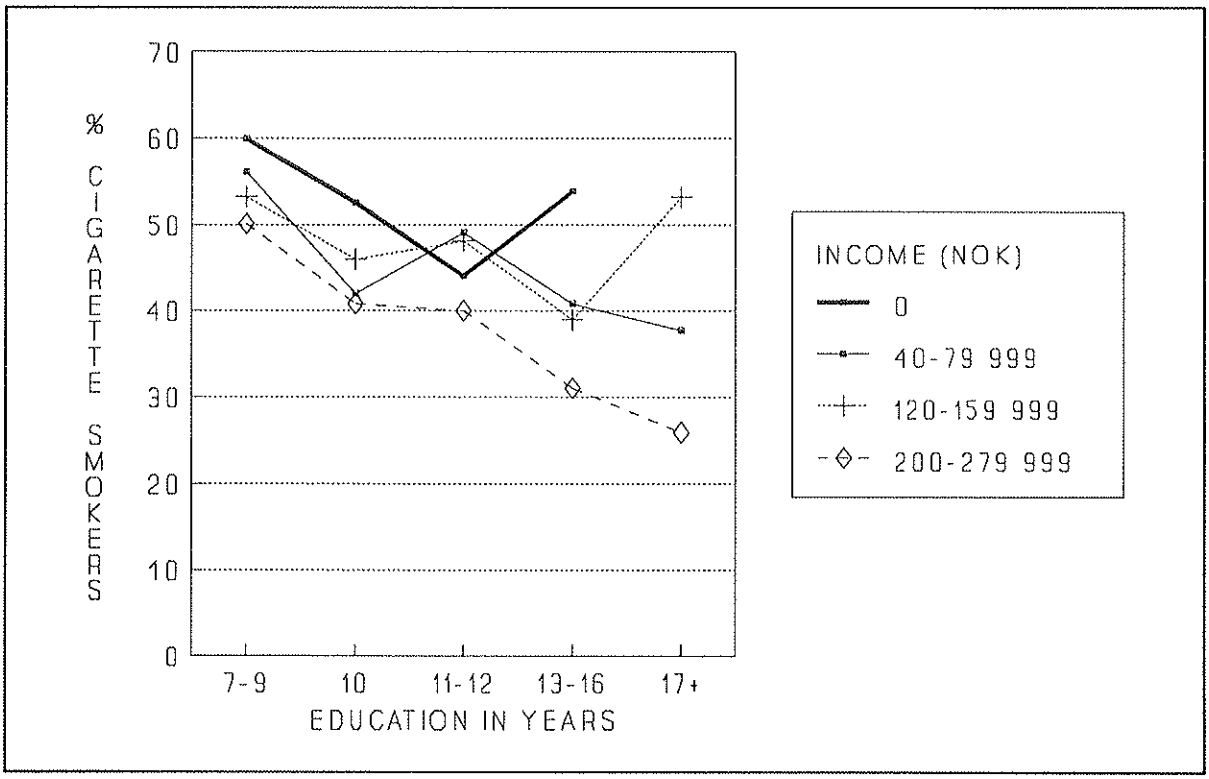

Table 39 Cigarette smoking by education and income, logistic regression, men

Descriptive statistics of independent variables, income variables are county specific.

Name	Min.	Max.	Mean	S.D.	Skewness	Kurtosis
Finnmark income	0.00	6.00	0.39	1.21	3.111	8.60
Sogn/Oppl income	0.00	6.00	1.64	2.18	0.793	-1.01
Oslo income	0.00	6.00	2.37	2.55	0.274	-1.72

Variable		Group		Design Variables		
Name	Label	Index	n=	(1)	(2)	(3)
Education	7-9		19092	0	0	0
	10	1	4697	1	0	0
	11-12	2	4380	0	1	0
	13+	3	4440	0	0	1
Finnmark	No		29101	0		
	Yes	1	3508	1		
Oslo	No		16635	0		
	Yes	1	15974	1		

Log likelihood =-21788.670

Goodn. Fit X^2 (2*O*ln(O/E))	=63.2	D.F.=	52	p= 0.137
Goodn. Fit X^2 (Hosmer-Lem.)	=14.2	D.F.=	8	p= 0.077

Term		Value(s)	coeff.	S.E.	coeff./SE.	$e^{coeff.}$
Education	(1)	10	-0.31	0.03	-9.1	0.74
	(2)	11-12	-0.31	0.04	-8.7	0.73
	(3)	13+	-0.82	0.04	-20.0	0.44
Income Finnmark		0 to 6	-0.10	0.03	-3.8	0.91
Income Sogn/Opp		0 to 6	-0.03	0.01	-2.0	0.97
Income Oslo		0 to 6	-0.18	0.02	-11.4	0.84
Finnmark		yes/no	1.12	0.12	9.6	3.06
Oslo		yes/no	1.02	0.09	11.1	2.78
Constant			-0.02	0.06	-0.3	0.98

F-statistics to remove terms were highly significant, p<0.001 for education, income in Finnmark and Oslo, living in Finnmark and Oslo. Income in Sogn og Fjordane og Oppland had an F-Statistic to remove p-value of 0.048, the p-value for the constant was 0.73.

Total n=32609, of which 15473 smokers and 17136 non-smokers.
Min. Expected frequency = 1.56, Number of expected values < 5.0 = 4

Table 40 Cigarette smoking (per cent) by education and income, women

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	29.8	26.1	29.6	24.9	0	29.4	28.7	5169
1-39	37.4	28.9	26.1	19.8	0	35.9	35.3	4470
40-79	44.2	25.5	31.8	22.5	0	42.3	41.9	3026
80-119	44.4	41.5	26.3	15.5	16.9	41.3	41.8	1953
120-159	45.4	40.5	33.9	21.9	0	41.3	42.9	1256
160-199	35.7	39.8	28.6	17.7	0	28.5	35.1	441
200-279	49.9	32.0	35.5	23.3	49.1	31.9	41.7	112
280+	25*	100*	50*	33*	40*	41.0	47.4	17
Total Age[1]	37.4	33.2	29.4	20.0	27.8	35.9		
Tot.Income[3]	37.5	32.6	28.8	20.6	27.5		35.9	
n=	13127	1924	743	614	36			16444

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.
* 5 or less in cell

Figure 34 Cigarette smoking (per cent) by education and selected incomes, women

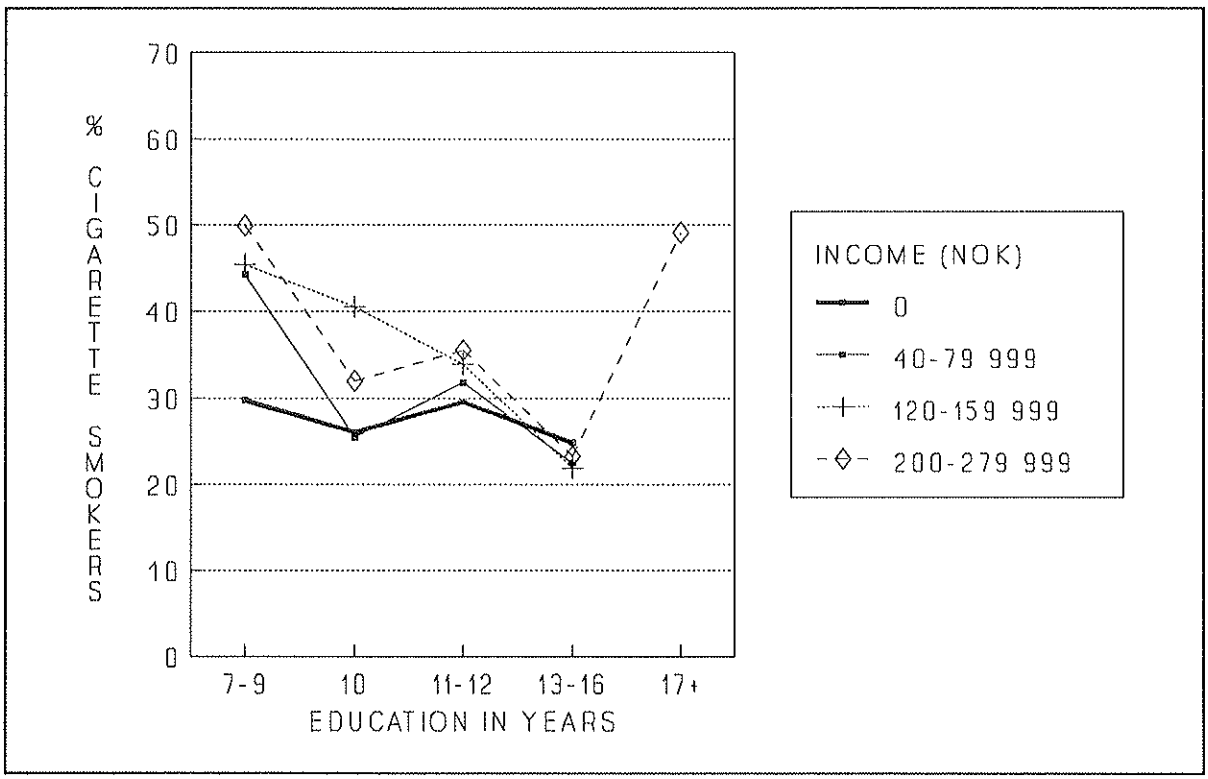

Table 41 Cigarette smoking by education and income, logistic regression, women

Descriptive statistics of independent variables:

Variable name	Group index	Label	n=	design variables (1)	(2)	(3)	(4)	(5)
Education		7-9	13084	0	0	0		
	1	10	1917	1	0	0		
	2	11-12	739	0	1	0		
	3	13+	646	0	0	1		
Income·1000		0	5145	0	0	0	0	0
	1	1-40	4423	1	0	0	0	0
	2	40-80	3015	0	1	0	0	0
	3	80-120	1970	0	0	1	0	0
	4	120-160	1248	0	0	0	1	0
	5	160+	585	0	0	0	0	1
Finnmark		No	13016	0				
	1	Yes	3370	1				

Log likelihood=-10446.860

Goodn. Fit X^2 (2*O*ln(O/E))	= 49.23	D.F. =38	p-value=0.105
Goodn. Fit X^2 (Hosmer-Lem.)	= 1.45	D.F. = 8	p-value=0.994

Logistic regression with smoking as dependent variable, e^{coeff} indicate the relative risk of being a smoker when comparing with the group with the lowest level of the independent variable.

Term		Value(s)	Coeff	S.E.	Coeff/S.E.	$e^{Coeff.}$
Education	(1)	10	-0.20	0.05	-3.71	0.82
	(2)	11-12	-0.40	0.09	-4.72	0.67
	(3)	13+	-0.94	0.11	-8.81	0.39
Income	(1)	1-40	0.27	0.04	6.14	1.31
	(2)	40-80	0.57	0.05	11.80	1.77
	(3)	80-120	0.53	0.06	9.55	1.71
	(4)	120-160	0.64	0.07	9.65	1.90
	(5)	160+	0.46	0.11	4.42	1.59
Finnmark Yes/No			0.56	0.04	14.07	1.75
Constant			-0.94	0.03	-28.95	0.39

All F-statistics to remove were highly significant with $p<0.0001$.

Total number of responses used in the analysis were 16386, of which 5898 were smokers and 10488 were non-smokers. Number of distinct covariate patterns were 48.
Minimum expected cell frequency=1.68, number of expected values less than 5.0=9

Table 42 Never-smoking (per cent) by education and income, men

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	23.9	28.3	28.0	31.0	34.5	24.8	26.6	433
1-39	21.7	23.3	33.5	65.0	36.4	23.2	25.1	1206
40-79	23.3	32.6	22.0	38.3	62.1	24.6	26.5	1950
80-119	21.3	29.8	23.1	32.1	16.3	22.6	24.4	3793
120-159	20.0	26.9	24.0	33.3	24.1	21.6	23.2	9256
160-199	20.8	24.0	22.6	35.2	30.3	23.0	23.4	8055
200-279	21.6	24.8	23.8	31.8	37.6	26.8	23.9	5802
280+	30.0	26.1	23.6	28.2	37.1	30.7	24.0	2436
Total Age[1]	21.1	25.9	23.5	32.2	36.8	23.9		
Tot. Income[3]	22.0	26.2	22.8	29.6	31.6		23.9	
n=	19092	4697	4472	3092	1578			32931

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 35 Never-smoking (per cent) by education and selected incomes, men

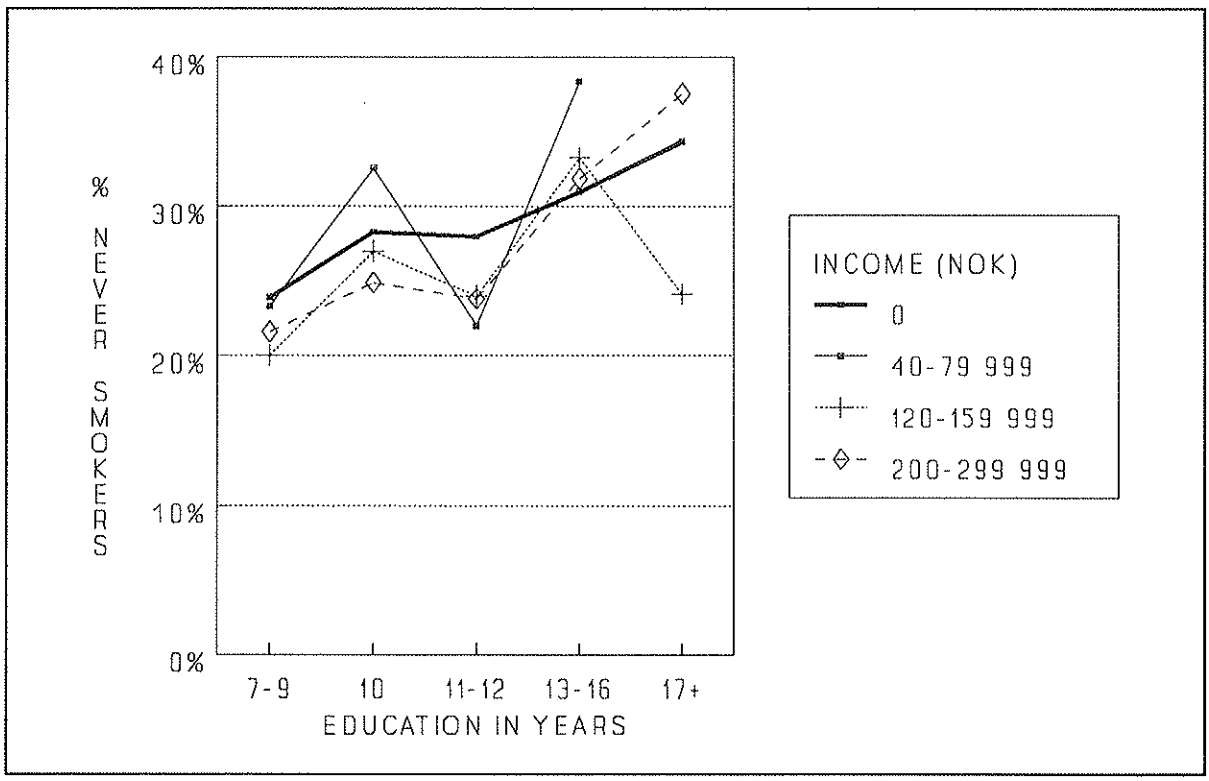

Table 43 Never-smoking (per cent) by education and income, women

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	59.2	60.4	49.6	57.0	100*	59.0	59.3	5144
1-39	51.9	55.5	54.4	58.0	100*	52.5	52.8	4458
40-79	45.4	53.5	54.7	75.7	0*	47.2	47.4	3017
80-119	43.8	44.2	58.6	65.5	49.8	46.0	45.7	1948
120-159	42.6	44.6	46.5	59.5	48.2	44.8	44.1	1253
160-199	50.5	47.6	54.4	66.0	50.3	56.3	52.3	438
200-279	41.7	45.9	53.0	65.0	36.5	55.6	51.3	112
280+	50	0	25	33	20	29.7	30.1	17
TotalAge[1]	51.7	53.0	52.8	63.7	41.7	52.3		
Tot.Income[3]	51.4	53.8	54.1	64.4	46.5		52.3	
n=	13084	1917	740	610	36			16387

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 36 Never-smoking (per cent) by education and selected incomes, women

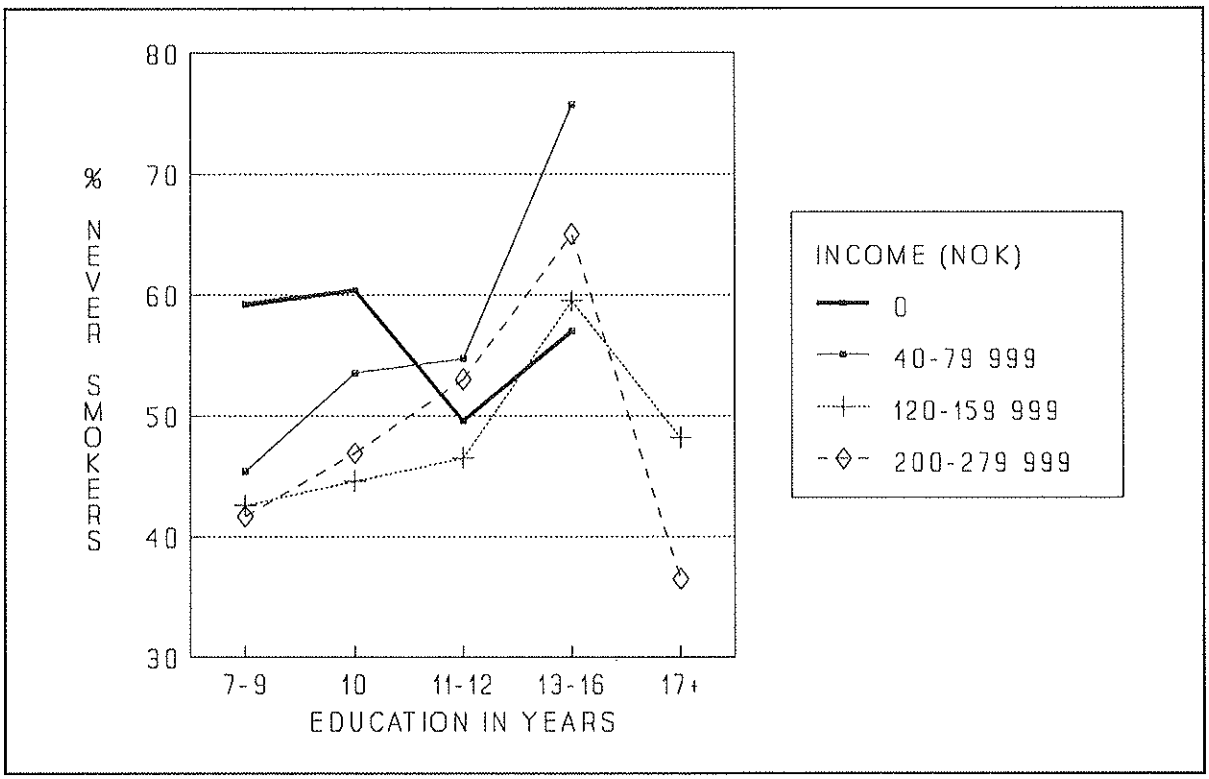

Table 44 Ex-smoking (per cent) by education and income, men

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	15.5	17.8	27.9	15.2	65.6	16.8	18.5	433
1-39	20.8	23.9	23.1	11.6	25.6	21.1	23.1	1206
40-79	20.2	25.4	27.1	20.8	0	21.0	23.0	1950
80-119	23.9	25.8	27.3	35.0	42.1	24.5	26.5	3793
120-159	26.5	26.7	27.8	27.6	19.3	26.6	28.3	9256
160-199	28.1	32.1	32.0	31.7	30.5	29.9	30.0	8055
200-279	27.9	34.1	36.2	37.0	36.4	34.0	31.0	5802
280+	32.5	29.8	40.0	42.2	39.7	38.9	32.8	2436
Total Age[1]	25.6	29.8	32.7	35.9	37.7	28.7		
Tot. Income[3]	27.4	29.5	30.8	34.4	30.0		28.7	
n=	19092	4697	4472	3092	1578			32931

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 37 Ex-smoking (per cent) by education and selected incomes, men

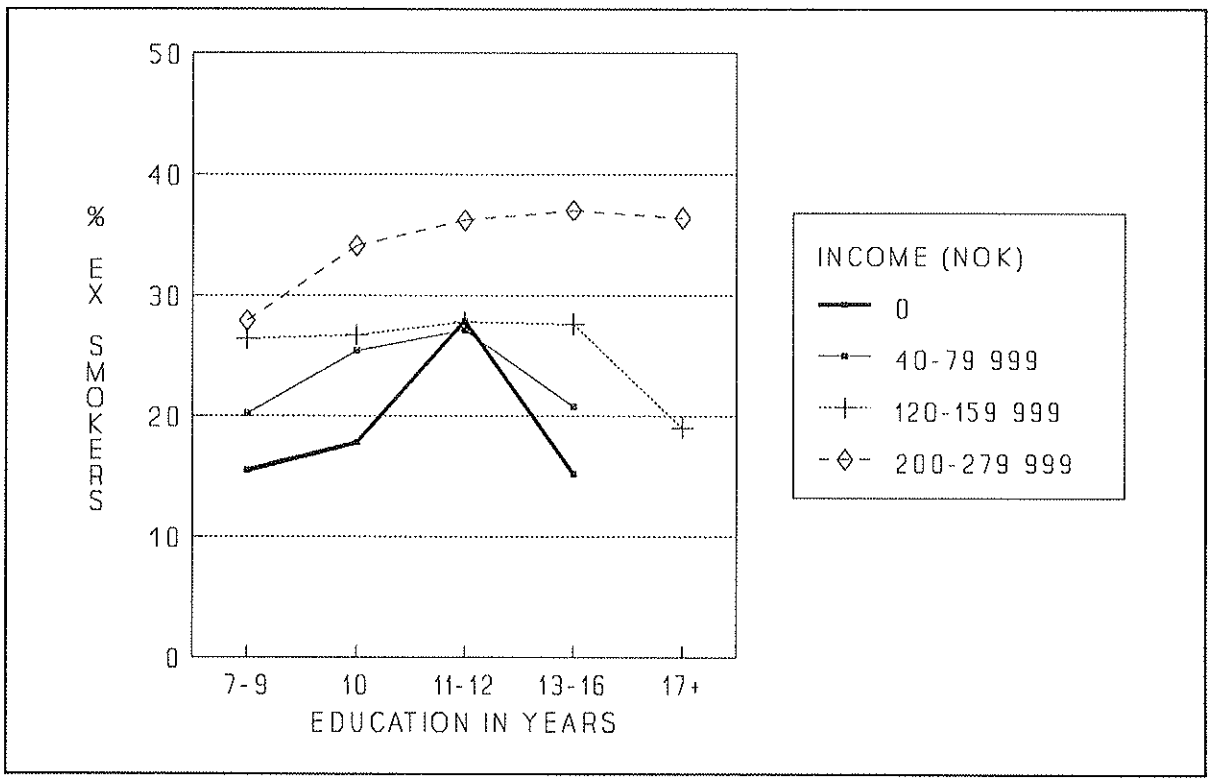

Table 45 Ex-smoking (per cent) by education and income, women

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	10.8	13.3	20.6	18.1	0	11.5	11.8	5144
1-39	10.5	15.6	19.5	11.2	0	11.5	11.7	4458
40-79	10.2	10.8	13.6	- *	0	10.3	10.5	3017
80-119	11.7	13.9	15.1	19.0	33.3	12.7	12.4	1948
120-159	11.9	14.9	19.5	18.4	49.4	13.8	13.0	1253
160-199	13.8	12.6	16.2	16.2	49.8	15.0	12.4	438
200-279	8.4	22.1	11.5	11.7	14.3	12.5	7.7	112
280+	24.9	0	24.9	33.6	39.6	29.3	22.2	17
TotalAge[1]	10.8	13.7	17.6	16.2	30.5	11.7		
Tot.Income[3]	10.9	13.5	17.1	14.8	25.2		11.7	
n=	13084	1917	740	610	36			16387

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.
* 1 of 56

Figure 38 Ex-smoking (per cent) by education and selected incomes, women

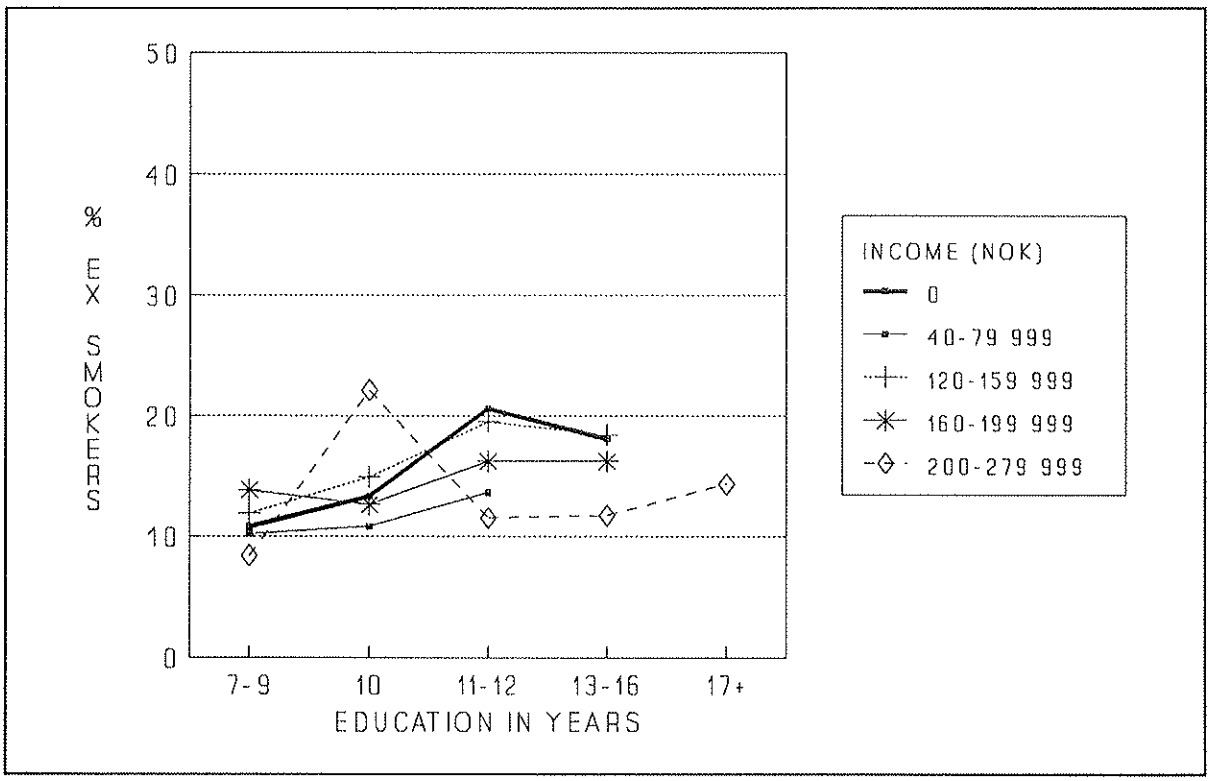

Table 46 Quitting (per cent) by education and income, men

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	20.6	25.3	38.8	22.0	*	22.6	25.5	433
1-39	26.8	31.6	34.7	33.0	40.4	27.7	31.2	1206
40-79	26.5	37.7	35.6	33.8	-	28.0	31.5	1950
80-119	30.5	37.0	35.6	53.0	50.2	31.9	35.3	3793
120-159	33.3	36.7	36.6	41.5	26.6	34.1	37.0	9256
160-199	35.7	42.3	41.4	49.0	43.8	38.9	39.3	8055
200-279	35.8	45.5	47.5	54.4	58.4	46.5	41.0	5802
280+	46.6	40.3	52.4	58.8	63.1	56.1	43.7	2436
Total Age[1]	32.6	40.4	42.8	53.0	59.8	37.9		
Tot. Income[3]	35.3	40.1	40.0	45.2	44.9		37.9	
n=	19092	4697	4472	3092	1578			32931

* 3 ex-smokers, no current smokers.
[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 39 Quitting (per cent) by education and selected incomes, men

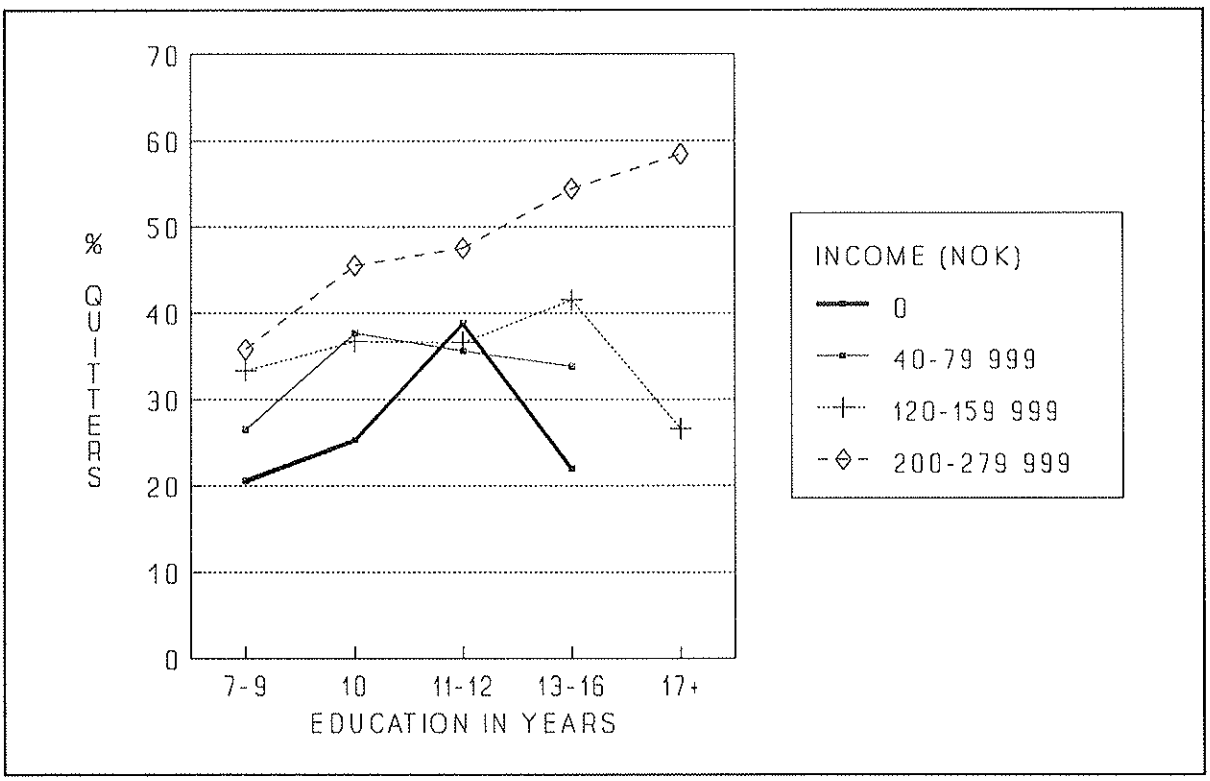

Table 47 Quitting (per cent) by education and income, women

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+*	Total Age[1]	Total Education[2]	n=
0	26.6	33.8	41.0	42.0	0	28.1	29.1	5144
1-39	21.9	35.1	42.8	36.1	0	24.3	24.9	4458
40-79	18.8	29.8	30.0	7.7	0	19.5	20.0	3017
80-119	20.9	25.1	36.5	55.0	66	23.5	22.9	1948
120-159	20.8	26.9	36.5	45.7	100	25.0	23.3	1253
160-199	27.9	24.0	36.2	47.8	100	34.5	26.1	438
200-279	14.4	40.9	24.5	33.4	22.6	28.2	15.6	112
280+*	50	0	33	50	50	41.7	31.9	17
TotalAge[1]	22.4	29.2	37.4	44.8	52.3	34.6		
Tot.Income[3]	22.5	29.3	37.3	41.8	47.8		34.6	
n=	13084	1917	740	610	36			16387

* Entire row and column based on small numbers.
[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 40 Quitting (per cent) by education and selected incomes, women

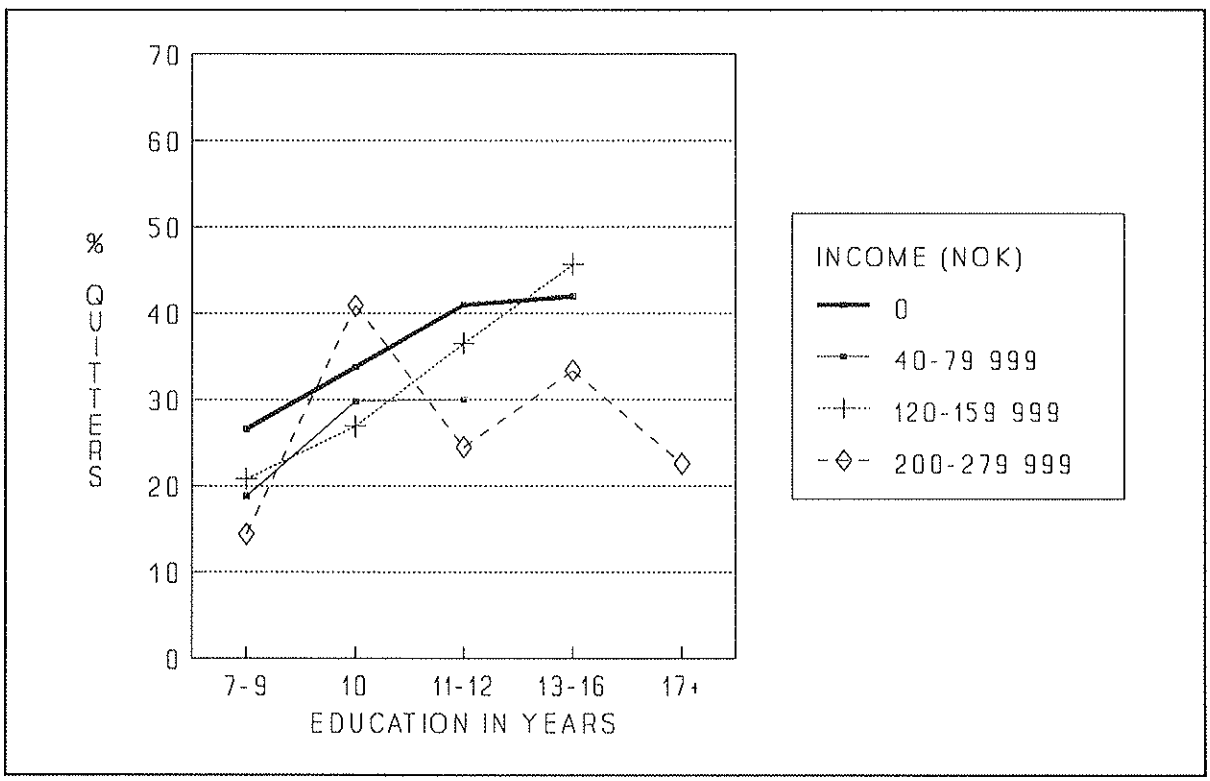

Table 48 Mean MI risk score by education and income, men

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	79.8	77.3	72.2	49.2	32.1	77.8	73.4	438
1-39	74.4	75.2	73.9	34.8	37.9	73.6	69.0	1219
40-79	72.6	67.2	53.7	44.9	26.3	70.3	65.9	1963
80-119	64.6	52.0	53.5	41.8	28.6	61.9	58.1	3819
120-159	61.8	56.4	55.0	40.1	38.7	60.0	56.7	9307
160-199	56.8	51.0	56.3	43.9	39.5	54.5	53.8	8089
200-279	62.0	53.7	51.6	38.6	35.4	49.8	55.4	5827
280+	55.0	68.3	55.1	40.8	35.2	44.9	57.5	2442
Total Age[1]	62.9	55.3	54.6	40.5	35.4	57.3		
Tot. Income[3]	60.2	55.8	57.5	45.4	42.6		57.3	
n=	19207	4728	4482	3103	1584			33104

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.

Figure 41 Mean MI risk score (log scale) by education and selected incomes, men

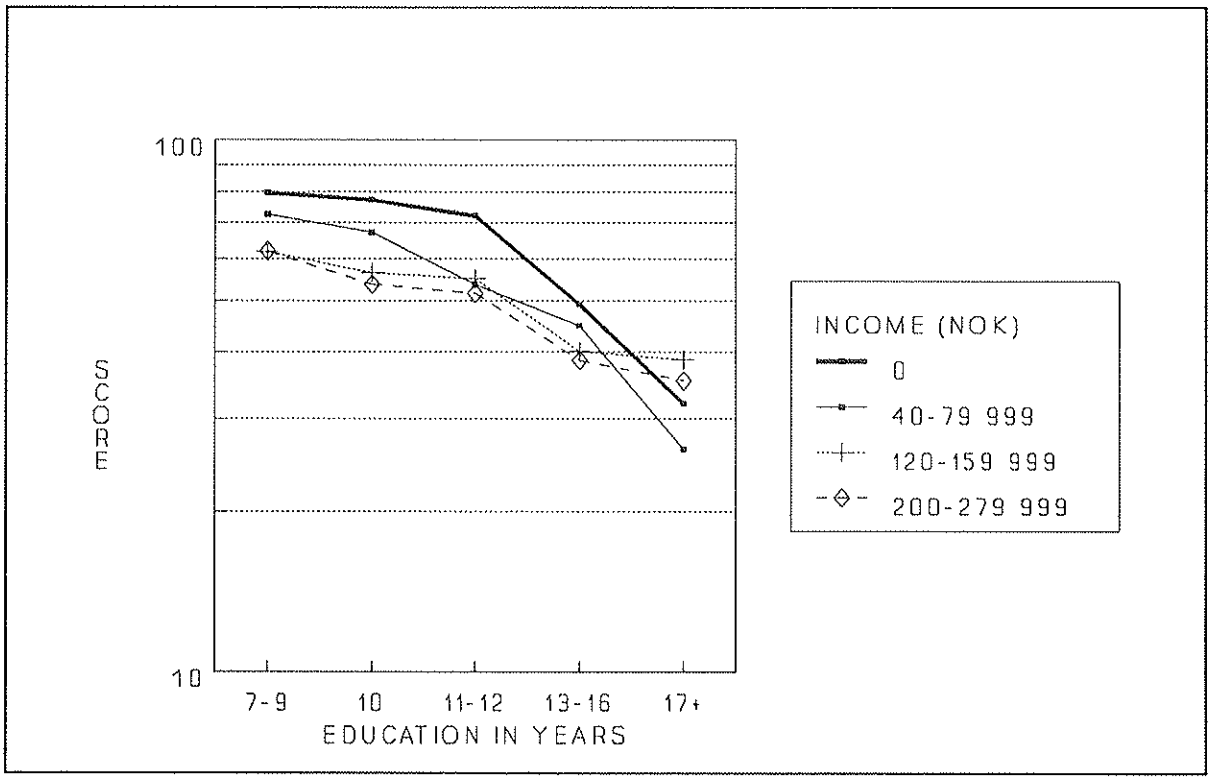

Table 49 MI risk score (ln), linear regression, men

Descriptive Statistics:

	Mean	S.D.	Label
Ln MI risk score	3.51	0.98	Ln score
Age	44.72	2.87	Age at screening (40-49 years)
BMI	2.50	0.30	Body Mass Index (g/cm^2)
Treatment BP	0.03	0.18	Blood pressure medication
Finnmark Yes/No	0.11	0.31	Living in Finnmark
Oslo Yes/No	0.49	0.50	Living in Oslo
Education 10 yrs	0.14	0.35	10 years of education
Education 12 yrs	0.13	0.34	11-12 years of education
Education 13+ yrs	0.14	0.35	13+ years of education
Income	164.88	74.01	Income·1000 NOK,(<500000)
Income 0	0.01	0.11	No income

N of Cases = 32420

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	10	3173.6	317.36
Residual	32409	27896.3	0.86
		F = 368.70	Signif F < 0.0

Regression analysis, dependent variable: Ln MI risk score

Multiple R	0.32
R Square	0.10
Adjusted R Square	0.10
Standard Error	0.93

Variable	Coeff.	S.E. Coeff	Beta	t	p
Age	0.02	1.80E-03	0.068	12.9	<0.001
BMI	0.58	0.018	0.176	33.0	<0.001
Treatment BP	0.50	0.030	0.089	16.7	<0.001
Education 10 yrs	-0.12	0.016	-0.042	-7.6	<0.001
Education 12 yrs	-0.12	0.017	-0.043	-7.5	<0.001
Education 13+ yrs	-0.29	0.018	-0.102	-15.8	<0.001
Finnmark Yes/No	0.57	0.018	0.180	32.0	<0.001
Oslo Yes/No	0.15	0.012	0.075	12.7	<0.001
Income	-6.9E-04	8.72E-05	-0.052	-7.9	<0.001
Income	0.09	0.047	0.010	1.9	0.06
Constant	1.06	0.092		1.5	<0.001

Income less than 500000, Natural log of score.

Table 50 Mean MI risk score by education and income, women

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13-16	17+	Total Age[1]	Total Education[2]	n=
0	9.44	6.90	10.57	7.19	4.07	9.20	9.04	5109
1-39	9.32	7.54	6.47	5.26	17.07	9.00	8.86	4402
40-79	9.11	6.29	5.88	4.84	5.00	8.60	8.52	2999
80-119	8.75	8.27	6.78	4.87	4.22	8.36	8.47	1933
120-159	8.43	7.99	7.20	6.77	2.87	8.08	8.51	1248
160-199	7.44	7.88	5.65	5.56	2.24	6.56	7.78	433
200-279	8.15	3.43	4.39	5.11	6.93	5.39	7.21	108
280+	6.8*	43.2*	5.9*	3.2*	11.9*	9.51	10.16	17
TotalAge[1]	9.18	7.31	7.27	5.65	7.55	8.75		
Tot.Income[3]	9.10	7.41	7.53	6.39	8.81		8.75	
n=	12985	1900	727	603	34			16249

[1] Adjusted for age by 1-year age groups.
[2] Adjusted for age and education.
[3] Adjusted for age and income.
* 5 or less in cell

Figure 42 Mean MI risk score (log scale) by education and selected incomes, women

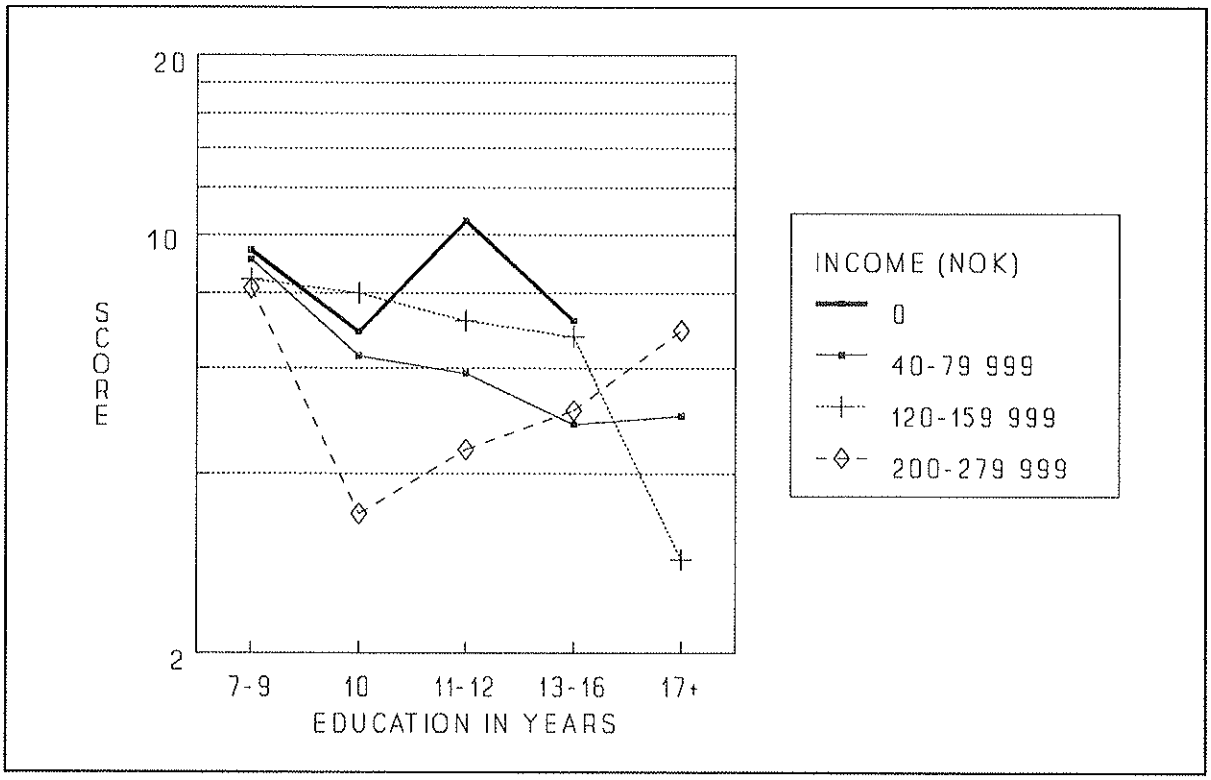

Table 51 MI risk score (ln) linear regression, women

Descriptive Statistics:

	Mean	S.D.	Label
Ln MI risk score	1.70	0.92	Ln score
Age	44.72	2.88	Age at screening (40-49 years)
BMI	2.50	0.42	Body Mass Index (g/cm^2)
Treatment BP	0.05	0.22	Blood pressure medication
Finnmark Yes/No	0.20	0.40	Living in Finnmark
Education 10 yrs	0.12	0.32	10 years of education
Education 12 yrs	0.04	0.20	11-12 years of education
Education 13+ yrs	0.04	0.19	13+ years of education
Income	44.01	52.19	Income in 1000 1987 NOK
Income 0	0.32	0.46	No income

N of Cases = 16039

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	9	1508.3	167.59
Residual	16029	12185.1	0 .76
		F = 220.5	Signif F = 0.0

Regression analysis: Dependent variable ln MI risk score

Multiple R	0.33
R Square	0.11
Adjusted R Square	0.11
Standard Error	0.87

Variable	Coeff.	S.E. Coeff	Beta	t	p
Age	0.05	2.4E-03	0.16	22.0	<0.001
BMI	0.25	0.02	0.11	14.9	<0.001
Treatment BP	0.49	0.03	0.11	15.0	<0.001
Education 10 yrs	-0.14	0.02	-0.05	-6.5	<0.001
Education 12 yrs	-0.17	0.03	0.04	-5.1	<0.001
Education 13+ yrs	-0.34	0.04	-0.07	-8.9	<0.001
Finnmark Yes/No	0.39	0.02	0.17	22.5	<0.001
Income	4.2E-05	1.7E-04	2.4E-03	0.2	0.81
Income 0	0.01	0.02	6.4E-03	0.7	0.49
(Constant)	-1.40	0.11		-12.4	<0.001

Income less than 300 000, natural log score

Table 52 Physical inactivity by education and income, logistic regression, Oslo men

Descriptive statistics of independent variables:

Variable name		Group Index	Freq	Design variables (1)	(2)	(3)	(4)	(5)	(6)
Education	7-9		6936	0	0	0			
	10	1	2410	1	0	0			
	11-12	2	3179	0	1	0			
	13+	3	3427	0	0	1			
Income·1000	1-40		210	0	0	0	0	0	0
	40-80	1	315	1	0	0	0	0	0
	80-120	2	1067	0	1	0	0	0	0
	120-160	3	4207	0	0	1	0	0	0
	160-200	4	4443	0	0	0	1	0	0
	200-280	5	3810	0	0	0	0	1	0
	280+	6	1900	0	0	0	0	0	1

Log likelihood = -8109.417

Goodn.Fit X^2 (2*O*ln(O/E)) =25.6 D.F.= 18 p-value= 0.11

Goodn.Fit X^2 (Hosmer-Lem.) = 5.1 D.F.= 8 p-value= 0.75

Logistic regression, dependent variable physical inactivity in Oslo men.

	Value(s)	Term	Coeff.	S.E.	Coeff./S.E.	e^{Coeff}
Education	10	(1)	-0.24	0.06	-4.1	0.79
	11-12	(2)	-0.38	0.06	-6.7	0.69
	13+	(3)	-0.54	0.07	-8.3	0.58
Income	40-80	(1)	0.31	0.20	1.5	1.36
	80-120	(2)	0.36	0.17	2.1	1.44
	120-160	(3)	-0.09	0.17	-0.5	0.92
	160-200	(4)	-0.20	0.17	-1.2	0.82
	200-280	(5)	-0.15	0.17	-0.9	0.86
	280+	(6)	-0.30	0.18	-1.7	0.74
Constant			-1.00	0.16	-6.1	0.37

All F-statistics to remove were highly significant, $p<0.0005$.

A total of 15952, are used of which 3378 have no leisure physical activity, and 12574 some activity. Men with 0 income are excluded.

Table 53 Physical inactivity by education and income, logistic regression, Sogn og Fjordane and Oppland men

Descriptive statistics of independent variables:

Variable name		Group Index	Freq	Design variables (1)	(2)	(3)	(4)	(5)	(6)
Education	7-9		9099	0	0	0			
	10	1	1882	1	0	0			
	11-12	2	1013	0	1	0			
	13+	3	1047	0	0	1			
Income·1000	1-40		660	0	0	0	0	0	0
	40-80	1	1140	1	0	0	0	0	0
	80-120	2	2110	0	1	0	0	0	0
	120-160	3	3908	0	0	1	0	0	0
	160-200	4	2964	0	0	0	1	0	0
	200-280	5	1769	0	0	0	0	1	0
	280+	6	490	0	0	0	0	0	1
County	Oppland		8429	0					
	Sogn og Fjordane	1	4612	1					

Log likelihood = -5949.87

Goodn. Fit X^2 (2*O*ln(O/E))	=71.4	D.F.=45	P-value=0.01
Goodn. Fit X^2 (Hosmer-Lem.)	= 7.8	D.F.= 8	P-value=0.46

	Value(s)	Term	Coeff.	S.E	Coeff/S.E.	e^{Coeff}
Education	10	(1)	0.002	0.07	0.28	1.02
	11-12	(2)	-0.16	0.10	-1.67	0.85
	13+	(3)	-0.38	0.11	-3.43	0.68
Income	40-80	(1)	-0.13	0.11	-1.12	0.88
	80-120	(2)	-0.26	0.10	-2.55	0.77
	120-160	(3)	-0.66	0.10	-6.62	0.52
	160-200	(4)	-0.81	0.10	-7.71	0.45
	200-280	(5)	-0.55	0.12	-4.69	0.58
	280+	(6)	-0.40	0.16	-2.50	0.67
County		(1)	-0.06	-0.05	-1.17	0.94
Constant			-1.00	0.09	-10.90	0.37

All F-statistics to remove terms were highly significant, $p<0.003$.

A total of 13041 Sogn og Fjordane and Oppland men were used, of which 2247 had no leisure physical activity, and 10794 had some activity. Men with 0 income are excluded.

Table 54 Physical inactivity by education and income, logistic regression, Finnmark, men

Descriptive statistics of independent variables:

Variable name		Group Index	Freq	Design variables (1)	(2)	(3)	(4)	(5)	(6)
Education	7-9		2749	0	0	0			
	10	1	381	1	0	0			
	11-12	2	252	0	1	0			
	13+	3	188	0	0	1			
Income·1000	1-40		320	0	0	0	0	0	0
	40-80	1	467	1	0	0	0	0	0
	80-120	2	624	0	1	0	0	0	0
	120-160	3	1031	0	0	1	0	0	0
	160-200	4	685	0	0	0	1	0	0
	200-280	5	358	0	0	0	0	1	0
	280+	6	85	0	0	0	0	0	1

Log likelihood = -1858.035

Goodn.Fit X^2 (2*O*ln(O/E))	=17.1	D.F.=18	p-value=0.52
Goodn.Fit X^2 (Hosmer-Lem.)	= 0.8	D.F.= 8	p-value=0.99

	Value(s)	Term	Coeff.	S.E.	Coeff/S.E.	e^{Coeff}
Education	10	(1)	0.11	0.13	0.80	1.11
	11-12	(2)	0.14	0.16	0.82	1.14
	13+	(3)	-0.37	0.22	-1.69	0.69
Income	40-80	(1)	0.32	0.18	1.78	1.37
	80-120	(2)	0.14	0.17	0.81	1.15
	120-160	(3)	0.06	0.16	0.39	1.07
	160-200	(4)	0.16	0.17	0.92	1.17
	200-280	(5)	0.33	0.20	1.63	1.39
	280+	(6)	0.50	0.30	1.67	1.65
Constant			-1.45	0.14	-10.19	0.23

Statistics to enter or remove terms

Term	F to remove	D.F.	D.F.	p-value
Education	1.71	3	3557	0.16
Income	1.29	6	3554	0.26
Constant	103.5	1	3559	0.00

A total of 3570 Finnmark residents were used, of which 772 had no leisure physical activity and 2798 had some activity. Men with 0 income were excluded.

Table 55 Physical inactivity by income and education, logistic regression, women

Descriptive statistics of independent variables:

Variable name	Min.	Max.	Mean
Sogn/Oppl.	0.00	1.00	0.80
Finnmark	0.00	1.00	0.20

Variable Name	Group Index	Label	Freq	Design variables (1)	(2)	(3)	(4)	(5)
Education		7-9	12989	0	0	0		
	1	10	1897	1	0	0		
	2	11-12	722	0	1	0		
	3	13+	540	0	0	1		
income·1000		0	5104	0	0	0	0	0
	1	1-40	4363	1	0	0	0	0
	2	40-80	2992	0	1	0	0	0
	3	80-120	1946	0	0	1	0	0
	4	120-160	1227	0	0	0	1	0
	5	160+	516	0	0	0	0	1

Log likelihood = -8599.394

Goodn.Fit X^2 (2·O·ln(O/E))	=37.8	D.F.=32	p-value=0.22
Goodn.Fit X^2 (Hosmer-Lem.)	= 5.4	D.F.= 8	p-value=0.71

Logistic regression with physical inactivity as dependent variable, women

Term		Coeff.	S.E	Coeff/S.E.	$e^{Coeff.}$
Education	(1)	-0.138	0.06	-2.3	0.87
	(2)	-0.228	0.10	-2.3	0.80
	(3)	-0.351	0.13	-2.7	0.70
Income	(1)	-0.295	0.05	-6.1	0.74
	(2)	-0.484	0.06	-8.7	0.62
	(3)	-0.450	0.07	-6.9	0.64
	(4)	-0.475	0.08	-5.9	0.62
	(5)	-0.283	0.13	-2.3	0.75
Finnmark No/Yes		0.360	0.05	8.0	1.43
Constant		-0.994	0.03	-29.8	0.37

All F-statistics to remove were highly significant, $p < 0.002$.

16148 women are used, of which 3708 have no leisure physical activity, and 12440 have some or much activity.

Table 56 Occupations ranked by mean systolic blood pressure, men

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
Total population			136.4	16.52	0.09	33173	87- 248
202710	1	Religious	129.9	13.50	1.95	48	102- 176
202810	2	Jurists	130.3	15.89	1.68	89	105- 209
242028	3	Reindeer herder	130.3	17.19	1.79	92	97- 182
202630	4	Students	130.6	12.92	1.86	48	110- 173
202025	5	Chief engineer	132.0	13.45	0.65	426	101- 178
202110	6	Science, natural	132.4	14.22	1.25	130	101- 188
212010	7	Central administration	132.9	16.13	1.30	155	100- 180
204026	8	Staff service	133.1	17.01	1.19	205	101- 226
202622	9	Univ. lecturer	133.2	13.39	1.39	93	111- 176
232110	10	Real estate	133.2	15.22	1.03	220	98- 187
292110	11	Hotel/restaurant	133.4	14.48	1.34	117	101- 179
202310	12	Physician	133.4	14.29	1.76	66	107- 193
202624	13	Vocational teacher	133.7	15.20	0.67	507	100- 198
222010	14	Book keeping	133.8	15.48	0.73	452	93- 202
202623	15	Teacher	133.9	14.87	0.75	392	100- 192
202023	16	Engineer	134.0	15.64	0.41	1454	95- 248
202021	17	Architect	134.1	14.90	1.46	104	110- 201
202510	18	Health professional	134.1	14.42	1.60	81	107- 189
202910	19	Artistic	134.5	17.13	1.14	224	101- 234
292929	20	Personal service	134.8	16.34	0.92	314	99- 216
212129	21	Other leader	134.6	14.89	0.81	334	103- 186
212110	22	Business administration	134.7	15.90	0.41	1486	98- 246
204021	23	Accountant	134.9	15.01	1.11	183	108- 199
212024	24	Local administration	135.0	15.98	1.13	201	108- 206
262010	25	Ship officer	135.2	15.28	1.16	172	96- 198
262610	26	Traffic control	135.4	15.15	1.33	130	109- 184
101010	27	No occupation	135.5	18.09	0.68	715	89- 238
202925	28	Editor, journalist	135.5	15.57	1.45	115	98- 192
232310	29	Sales, from office	135.5	16.45	0.66	617	98- 206
292010	30	Surveillance	135.6	16.94	0.86	388	100- 237
262110	31	Seamen	135.7	17.54	1.67	111	98- 196
292310	32	Janitor, cleaning	135.7	16.71	0.78	459	104- 213
282523	33	Production, plastic.	135.9	16.78	1.27	174	99- 211
222910	34	Office work NEC	136.0	17.34	0.41	1785	89- 245
301010	35	Military	136.0	15.94	0.88	328	103- 220
262710	36	Post/telecommunication	136.1	17.20	0.97	316	102- 220
252929	37	Mine/quarry	136.1	16.47	0.99	279	99- 216
232210	38	Sales, personal	136.4	17.75	0.88	405	97- 215
202410	39	Nurse	136.4	17.50	2.12	68	99- 198
232322	40	Shop keeper	136.4	16.98	0.83	414	104- 197
202322	41	Dentist	136.6	13.21	1.51	77	110- 170
282810	42	Dock work	136.7	16.86	0.54	979	97- 223
272610	43	Electrician	136.7	16.32	0.46	1256	98- 212
272310	44	Smelterwork	136.7	16.61	0.80	436	99- 203
282310	45	Chemical processing	136.9	15.16	1.04	211	99- 186
272525	46	Plumber	136.9	15.75	0.90	308	96- 188
262510	47	Conductor etc.	137.0	16.72	0.89	355	106- 209
272510	48	Iron/metal work	137.1	16.39	0.32	2606	96- 228
212123	49	Adm. secretary	137.1	18.52	1.19	244	93- 240
262425	50	Driver	137.2	16.33	0.37	1931	95- 227

Table 56 continued

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
272821	51	Building painter	137.2	16.15	0.86	354	96- 212
232010	52	Sales, whole/retail	137.5	17.62	0.75	550	95- 232
272710	53	Wood work	137.6	16.68	0.89	349	104- 215
282210	54	Food processing	137.7	16.11	0.60	728	102- 200
282710	55	Machine operator	137.7	16.58	0.56	866	99- 217
282022	56	Repro/graphic industry	137.7	17.25	0.79	478	100- 210
272910	57	Construction else	137.7	15.75	0.48	1097	100- 222
272724	58	Carpenter	138.0	16.45	0.39	1818	92- 230
242021	59	Farming etc.	138.0	16.83	0.36	2243	87- 232
272010	60	Textile industry	138.1	17.28	1.08	257	102- 209
242310	61	Fishing	138.1	17.09	0.63	729	99- 225
232323	62	Cashier, shop	138.3	17.23	0.77	504	99- 230
272410	63	Fine mechanic	139.4	17.24	1.26	188	110- 210
242110	64	Farm worker	141.0	17.88	0.77	534	99- 228
242410	65	Logger	141.6	16.48	1.24	178	98- 194

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between Groups	64	104044.3	1625.7	5.97	<0.0005
Within Groups	33108	9014287.6	272.3		

Table 57 Occupations ranked by mean systolic blood pressure, women

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
Total population:			133.9	18.2	0.14	16418	88- 262
202421	1	Nurse	125.6	13.9	1.05	177	92- 171
201010	2	Technical/science	128.1	14.9	1.34	123	98- 176
202623	3	Teacher	128.2	15.3	0.75	415	97- 195
292929	4	Other service	128.5	16.4	1.49	121	98- 198
202429	5	Aux nurse	130.0	17.5	1.19	218	93- 180
222010	6	Clerks	130.8	16.5	0.63	699	98- 204
101010	7	No occupation	131.4	17.0	0.49	1200	88- 250
262710	8	Post/telecomm.	131.8	16.7	1.05	253	93- 190
212010	9	Administration	132.2	19.3	1.65	137	101- 200
202910	10	Artists, students	132.4	17.4	2.94	35	96- 197
232323	11	Cashier, shop	132.8	17.8	0.63	811	93- 237
242310	12	Industry, manual work	133.2	17.7	1.16	232	100- 195
292110	13	Hotel/restaurant	133.4	18.8	0.75	632	89- 222
292310	14	Cleaning etc.	133.8	17.3	0.60	826	90- 224
282621	15	Packing	134.5	18.1	1.97	84	95- 195
272010	16	Textile industry	134.7	21.2	1.32	260	97- 262
282210	17	Food processing	134.7	18.1	1.11	267	97- 209
292130	18	House work	134.9	18.6	0.22	7474	89- 257
242110	19	Farming	136.3	18.6	0.38	2454	95- 253

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	18	75736.6	4207.6	12.8	<0.0005
Within groups	16399	5380131.6	328.1		

Table 58 Occupations ranked by mean diastolic blood pressure, men

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
Total population			86.3	10.94	0.06	33171	17-170
242028	1	Reindeer herder	80.9	11.01	1.15	92	49-109
202110	2	Science, natural	82.9	10.43	1.15	130	60-126
202630	3	Students	84.3	10.02	1.45	48	59-107
202022	4	Chief engineer	84.5	9.82	0.48	426	48-124
212010	5	Central administration	84.8	11.21	0.90	155	56-117
202622	6	Univ. lecturer	84.9	9.60	1.00	93	66-118
202810	7	Jurists	85.0	9.18	0.97	89	66-103
282310	8	Chemical processing	85.2	9.69	0.67	211	61-109
204026	9	Staff service	85.2	10.76	0.75	205	63-118
202322	10	Dentist	85.4	9.71	1.11	77	62-105
252929	11	Mine/quarry	85.5	10.45	0.63	279	53-114
272310	12	Smelterwork	85.5	11.17	0.54	436	57-128
222010	13	Book keeping	85.6	10.61	0.50	452	49-137
202910	14	Artistic	85.6	11.85	0.79	224	38-128
202410	15	Nurse	85.6	12.05	1.46	68	61-126
292310	16	Janitor, cleaning	85.7	10.42	0.49	459	56-127
242021	17	Farming etc.	85.7	10.88	0.23	2243	50-140
232110	18	Real estate	85.8	11.08	0.75	219	63-131
202023	19	Engineer	85.8	10.39	0.27	1454	51-129
204021	20	Accountant	85.8	10.11	0.75	183	59-132
202710	21	Religious	85.8	9.04	1.31	48	69-111
202624	22	Vocational teacher	85.9	10.27	0.46	507	59-129
272724	23	Carpenter	85.9	11.18	0.26	1818	52-136
292110	24	Hotel/restaurant	85.9	11.30	1.05	117	58-116
242110	25	Farm worker	86.0	10.93	0.47	534	40-142
272510	26	Iron/metal work	86.1	10.94	0.21	2606	32-129
262110	27	Seamen	86.2	11.24	1.07	111	57-121
202623	28	Teacher	86.2	10.79	0.55	392	57-125
282210	29	Food processing	86.2	11.04	0.41	728	57-132
262610	30	Traffic control	86.2	10.57	0.93	130	54-113
272610	31	Electrician	86.3	10.76	0.30	1256	41-131
212110	32	Business administration	86.3	10.89	0.28	1486	39-139
212129	33	Other leader	86.3	10.38	0.57	334	59-122
262010	34	Ship officer	86.3	10.66	0.81	172	60-116
272525	35	Plumber	86.4	10.95	0.62	308	56-123
301010	36	Military	86.6	10.42	0.58	328	30-128
272910	37	Construction else	86.6	10.66	0.32	1097	56-138
232310	38	Sales, from office	86.6	11.54	0.46	617	60-137
292929	39	Personal service	86.7	11.08	0.75	221	60-118
272821	40	Building painter	86.7	11.10	0.59	354	60-156
202510	41	Health professional	86.7	9.92	1.10	81	56-118
292010	42	Surveillance	86.7	11.04	0.56	387	56-128
222910	43	Office work NEC	86.7	11.19	0.26	1785	17-131
232322	44	Shop keeper	86.7	11.05	0.54	414	60-127
242310	45	Fishing	86.7	10.24	0.38	729	60-122
282710	46	Machine operator	86.8	11.36	0.39	866	59-148
212024	47	Local administration	86.8	9.90	0.70	201	61-131
272710	48	Wood work	86.8	10.20	0.55	349	57-118
272010	49	Textile industry	86.9	11.91	0.74	257	59-129
282523	50	Production, plastic etc.	86.9	10.73	0.81	174	57-116

Table 58 continued

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
282810	51	Dock work	86.9	11.61	0.37	979	52-151
242410	52	Logger	86.9	11.32	0.85	178	59-146
262425	53	Driver	87.0	10.98	0.25	1931	45-130
262710	54	Post/telecommunication	87.0	10.70	0.60	316	56-121
101010	55	No occupation	87.0	12.02	0.46	680	48-152
262510	56	Conductor etc.	87.0	10.54	0.56	355	63-124
232010	57	Sales, whole/retail	87.2	11.08	0.47	550	55-136
212123	58	Adm. secretary	87.2	12.14	0.78	244	46-139
232210	59	Sales, personal	87.5	11.36	0.56	405	63-131
282022	60	Repro/graphic industry	87.5	11.37	0.52	478	48-130
232323	61	Cashier, shop	87.7	11.29	0.50	504	58-170
202021	62	Architect	87.7	10.81	1.06	104	66-119
202925	63	Editor, journalist	87.8	9.74	0.91	115	71-118
272410	64	Fine mechanic	88.5	10.92	0.80	188	66-120
202310	65	Physician	89.2	10.29	1.27	66	69-129

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	64	18141.6	283.5	2.34	<0.0005
Within groups	33106	3950227.2	119.3		

Table 59 Occupations ranked by mean diastolic blood pressure, women

Code	Rank	Occupation grouped	Mean	S.D.	S.E.M	n=	min-max
Total population:			82.4	10.6	0.08	16418	24-165
202421	1	Nurse	79.7	9.3	0.70	177	57-102
202429	2	Aux. Nurse	80.1	10.2	0.69	218	57-115
202623	3	Teacher	80.2	9.5	0.47	415	50-110
201010	4	Technical/Science	80.6	10.1	0.91	123	59-110
292929	5	Other service	80.8	9.4	0.85	121	58-112
222010	6	Clerks	81.0	9.7	0.38	699	53-120
282621	7	Packing	81.2	11.6	1.26	84	58-120
202910	8	Artists, students	81.2	10.6	1.82	35	59-108
212010	9	Administration	81.6	11.3	0.96	137	58-119
282210	10	Food processing etc.	81.6	9.9	0.61	267	61-112
101010	11	No occupation	81.7	10.5	0.30	1200	51-121
242310	12	Industry, manual work	81.8	10.3	0.68	232	61-124
262710	13	Post and telecomm.	81.9	10.3	0.65	253	53-117
272010	14	Textile industry	82.0	12.0	0.75	260	47-148
232323	15	Cashier, shop	82.0	10.7	0.37	811	53-136
292310	16	Cleaning etc.	82.1	10.0	0.35	826	55-123
292110	17	Hotel/restaurant	82.3	10.8	0.43	632	55-133
292130	18	House work	82.9	10.8	0.12	7474	24-165
242110	19	Farming	83.5	10.9	0.22	2454	43- 146

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	18	12411.7	689.5	6.1	<0.0005
Within groups	16399	1848638.8	112.7		

Table 60 Occupations ranked by mean serum cholesterol, men

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
Total population			7.00	1.33	0.01	33162	2.5- 25.3
202021	1	Architect	6.62	1.05	0.10	104	4.2- 9.9
202810	2	Jurists	6.62	1.06	0.11	89	4.1- 9.5
202310	3	Physician	6.64	1.00	0.12	66	4.4- 9.5
202630	4	Students	6.66	1.40	0.20	48	4.6- 9.9
202322	5	Dentist	6.71	1.15	0.13	77	3.8- 10.0
202110	6	Science, natural	6.74	1.19	0.11	130	4.1- 10.8
202623	7	Teacher	6.76	1.14	0.06	393	4.3- 11.0
202710	8	Religious	6.77	1.52	0.22	48	3.2- 10.8
202022	9	Chief engineer	6.79	1.14	0.06	426	4.1- 11.5
212024	10	Local administration	6.79	1.78	0.13	201	3.8- 25.3
202622	11	Univ. lecturer	6.80	1.10	0.11	93	3.9- 9.4
212010	12	Central administration	6.81	1.39	0.11	155	4.4- 14.2
202023	13	Engineer	6.82	1.27	0.03	1454	3.0- 18.4
202624	14	Vocational teacher	6.82	1.32	0.06	509	3.9- 15.7
202910	15	Artistic	6.85	1.19	0.08	223	4.0- 11.3
202510	16	Health professional	6.85	2.26	0.25	81	4.3- 23.0
232110	17	Real estate	6.87	1.17	0.08	220	3.1- 10.4
222010	18	Book keeping	6.88	1.24	0.06	452	3.9- 12.0
272710	19	Wood work	6.88	1.24	0.07	349	3.7- 12.2
212129	20	Other leader	6.88	1.14	0.06	335	3.3- 10.6
232310	21	Sales, from office	6.88	1.16	0.05	617	4.2- 10.7
222910	22	Office work NEC	6.89	1.32	0.03	1784	2.6- 17.7
202925	23	Editor, journalist	6.89	1.25	0.12	115	3.7- 10.5
204026	24	Staff service	6.89	1.23	0.09	205	3.5- 10.2
282022	25	Repro/graphic industry	6.89	1.22	0.06	478	3.3- 11.8
212123	26	Adm. secretary	6.90	1.65	0.11	244	3.4- 21.6
242110	27	Farm work	6.90	1.35	0.06	533	2.9- 16.6
212110	28	Business administration	6.93	1.28	0.03	1486	2.5- 14.6
272410	29	Fine mechanic	6.93	1.26	0.09	188	3.9- 11.3
242021	30	Farming etc.	6.93	1.35	0.03	2241	2.8- 19.1
272310	31	Smelterwork	6.94	1.13	0.05	436	4.1- 11.6
232322	32	Shop keeper	6.94	1.24	0.06	413	3.9- 11.4
272010	33	Textile industry	6.94	1.61	0.10	257	3.1- 19.0
232010	34	Sales, whole/retail	6.95	1.25	0.05	550	4.1- 14.3
292010	35	Surveillance	6.96	1.23	0.06	388	4.2- 11.7
262710	36	Post/telecommunication	6.97	1.47	0.08	316	3.6- 17.7
282523	37	Production, plastic etc.	6.97	1.28	0.10	174	3.6- 11.4
272724	38	Carpenter	6.99	1.42	0.03	1818	3.4- 23.7
272821	39	Building painter	7.01	1.35	0.07	354	4.0- 12.5
272510	40	Iron/metal work	7.01	1.33	0.03	2602	3.7- 16.4
282310	41	Chemical processing	7.02	1.36	0.09	211	4.5- 16.7
292929	42	Personal service	7.02	1.30	0.09	221	4.3- 10.8
204021	43	Accountant	7.04	1.29	0.10	183	4.2- 10.8
301010	44	Military	7.05	1.22	0.07	328	3.5- 10.5
232210	45	Sales, personal	7.05	1.21	0.06	405	3.4- 14.0
232323	46	Cashier, shop	7.06	1.29	0.06	504	4.0- 12.4
262510	47	Conductor etc.	7.06	1.26	0.07	355	4.4- 15.0
262610	48	Traffic control	7.07	1.11	0.10	130	4.2- 9.9
282810	49	Dock work	7.07	1.32	0.04	979	3.5- 12.8
242410	50	Logger	7.08	1.31	0.10	180	3.8- 11.6

Table 60 continued.

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
272610	51	Electrician	7.09	1.38	0.04	1255	3.8- 18.2
262425	52	Driver	7.11	1.34	0.03	1932	2.7- 17.1
292310	53	Janitor, cleaning	7.12	1.43	0.07	458	3.6- 16.3
282710	54	Machine operator	7.12	1.32	0.04	866	3.8- 14.8
202410	55	Nurse	7.14	1.45	0.18	68	4.3- 11.0
292110	56	Hotel/restaurant	7.17	1.39	0.13	117	4.0- 11.3
272525	57	Plumber	7.17	1.31	0.07	308	3.7- 11.6
272910	58	Construction else	7.18	1.39	0.04	1095	3.1- 20.0
101010	59	No occupation	7.18	1.44	0.05	706	3.1- 11.8
262110	60	Seamen	7.20	1.33	0.13	111	4.1- 11.4
252929	61	Mine/quarry	7.21	1.39	0.08	279	4.1- 17.6
282210	62	Food processing	7.22	1.32	0.05	728	4.3- 11.8
262010	63	Ship officer	7.23	1.36	0.10	172	4.5- 10.6
242310	64	Fishing	7.64	1.46	0.05	728	3.7- 16.7
242028	65	Reindeer herder	7.67	1.73	0.18	91	4.1- 14.2

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	64	821.06	12.83	7.29	<0.0005
Within groups	33097	58249.04	1.76		

Table 61 Occupations ranked by mean cholesterol, women, adjusted for age and county

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
Total population:			6.94	1.31	0.010	16402	2.3- 19.6
202623	1	Teacher	6.63	1.08	0.054	414	3.9- 10.2
212010	2	Administration	6.68	1.18	0.103	137	4.3- 12.3
202910	3	Artists, students	6.71	1.50	0.242	36	4.3- 9.8
232323	4	Cashier, shop	6.78	1.18	0.043	810	3.2- 11.5
202421	5	Nurse	6.82	1.20	0.091	177	4.6- 10.6
201010	6	Technical/science	6.83	1.36	0.121	123	4.0- 11.4
262710	7	Post/telecomm	6.84	1.31	0.085	254	2.6- 16.2
101010	8	No occupation	6.88	1.32	0.039	1199	2.3- 17.1
222010	9	Clerks	6.90	1.27	0.049	697	3.9- 13.9
282621	10	Packing	6.90	1.18	0.129	84	4.7- 10.4
272010	11	Textile industry	6.91	1.23	0.075	261	4.0- 11.4
292929	12	Other service	6.92	1.20	0.108	121	2.7- 10.0
202429	13	Aux. nurse	6.97	1.30	0.087	218	4.4- 12.4
242110	14	Farming	6.97	1.36	0.027	2451	3.1- 19.0
292130	15	House work	6.97	1.32	0.016	7463	3.2- 19.1
292310	16	Cleaning etc.	7.02	1.31	0.048	827	3.7- 19.6
282210	17	Food processing	7.03	1.25	0.083	267	4.4- 13.1
292110	18	Hotel/restaurant	7.03	1.23	0.050	631	3.8- 11.6
242310	19	Industry, manual work	7.08	1.28	0.086	232	4.6- 11.6

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	18	111.17	6.18	3.64	0.001
Within groups	16383	27839.18	1.70		

Table 62 Occupations ranked by mean serum triglycerides, men

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
Total population			2.35	1.43	0.01	33160	0.39- 58.5
202310	1	Physician	1.84	0.80	0.10	66	0.70- 4.9
202810	2	Jurists	2.03	1.29	0.14	89	0.76- 9.7
202022	3	Chief engineer	2.04	0.93	0.04	426	0.56- 6.5
202021	4	Architect	2.06	0.93	0.09	104	0.61- 6.5
212123	5	Adm. secretary	2.07	1.08	0.07	244	0.70- 10.3
202322	6	Dentist	2.07	1.07	0.12	77	0.77- 5.5
202622	7	Univ. lecturer	2.08	1.17	0.12	93	0.72- 6.8
204026	8	Staff adm	2.09	1.17	0.08	205	0.67- 9.9
262110	9	Seamen	2.09	1.23	0.12	111	0.59- 10.6
212129	10	Other leader	2.12	1.01	0.06	335	0.75- 6.9
242310	11	Fishing	2.13	1.42	0.05	728	0.55- 23.1
222010	12	Book keeping	2.14	1.06	0.05	452	0.71- 7.4
202623	13	Teacher	2.14	1.10	0.06	393	0.61- 10.8
232110	14	Real estate	2.16	1.15	0.08	220	0.49- 11.9
212010	15	Central administration	2.16	1.26	0.10	155	0.77- 10.4
202023	16	Engineer	2.17	1.05	0.03	1454	0.57- 9.9
232310	17	Sales, from office	2.19	1.14	0.05	617	0.60- 10.8
202510	18	Health professional	2.20	1.09	0.12	84	0.64- 6.4
202910	19	Artistic	2.20	1.17	0.08	223	0.84- 7.3
262710	20	Post/telecommunication	2.22	1.20	0.07	316	0.58- 11.4
202925	21	Editor, journalist	2.22	1.21	0.11	115	0.77- 8.7
212110	22	Business administration	2.22	1.21	0.03	1486	0.53- 14.1
282022	23	Repro/graphic industry	2.22	1.27	0.06	478	0.59- 16.0
222910	24	Office work NEC	2.22	1.24	0.03	1784	0.39- 16.5
202624	25	Vocational teacher	2.23	1.25	0.06	509	0.68- 15.8
272310	26	Smelterwork	2.24	1.14	0.05	436	0.68- 9.0
292929	27	Personal service	2.24	1.15	0.08	220	0.66- 6.6
282523	28	Production, plastic etc.	2.24	1.00	0.08	174	0.63- 6.0
262010	29	Ship officer	2.24	1.14	0.09	172	0.52- 8.6
212024	30	Local administration	2.25	4.18	0.29	201	0.64- 58.5
232322	31	Shop keeper	2.27	1.24	0.06	413	0.68- 11.8
204021	32	Accountant	2.28	1.28	0.09	183	0.89- 10.5
202110	33	Science, natural	2.29	1.30	0.11	130	0.72- 11.2
272821	34	Building painter	2.31	1.30	0.07	354	0.54- 13.1
292010	35	Surveillance	2.33	1.54	0.08	388	0.61- 18.6
301010	36	Military	2.33	1.22	0.07	328	0.63- 12.1
282810	37	Dock work	2.35	1.22	0.04	979	0.58- 10.0
242410	38	Logger	2.36	1.32	0.10	180	0.57- 8.6
272724	39	Carpenter	2.37	1.47	0.03	1818	0.42- 27.3
292310	40	Janitor, cleaning	2.37	1.29	0.06	458	0.60- 10.3
232210	41	Sales, personal	2.37	1.19	0.06	405	0.69- 9.3
232010	42	Sales, whole/retail	2.39	1.51	0.06	550	0.64- 16.9
282210	43	Food processing	2.39	1.43	0.05	727	0.66- 18.1
242110	44	Farm worker	2.39	1.44	0.06	533	0.42- 13.3
202630	45	Students	2.40	1.78	0.26	48	0.65- 10.5
272910	46	Construction else	2.40	1.28	0.04	1095	0.58- 12.4
292110	47	Hotel/restaurant	2.41	1.45	0.10	210	0.74- 9.5
252929	48	Mine/quarry	2.41	1.31	0.08	279	0.62- 8.7
272010	49	Textile industry	2.41	1.44	0.09	257	0.73- 9.3
242021	50	Farming etc.	2.44	1.32	0.03	2241	0.44- 17.5

Table 62 continued

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
272510	51	Iron/metal work	2.46	1.44	0.03	2602	0.59- 24.4
272410	52	Fine mechanic	2.46	1.97	0.14	188	0.52- 20.4
262610	53	Traffic control	2.46	1.40	0.12	130	0.97- 9.6
272610	54	Electrician	2.47	2.02	0.06	1255	0.43- 45.3
232323	55	Cashier, shop	2.47	1.41	0.06	504	0.62- 10.3
242028	56	Reindeer herder	2.49	2.12	0.22	91	0.55- 14.2
202410	57	Nurse	2.52	1.07	0.13	68	1.03- 5.4
282310	58	Chemical processing	2.54	1.50	0.10	211	0.65- 15.2
272710	59	Wood work	2.54	1.50	0.08	349	0.75- 17.7
262425	60	Driver	2.55	1.52	0.03	1932	0.52- 24.1
272525	61	Plumber	2.58	1.88	0.11	308	0.60- 25.8
101010	62	No occupation	2.61	1.70	0.06	706	0.45- 19.0
262510	63	Conductor etc.	2.61	2.14	0.11	355	0.52- 29.3
282710	64	Machine operator	2.65	1.67	0.06	866	0.54- 21.6
202710	65	Religious	2.68	1.33	0.19	48	1.31- 7.7

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	64	762	11.9	5.90	<0.0005
Within groups	33095	66857	2.0		

Table 63 Occupations ranked by mean triglycerides, women, adjusted for age and county

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
Total population:			1.72	0.89	0.01	16402	0.3-20.0
202623	1	Teacher	1.42	0.65	0.03	414	0.5- 7.2
202910	2	Artists, students	1.44	0.81	0.14	36	0.6- 5.0
292929	3	Other service	1.52	0.64	0.06	121	0.6- 4.4
202421	4	Nurse	1.53	0.71	0.05	177	0.6- 5.3
201010	5	Technical/Science	1.59	0.82	0.08	123	0.6- 6.1
212010	6	Administration	1.59	0.71	0.06	137	0.5- 5.8
222010	7	Clerks	1.61	0.75	0.03	697	0.4- 7.7
232323	8	Cashier, shop	1.64	0.80	0.03	810	0.4- 9.1
262710	9	Post and telecomm.	1.65	0.87	0.06	254	0.4- 6.7
282210	10	Food processing etc.	1.69	0.80	0.05	267	0.6- 6.2
101010	11	No occupation	1.72	0.84	0.03	1199	0.5- 7.5
272010	12	Textile industry	1.72	0.85	0.05	261	0.3- 6.2
242110	13	Farming	1.74	0.85	0.02	2451	0.3- 9.6
292130	14	House work	1.75	0.96	0.01	7463	0.4-20.0
292310	15	Cleaning etc.	1.75	0.81	0.03	827	0.6- 6.3
292110	16	Hotel/restaurant	1.76	0.96	0.04	631	0.4-12.0
202429	17	Aux. nurse	1.78	1.08	0.07	218	0.4- 9.2
282621	18	Packing	1.78	0.73	0.08	84	0.4- 4.6
242310	19	Industry, manual work	1.79	0.91	0.06	232	0.5- 6.9

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	18	78.86	4.38	5.52	<0.0005
Within groups	16383	13014.56	0.79		

Table 64 Occupations ranked by percentage smoking cigarettes daily, men

Code	Rank	Occupation	Per cent	S.E.M	n=
Total population :			47.1	0.3	33396
202710	1	Religious	4.2	2.9	48
202310	2	Physician	16.4	4.5	67
202110	3	Science, natural	19.1	1.7	131
202322	4	Dentist	20.5	4.6	78
202623	5	Teacher	21.7	2.1	396
202810	6	Jurists	23.6	4.5	89
202510	7	Health professional	24.7	4.8	81
202622	8	University lecturer	25.8	4.6	93
202624	9	Vocational teacher	27.7	2.0	512
202021	10	Architect	28.9	4.5	104
204026	11	Staff administration.	29.3	3.2	205
202022	12	Chief engineer	29.7	2.2	428
212024	13	Local administration	33.0	3.3	203
242410	14	Logger	33.3	3.5	180
204021	15	Accountant	34.6	3.5	185
242021	16	Farming etc.	34.8	1.0	2258
212129	17	Other leader	35.8	2.6	335
212010	18	Central administration	35.9	3.8	156
202023	19	Engineer	36.6	1.3	1458
212123	20	Adm. secretary	37.1	3.1	245
212110	21	Business administration	38.5	1.3	1490
202410	22	Nurse	39.7	6.0	68
242110	23	Farm work	40.6	2.1	537
301010	24	Military	40.9	2.7	337
222010	25	Book keeping	41.0	2.3	454
262610	26	Traffic control	42.0	4.3	131
202925	27	Editor, journalist	42.2	4.6	116
232310	28	Sales, from office	43.5	2.0	618
202910	29	Artistic	44.0	3.3	225
222910	30	Office work NEC	44.8	1.2	1789
232110	31	Real estate	44.8	3.4	221
262510	32	Conductor etc.	45.1	2.6	355
272410	33	Fine mechanic	46.3	3.7	188
232323	34	Cashier, shop	46.4	2.2	507
232322	35	Shop keeper	46.5	2.5	417
272724	36	Carpenter	47.1	1.2	1831
262710	37	Post/telecommunication	47.5	2.8	322
272710	38	Wood work	48.4	2.7	349
292929	39	Personal service	48.4	2.8	223
292010	40	Surveillance	48.7	2.5	390
272610	41	Electrician	49.8	1.4	1265
232010	42	Sales, whole/retail	50.3	2.1	555
272010	43	Textile industry	50.8	3.1	258
232210	44	Sales, personal	50.9	2.5	407
292310	45	Janitor, cleaning	52.2	2.3	460
272510	46	Iron/metal work	52.4	1.0	2614
282022	47	Repro/graphic industry	52.5	2.3	478
272525	48	Plumber	52.6	2.8	308
282310	49	Chemical processing	52.6	3.5	211
282710	50	Machine operator	54.9	1.7	872

Table 64 continued

Code	Rank	Occupation	Per cent	S.E.M	n=
282523	51	Production, plastic etc.	55.2	3.8	174
101010	52	No occupation	55.3	1.9	727
202630	53	Students	56.3	7.2	48
262425	54	Driver	57.2	1.1	1938
272910	55	Construction	57.4	1.5	1105
282210	56	Food processing	58.5	1.8	732
282810	57	Dock work	59.9	1.6	982
272821	58	Building painter	59.9	2.6	354
292110	59	Hotel/restaurant	61.0	4.4	123
252929	60	Mine/quarry	61.6	2.9	284
272310	61	Smelterwork	61.9	2.3	438
262010	62	Ship officers	62.2	3.6	188
262110	63	Seamen	64.1	4.5	117
242028	64	Reindeer herder	67.4	4.9	92
242310	65	Fishing	72.0	1.7	744

Analysis of Variance,	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	64	65.8	5.72	23.9	<0.0005
Within groups	33331	7955.7	0.24		

Table 65 Occupations ranked by percentage smoking cigarettes daily, women

Code	Rank	Occupation	Per cent	S.E.M	n=
Total population:			35.8	0.4	16587
202623	1	Teacher	18.8	1.9	421
242110	2	Farming	20.4	0.8	2474
202421	3	Nurse	22.1	3.1	181
202910	4	Artists, students	24.3	7.2	37
201010	5	Technical/Science	30.7	4.2	124
212010	6	Administration	36.2	4.1	138
292130	7	House work	36.2	0.6	7540
262710	8	Post and telecomm.	36.8	3.0	253
272010	9	Textile industry	37.5	3.0	261
222010	10	Clerks	37.5	1.8	706
202429	11	Aux. nurse	40.7	3.3	221
101010	12	No occupation	43.0	1.4	1227
232323	13	Cashier, shop	43.4	1.7	356
292929	14	Other service	45.1	4.5	122
292110	15	Hotel/restaurant	46.2	2.0	638
292310	16	Cleaning etc.	48.2	1.7	834
242310	17	Industry, manual work	49.2	3.3	234
282210	18	Food processing etc.	53.7	3.0	272
282621	19	Packing	54.8	5.4	84

X^2=538.3 d.f.=18, p <0.0005, no cells with expected freqeuncies less than 5.

Analysis of Variance,	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	18	123.7	6.87	30.9	<0.0005
Within groups	16568	3689.4	0.22		

Table 66 Occupations ranked by mean MI risk score, men

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
Total population			57.3	85.5	0.5	33148	5- 2126
202710	1	Religious	25.6	25.3	3.7	48	5- 143
202310	2	Physician	27.1	25.0	3.1	66	5- 135
202810	3	Jurists	27.3	29.4	3.1	89	5- 166
202110	4	Science, natural	32.8	50.0	4.4	130	5- 514
202021	5	Architect	33.2	29.6	2.9	104	5- 159
202622	6	Univ. lecturer	34.2	39.3	4.1	93	5- 303
202022	7	Chief engineer	35.0	39.8	1.9	426	5- 377
202623	8	Teacher	35.4	46.6	2.4	392	5- 491
202322	9	Dentist	36.1	43.4	4.9	77	5- 264
202510	10	Health professional	41.7	69.8	7.8	81	5- 492
202624	11	Vocational teacher	41.2	61.5	2.7	507	5- 769
204026	12	Staff adm	42.0	52.0	3.6	205	5- 421
212024	13	Local administration	43.2	69.6	4.9	201	5- 562
212129	14	Other leader	43.4	52.3	2.9	334	5- 427
202023	15	Engineer	44.3	70.5	1.9	1454	5- 1118
222010	16	Book keeping	46.8	82.5	3.9	452	5- 1299
202630	17	Students	47.1	77.3	11.2	48	5- 503
242021	18	Farming etc.	47.7	62.1	1.3	2238	5- 818
204021	19	Accountant	48.1	54.7	4.1	183	5- 340
272710	20	Wood work	48.2	53.9	2.9	349	5- 371
232110	21	Real estate	49.0	72.4	4.9	220	5- 536
202910	22	Artistic	49.9	80.2	5.4	222	5- 874
242110	23	Farm worker	51.2	62.7	2.7	533	5- 654
212010	24	Central administration	51.6	101.2	8.1	155	5- 901
222910	25	Office work NEC	51.9	77.9	1.8	1783	5- 1297
301010	26	Military	52.0	60.8	3.4	328	5- 541
262610	27	Traffic control	53.4	70.8	6.2	130	5- 548
292010	28	Surveillance	54.0	84.6	4.3	388	5- 1047
232310	29	Sales, from office	54.0	77.5	3.1	617	5- 863
212123	30	Adm. secretary	54.4	91.1	5.8	244	5- 838
212110	31	Business administration	54.7	111.3	2.9	1486	5- 2126
282523	32	Production, plastic etc.	54.9	67.7	5.1	174	5- 522
272724	33	Carpenter	55.3	71.1	1.7	1817	5- 910
202410	34	Nurse	56.3	67.7	8.2	68	5- 337
262510	35	Conductor etc.	57.3	85.1	4.5	355	5- 791
272410	36	Fine mechanic	57.5	76.2	5.6	188	5- 375
262710	37	Post/telecommunication	58.4	79.6	4.5	320	5- 603
282310	38	Chemical processing	58.4	95.9	6.6	211	5- 787
232322	39	Shop keeper	58.4	107.6	5.3	413	5- 1153
232323	40	Cashier, shop	58.7	83.6	3.7	504	5- 1107
272310	41	Smelterwork	58.8	81.3	3.9	436	5- 973
272010	42	Textile industry	59.0	78.0	4.9	257	5- 493
292929	43	Personal service	59.0	87.4	5.9	221	5- 885
272610	44	Electrician	59.5	84.6	2.4	1255	5- 1194
242410	45	Logger	59.7	82.1	6.2	178	5- 557
272510	46	Iron/metal work	60.0	92.0	1.8	2602	5- 1453
282022	47	Repro/graphic industry	60.6	100.1	4.6	478	5- 1305
202925	48	Editor, journalist	62.6	145.3	13.6	115	5- 1174
252929	49	Mine/quarry	63.0	85.0	5.1	279	5- 1011
282810	50	Dock work	63.4	89.8	2.9	979	5- 1390

Table 66 continued

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
232010	51	Sales, whole/retail	64.1	100.0	4.3	550	5- 1029
232210	52	Sales, personal	64.9	96.8	4.8	405	5- 961
282710	53	Machine operator	65.0	87.2	3.0	866	5- 838
262425	54	Driver	66.0	91.2	2.1	1931	5- 973
292310	55	Janitor, cleaning	66.3	93.4	4.4	458	5- 816
272821	56	Building painter	67.5	104.5	5.6	354	5- 854
272525	57	Plumber	67.7	93.6	5.3	308	5- 743
282210	58	Food processing	68.0	85.8	3.2	728	5- 1085
101010	59	No occupation	68.8	88.9	3.3	706	5- 764
272910	60	Construction else	69.0	103.0	3.1	1095	5- 1188
292110	61	Hotel/restaurant	72.2	122.9	12.6	210	6- 1138
262110	62	Seamen	77.2	97.6	9.3	111	5- 525
262010	63	Ship officer	77.6	102.0	7.8	171	5- 606
242028	64	Reindeer herder	87.1	91.5	9.6	91	5- 438
242310	65	Fishing	98.1	124.7	4.6	728	5- 1276

Analysis of Variance	DF.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	64	4036832	64076	8.76	<0.0005
Within groups	33083	238170700	7199		

Table 67 Occupations ranked by mean MI risk score, women, adjusted for age and county

Code	rank	Occupation	Mean	S.D.	S.E.M	n=	min-max
Total population:			8.7	11.8	0.1	16395	1- 295
202623	1	Teacher	5.5	7.3	0.4	414	1- 80
202421	2	Nurse	5.9	7.3	0.6	177	1- 84
201010	3	Technical/Science	7.1	8.5	0.8	123	1- 45
292929	4	Other service	7.4	7.2	0.7	121	1- 48
202910	5	Artists, students	7.7	9.5	1.6	35	1- 34
232323	6	Cashier, shop	7.8	9.3	0.3	810	1- 147
101010	7	No occupation	8.1	10.3	0.3	1198	1- 98
262710	8	Post and telecomm.	8.2	11.2	0.7	253	1- 135
212010	9	Administration	8.3	11.2	1.0	137	1- 74
222010	10	Clerks	8.5	12.3	0.5	697	1- 163
242110	11	Farming	8.6	12.2	0.3	2451	1- 229
202429	12	Aux. nurse	8.9	11.8	0.8	218	1- 89
292130	13	House work	9.1	12.6	0.2	7462	1- 295
292310	14	Cleaning etc.	9.1	11.0	0.4	826	1- 181
272010	15	Textile industry	9.2	13.9	0.9	260	1- 114
282621	16	Packing	9.4	9.0	1.0	84	1- 46
292110	17	Hotel/restaurant	9.5	10.7	0.4	631	1- 85
282210	18	Food processing etc.	9.9	12.0	0.7	266	1- 106
242310	19	Industry, manual work	10.7	13.3	0.9	232	1- 91

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	18	10589.6	588.3	4.23	<0.0005
Within groups	16376	2280454.7	139.3		

Table 68 Occupations ranked by percentage physically inactive during leisure, men

Code	Rank	Occupation	Per cent	S.E	n=
Total population			19.9	0.2	33334
202810	1	Jurists	11.2	3.4	89
262610	2	Traffic control	11.5	2.8	131
202021	3	Architect	11.5	3.2	104
202022	4	Chief engineer	12.7	1.6	427
301010	5	Military	12.7	1.8	338
202622	6	University lecturer	12.9	3.5	93
202110	7	Science, natural	13.0	3.0	131
282310	8	Chemical processing	13.2	2.3	212
262510	9	Conductor etc.	13.2	1.8	355
202310	10	Physician	13.4	4.2	67
292010	11	Surveillance	13.9	1.8	390
272310	12	Smelterwork	14.2	1.7	436
212129	13	Other leader	14.4	1.9	334
202023	14	Engineer	15.2	0.9	1458
202624	15	Vocational teacher	15.3	1.6	511
212010	16	Central administration	15.4	2.9	156
202623	17	Teacher	15.7	1.8	396
202910	18	Artistic	16.0	2.5	225
222010	19	Book keeping	16.1	1.7	453
204021	20	Accountant	16.3	2.7	184
272710	21	Wood work	16.3	2.0	349
212123	22	Adm. secretary	16.3	2.4	245
202322	23	Dentist	16.7	4.3	78
232310	24	Sales, from office	16.7	1.5	618
212024	25	Local administration	16.7	2.6	204
272724	26	Carpenter	17.0	0.9	1825
272610	27	Electrician	17.2	1.1	1264
232110	28	Real estate	17.2	2.5	221
222910	29	Office work NEC	17.6	0.9	1789
202410	30	Nurse	17.7	4.7	68
204026	31	Staff administration	18.5	2.7	205
272525	32	Plumber	18.6	2.2	308
272510	33	Iron/metal work	18.7	0.8	2610
242410	34	Logger	18.9	2.9	180
272910	35	Construction	19.0	1.2	1102
232322	36	Shop keeper	19.0	1.9	416
212110	37	Business administration	19.3	1.0	1490
282710	38	Machine operator	19.4	1.3	872
292310	39	Janitor, cleaning	20.0	1.9	459
232323	40	Cashier, shop	20.4	1.8	505
232210	41	Sales, personal	20.6	2.0	407
282210	42	Food processing	20.8	1.5	732
202630	43	Students	21.4	5.9	48
202510	44	Health professional	21.4	4.5	84
202925	45	Editor, journalist	21.6	3.8	116
262110	46	Seamen	21.7	3.9	115
272410	47	Fine mechanic	21.8	3.0	188
282523	48	Production, plastic etc	21.8	3.1	174
262710	49	Post/telecommunication	22.0	2.3	327
282022	50	Repro/graphic industry	22.4	1.9	478

Table 68 continued

Code	Rank	Occupation	Per cent	S.E	n=
272821	51	Building painter	22.4	2.2	352
272010	52	Textile industry	22.5	2.6	258
282810	53	Dock work	22.9	1.3	981
252929	54	Mine/quarry	23.1	2.5	282
242310	55	Fishing	23.3	1.6	744
242110	56	Farm work	23.8	1.8	537
242028	57	Reindeer herder	23.9	4.5	92
262010	58	Ship officers	24.6	3.2	183
292929	59	Personal service	26.6	3.0	222
242021	60	Farming etc.	26.8	0.9	2255
262425	61	Driver	27.0	1.0	1935
292110	62	Hotel/restaurant	30.1	3.2	213
101010	63	No occupation	30.4	1.7	715
232010	64	Sales, whole/retail	30.7	2.0	551
202710	65	Religious	31.3	6.8	48

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	64	69.6	1.09	6.89	<0.0005
Within groups	33269	5252.5	0.16		

Table 69 Occupations ranked by percentage physically inactive during leisure, women

Code	Rank	Occupation	Per cent	S.E	n=
Total population:			23.2	0.3	16546
201010	1	Technical/Science	15.3	3.3	124
202421	2	Nurse	16.0	2.7	181
202623	3	Teacher	16.6	1.8	421
242310	4	Industry, manual work	16.7	2.4	234
262710	5	Post and telecomm.	18.1	2.4	254
292929	6	Other service	18.2	3.5	121
232323	7	Cashier, shop	19.2	1.4	819
292310	8	Cleaning etc.	19.3	1.4	835
202429	9	Aux. nurse	19.6	2.7	220
292110	10	Hotel/restaurant	20.6	1.6	635
222010	11	Clerks	20.8	1.5	706
101010	12	No occupation	22.7	1.2	1212
292130	13	House work	23.8	0.5	7523
202910	14	Artists, students	24.3	7.2	37
272010	15	Textile industry	24.9	2.7	261
212010	16	Administration	25.4	3.7	138
242110	17	Farming	28.3	0.9	2471
282210	18	Food processing etc.	29.3	2.8	270
282621	19	Packing	31.0	5.1	84

X^2=97.7, D.F.=18, p< 0.0005, No cells have expected frequencies less than 5.

Analysis of Variance	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between Groups	18	17.4	0.97	5.5	<0.0005
Within Groups	16527	2931.9	0.18		

Table 70 Number of deaths by cause and county, men, all invited

County	Oslo		Oppland		Sogn og Fjordane		Finnmark	
Cause of death, (short code, appendix B)	Deaths	%	Deaths	%	Deaths	%	Deaths	%
Tuberculosis, other infections, (1,2,27)	18	0.6	7	1.3	2	0.7	3	0.7
Cancer oesophagus/stomach (3,4)	64	2.1	7	1.3	13	4.3	12	2.7
Cancer colon/rectum (5,6)	60	2.0	20	3.5	10	3.3	3	0.7
Cancer hepar/pancreas (7,8)	60	2.0	12	2.2	6	2.0	7	1.5
Cancer pharynx/larynx (9,10)	28	0.9	1	0.2	1	0.3	1	0.2
Cancer lung (11)	221	7.3	21	3.9	15	5.0	25	5.5
Cancer prostate/bladder (16,17)	44	1.5	6	1.1	4	1.3	2	0.4
Malignant melanoma (18)	32	1.1	2	0.4	1	0.3	-	
Cancer brain (19)	34	1.1	9	1.7	5	1.7	-	
Lymphoma/myeloma/leuk. (21-23)	38	1.3	11	2.1	7	2.3	-	
Other malignant disease (20,24)	156	5.1	34	6.4	15	5.0	18	4.0
Diabetes (25)	35	1.2	7	1.3	3	1.0	3	0.7
Stroke (26)	104	3.4	22	4.1	9	3.0	14	3.1
Subarachnoid haemorrhage (70)	29	1.0	5	0.9	7	2.3	6	1.3
Multiple sclerosis (28)	2	0.1	3	0.6	1	0.3	1	0.2
Coronary heart disease (30)	1054	34.7	185	34.6	97	32.1	160	35.4
Other myocardial degeneration (31)	29	1.0	4	0.7	1	0.3	3	0.7
Valvular disease (32)	25	0.8	1	0.2	-		6	1.3
Other CVD (33,34)	112	3.7	21	3.9	11	3.6	23	5.1
Sudden death (35)	51	1.7	15	2.8	8	2.6	25	5.5
Pneumonia (36)	51	1.7	5	0.9	3	1.0	3	0.7
Other respiratory (37-41)	73	2.4	12	2.2	2	0.7	9	2.0
Ulcer (42-44)	22	0.7	2	0.4	4	1.3	1	0.2
Hepatic cirrhosis (48)	118	3.9	7	1.3	1	0.3	7	1.5
Other gastrointestinal (46,50)	35	1.2	2	0.4	1	0.3	2	0.4
Urogenital disease (51,52,54)	14	0.5	3	0.6	3	1.0	1	0.2
Skin and bone disease (55)	5	0.2	2	0.4	4	1.3	-	
Suicide (57-61)	135	4.4	37	6.9	16	5.3	14	3.1
Accidents (62-66)	151	5.0	33	6.2	24	7.9	52	11.5
Other violent deaths (67)	62	2.0	20	3.7	10	3.3	18	4.0
Other and unknown causes (68)	173	5.7	18	3.4	19	6.3	29	6.4
Total per cent within county		100.0		100.0		100.0		100.0
All causes, number of deaths	3035		534		302		452	

Table 71 Number of deaths by cause and county, women, all invited

County :	Oppland		Sogn og Fjordane		Finnmark	
Cause of death, (short code, appendix B)	Deaths	%	Deaths	%	Deaths	%
Tuberculosis, other infections (1,2,27)	1	0.4	2	1.7	4	2.5
Cancer oesophagus/stomach (3,4)	5	1.9	2	1.7	10	6.3
Cancer colon/rectum (5,6)	13	4.9	13	11.1	1	0.6
Cancer hepar/pancreas (7,8)	4	1.5	2	1.7	4	2.5
Cancer pharynx/larynx (9,10)	1	0.4	1	0.9	-	
Cancer lung (11)	11	4.1	2	1.7	7	4.4
Cancer breast (12)	28	10.4	15	12.8	10	6.3
Cancer uterine cervix (13)	11	4.1	3	2.6	3	1.9
Cancer uterine corpus (14)	2	0.7	1	0.9	2	1.3
Cancer ovary (15)	12	4.5	6	5.1	9	5.7
Cancer bladder (17)	2	0.7	1	0.9	-	
Malignant melanoma (18)	3	1.1	2	1.7	-	
Cancer brain (19)	8	3.0	4	3.4	1	0.6
Lymphoma/myeloma/leukemia (21-23)	10	3.7	4	3.4	5	3.2
Other malignant disease (20,24)	19	7.1	13	11.1	9	5.7
Diabetes (25)	4	1.5	2	1.7	-	
Apoplexy (26)	12	4.5	-		16	10.1
Subarachnoid haemorrhage (70)	11	4.1	3	2.6	9	5.7
Multiple sclerosis (28)	7	2.6	2	1.7	-	
Coronary heart disease (30)	21	7.8	12	10.3	23	14.6
Other myocardial degeneration (31)	2	0.7	1	0.9	1	0.6
Valvular disease (32)	2	0.7	-		4	2.5
Other CVD (33,34)	5	1.9	6	5.1	7	4.4
Sudden death (35)	4	1.5	2	1.7	3	1.9
Pneumonia (36)	6	2.2	1	0.9	-	
Other respiratory (37-41)	10	3.7	1	0.9	5	3.2
Hepatic cirrhosis (48)	5	1.9	-		-	
Other gastrointestinal (46,49,50)	3	1.1	-		2	1.3
Urogenital disease (51,52,54)	2	0.7	2	1.7	2	1.3
Skin and bone disease (55)	3	1.1	3	2.6	1	0.6
Suicide (57-61)	11	4.1	4	3.4	3	1.9
Accidents (62-66)	7	2.6	3	2.6	4	2.5
Other violent deaths (67)	3	1.1	1	0.9	3	1.9
Other and unknown causes (68)	20	7.5	3	2.6	10	6.3
Total per cent within county		100.0		100.0		100.0
All causes, total number of deaths	268		117		158	

Figure 43 CHD mortality/1000 obs. years in all invited by education and county. Bar diagram shows mortality by education adjusted for age and county, men

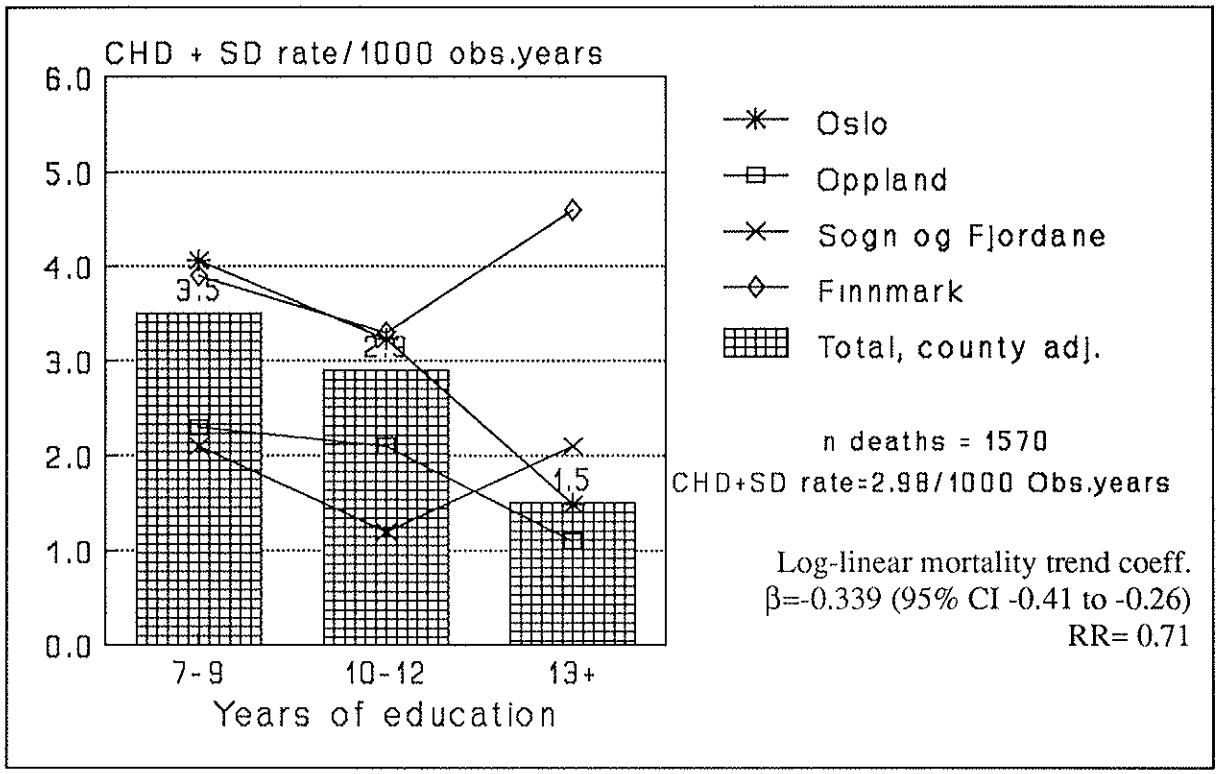

Figure 44 CHD mortality/1000 obs. years in attenders by education and county. Bar diagram shows mortality by education adjusted for age and county, men

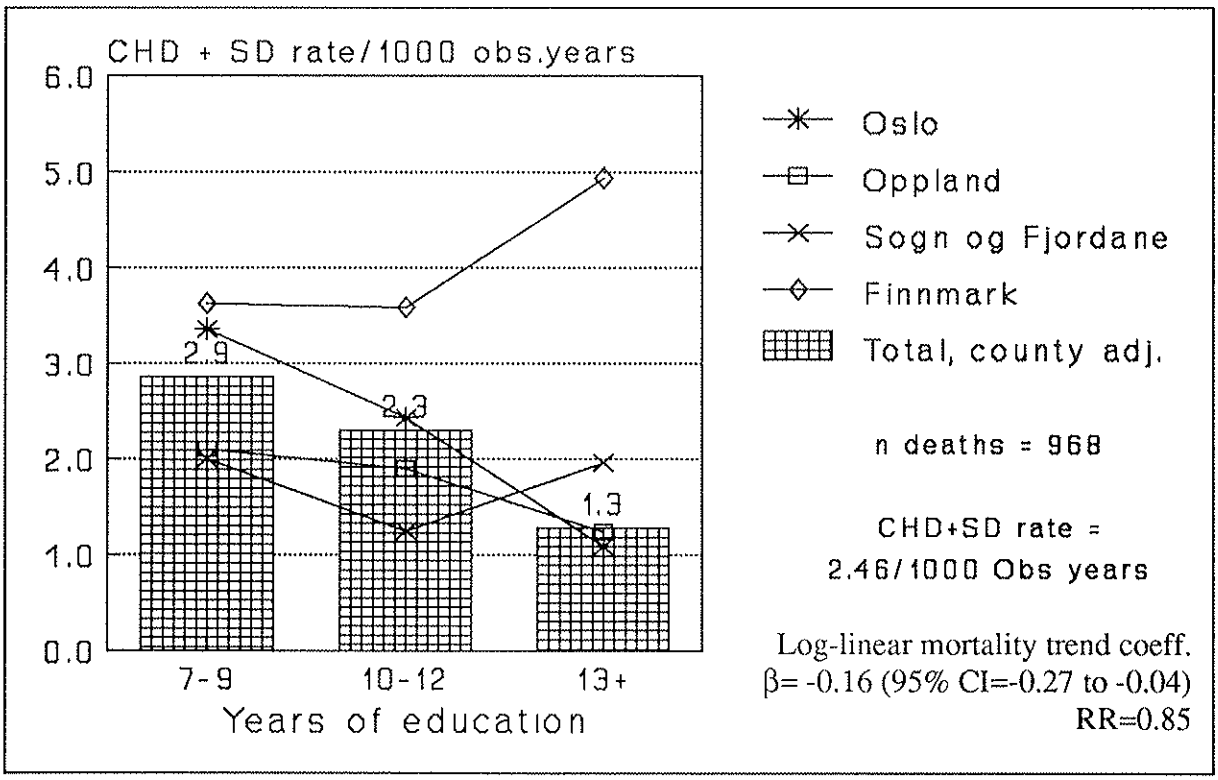

Figure 45 Stroke mortality/1000 obs. years in all invited by education and county. Bar diagram shows mortality by education adjusted for age and county, men

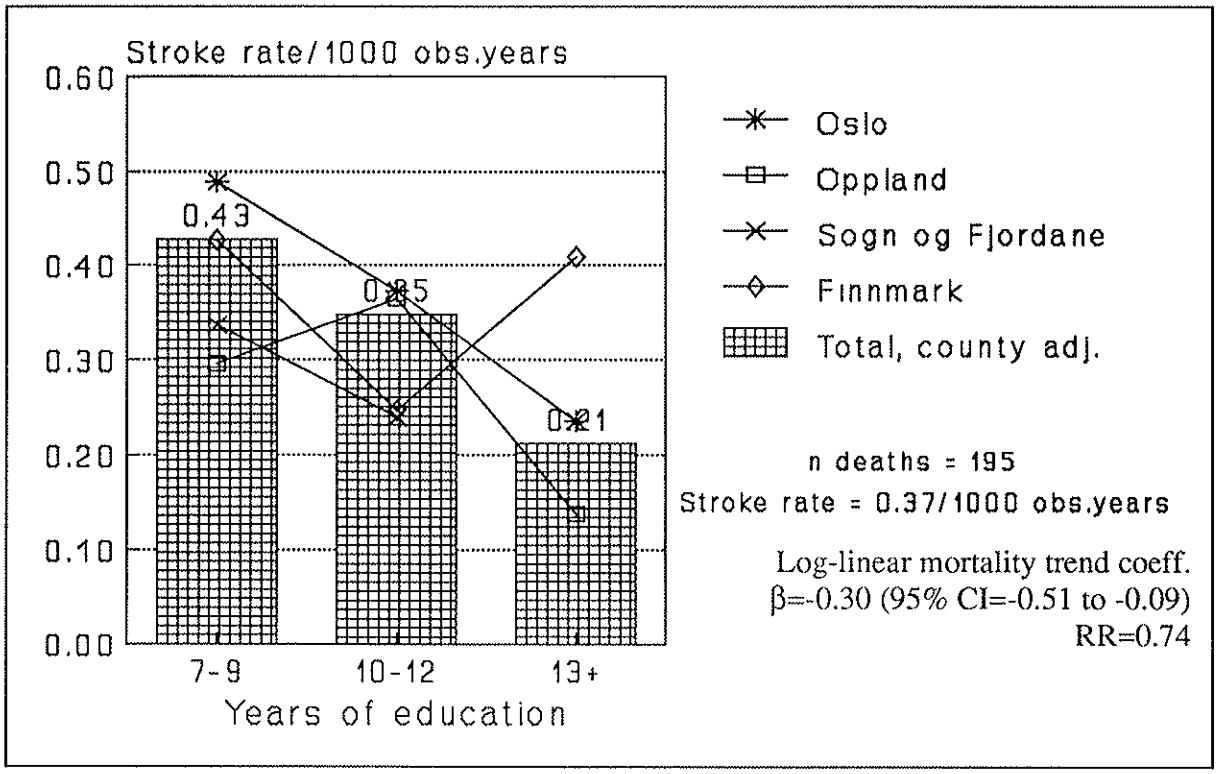

Figure 46 Stroke mortality/1000 obs. years in attenders by education and county. Bar diagram shows mortality by education adjusted for age and county, men

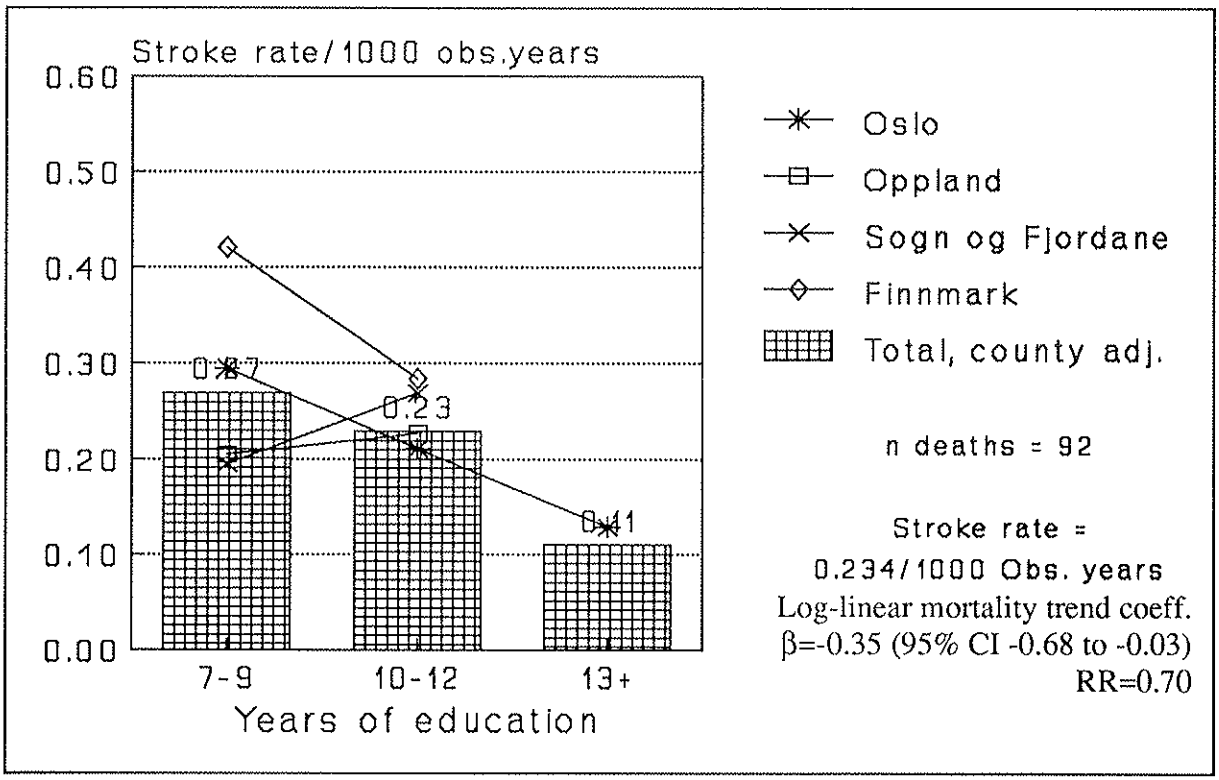

Figure 47 All cause mortality/1000 obs. years in all invited by education and county. Bar diagram shows mortality by education adjusted for age and county, men

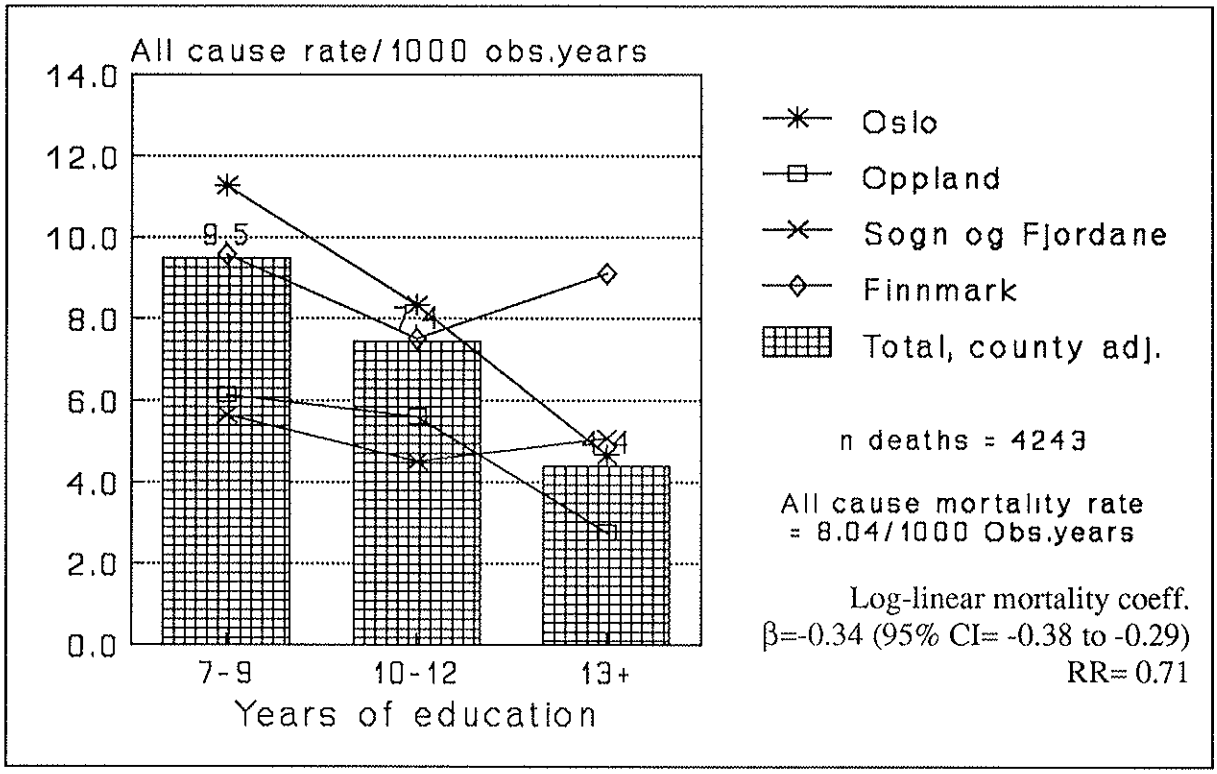

Figure 48 All cause mortality/1000 obs. years in attenders by education and county. Bar diagram shows mortality by education adjusted for age and county, men

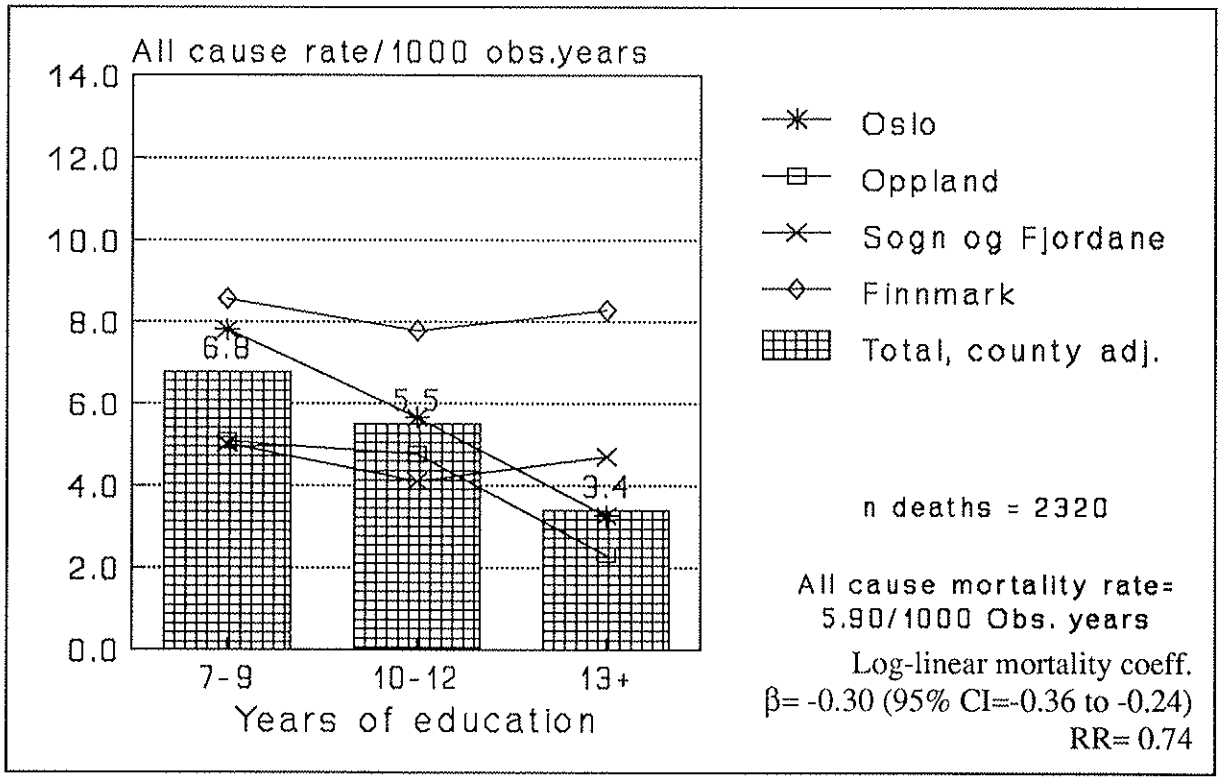

Figure 49 CHD mortality/1000 obs. years in all invited by social class and county. Bar diagram shows mortality by class adjusted for age and county, men

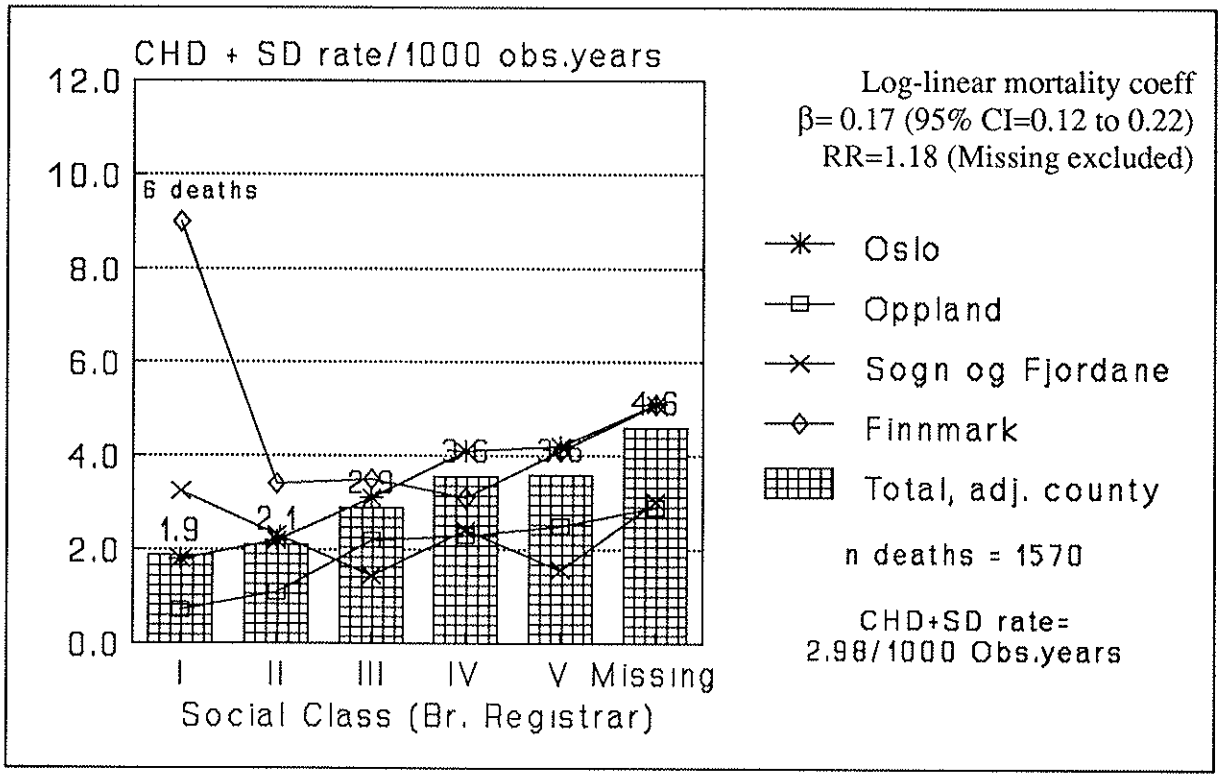

Figure 50 CHD mortality/1000 obs. years in attenders by social class and county. Bar diagram shows mortality by class adjusted for age and county, men

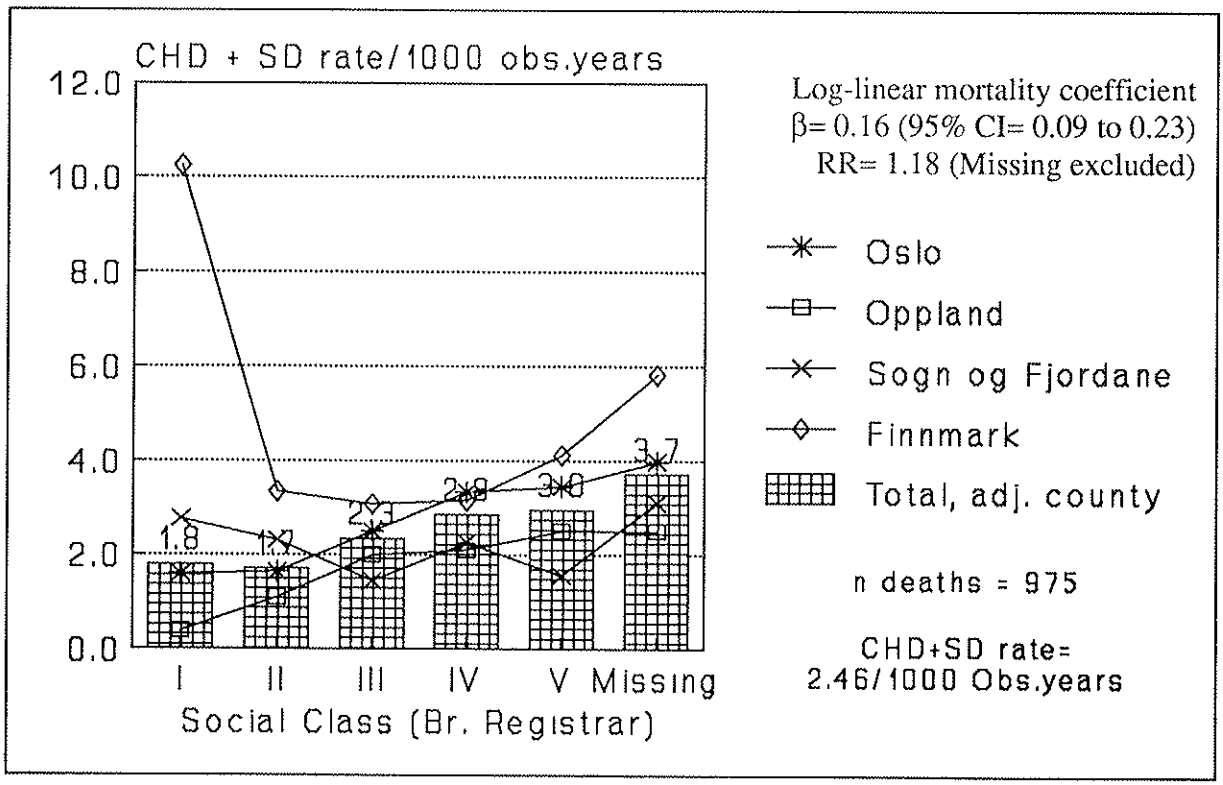

Figure 51 Stroke mortality/1000 obs. years in all invited by social class and county. Bar diagram shows mortality by class adjusted for age and county, men

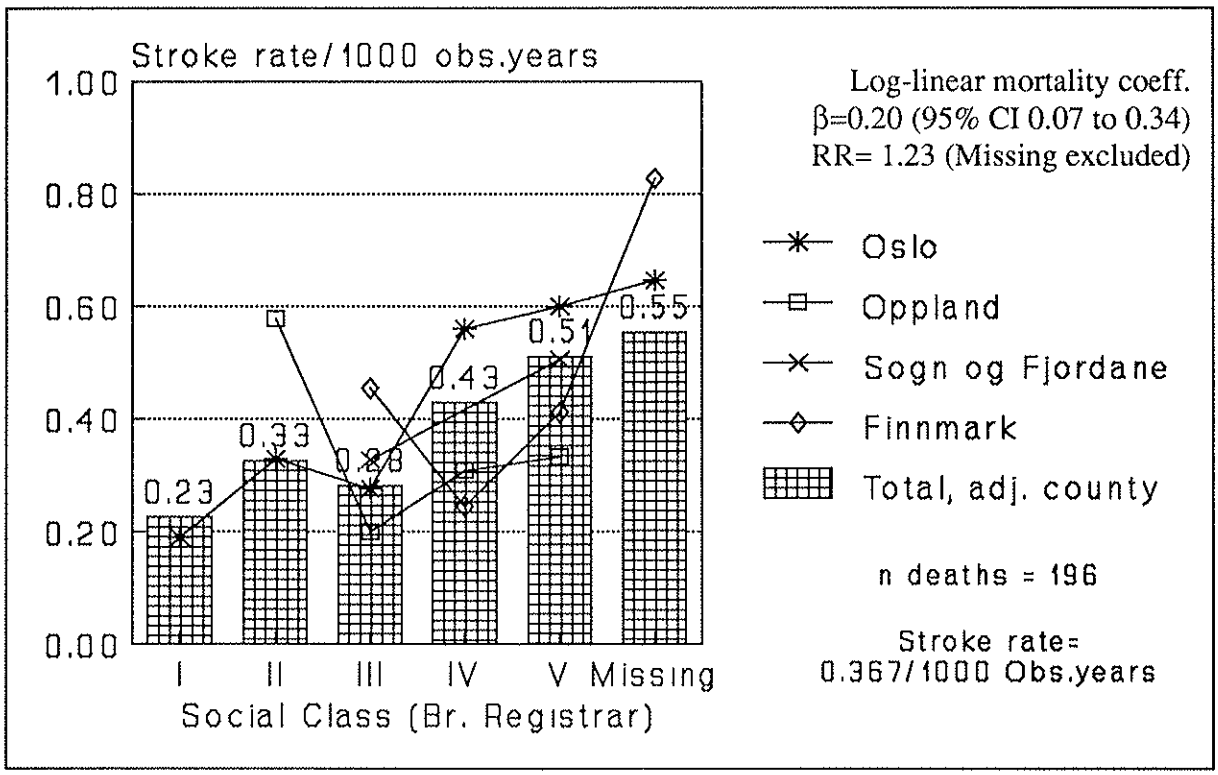

Figure 52 Stroke mortality/1000 obs. years in attenders by social class and county. Bar diagram shows mortality by class adjusted for age and county, men

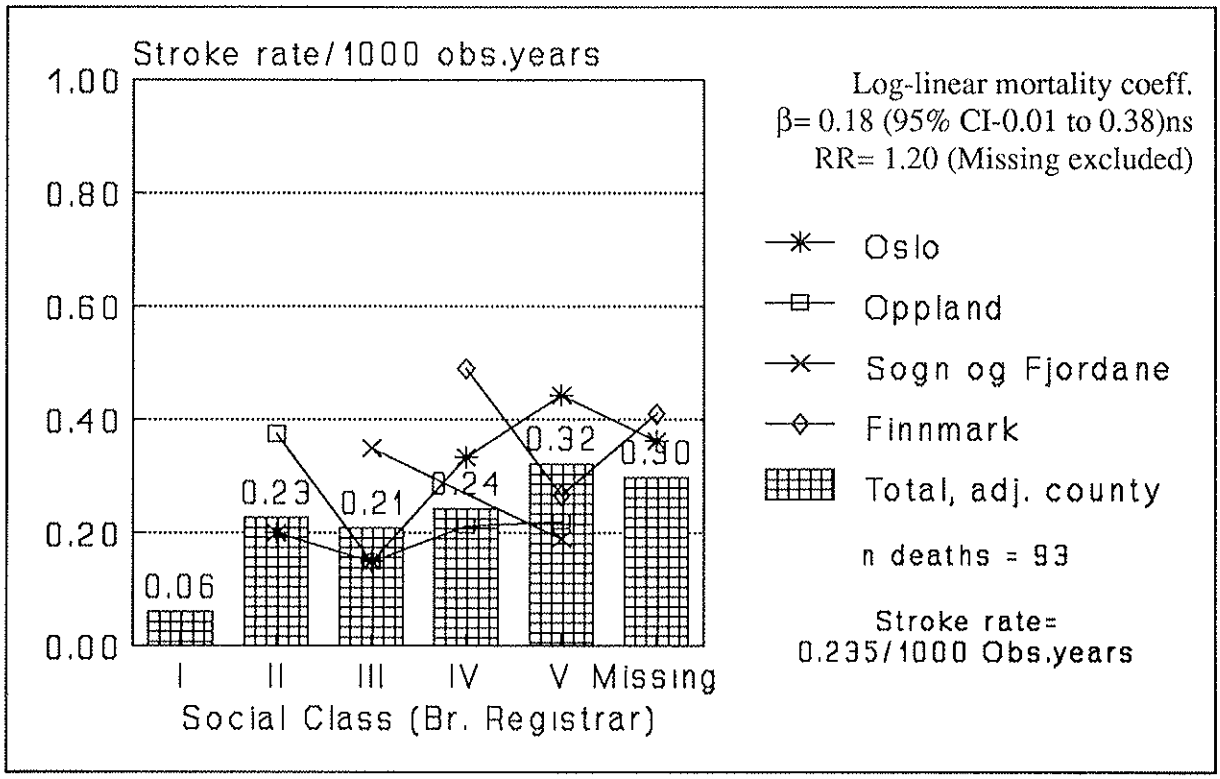

Figure 53 All cause mortality/1000 obs. years in all invited by social class and county. Bar diagram shows mortality by class adjusted for age and county, men

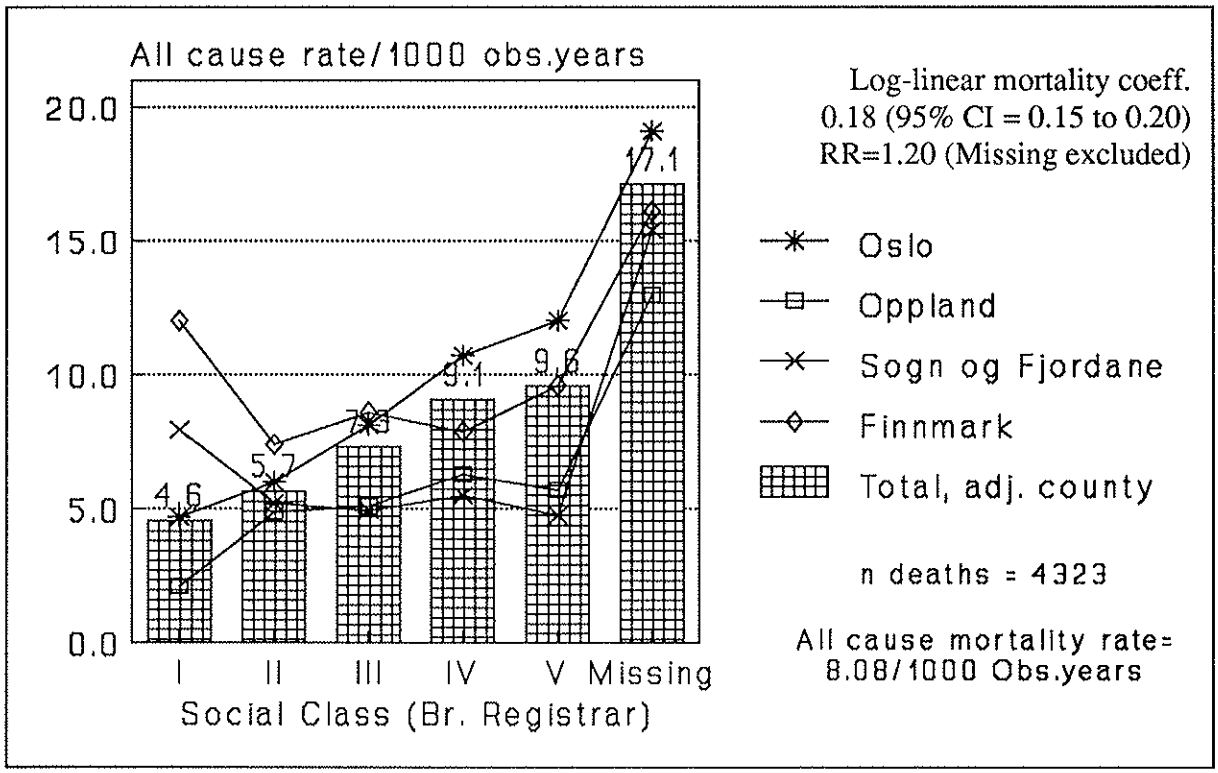

Figure 54 All cause mortality/1000 obs. years in attenders by social class and county. Bar diagram shows mortality by class adjusted for age and county, men

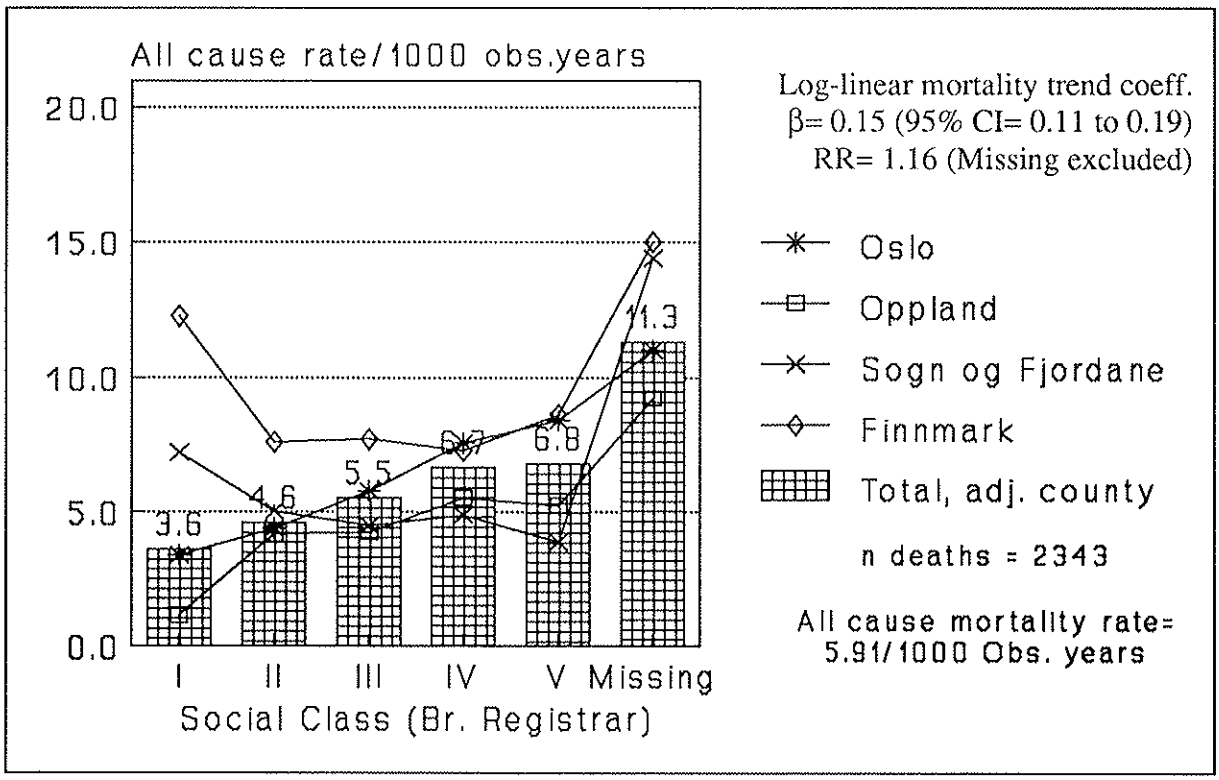

Table 72 Number of CHD+SD deaths by education and income, men, all invited

	Highest completed education, in years.							
Income (x1000)	Missing	7-9	10	11-12	13-16	17+	Deaths	n
0[1]	6	61	11	5	1	0	84	1373
1-39	3	75	8	6	2	1	95	1999
40-79	5	109	10	7	3	0	134	2863
80-119	3	163	21	19	5	2	213	5180
120-159	4	326	65	45	9	0	449	11803
160-199	2	181	74	62	21	1	341	10175
200-279	1	68	45	42	28	18	202	7639
280+	1	14	7	19	19	17	77	3658
Deaths=	25	997	241	205	88	39	1595	
n=	681	24942	6254	6325	4106	2382		44690

Table 73 Number of CHD+SD deaths by education and income, men, attenders

	Highest completed education, in years.						
Income (x1000)	Missing	7-9	10	11-12	13+	Deaths	n
0[1]	1	24	3	1	0	28	487
1-39	2	39	5	4	0	48	1210
40-79	1	63	5	3	0	71	1952
80-119	0	102	14	10	4	130	3829
120-159	2	225	43	22	5	295	9319
160-199	0	128	45	38	15	226	8089
200-279	1	49	26	27	30	132	5821
280+	0	8	3	6	21	38	2440
Deaths=	7	638	144	111	75	975	
n=	287	19060	4692	4443	4665		33147

[1] Missing incomes grouped with 0 income.

Table 74 Number of deaths (and CHD deaths) in each education-income group, women, all invited

	Highest completed education, in years.						
Income (x1000)	Missing	7-9	10	11-12	13+	Deaths=	n=
0	10 (1)	172 (16)	20 (2)	2 (1)	2	206 (20)	5626
1-39	3 (1)	130 (19)	16 (3)	2	1	152 (23)	4710
40-79	0	70 (14)	12	2	2	86 (14)	3164
80-119	0	43 (5)	6	4	2	55 (5)	2080
120-159	0	18 (1)	9	2	3 (1)	32 (2)	1340
160-199	0	3	2	0	2	7 (0)	480
200-279	0	4	3	1	4 (1)	12 (1)	140
Deaths=	13 (2)	437 (55)	66 (5)	13 (1)	14 (2)	543 (65)	
n=	209	13843	2012	791	685		17540

Table 75 Number of deaths (and CHD deaths) in each education-income group, women, attenders

	Highest completed education, in years.						
Income (x1000)	Missing	7-9	10	11-12	13+	Deaths=	n=
0	2 (1)	124 (15)	16 (2)	1 (1)	2	145 (19)	5168
1-39	3 (1)	96 (16)	14 (2)	2	1	116 (19)	4438
40-79	0	59 (11)	11	2	2	74 (11)	2996
80-119	0	37 (4)	4	4	1	46 (4)	1971
120-159	0	15 (1)	9	2	3 (1)	29 (2)	1260
160-199	0	2	3	0	2	7 (0)	435
200+	0	1	0	0	2 (1)	3 (1)	127
Deaths=	5 (2)	334 (47)	57 (4)	11	13 (2)	420 (56)	
n=	146	12985	1900	727	637		16395

Table 76 CHD mortality (SMR) by education and income, men, attenders

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13+	Total AGE[1]	Total EDUCAT[2]	Obs. years
0	257.6	282.5*	148.2*	-	240.4	203.4	5223
1-39	144.2	151.4	184.0	-	144.0	133.3	13428
40-79	143.0	105.5	95.2*	-	133.1	120.5	21665
80-119	120.7	114.9	127.8	219.0*	122.2	109.7	43360
120-159	110.3	114.6	87.5	79.6	108.1	98.8	110342
160-199	98.6	99.6	91.2	67.6	94.6	92.3	98336
200-279	110.2	93.5	65.1	49.4	75.7	90.8	72435
280+	99.4	52.1*	44.8	42.5	49.6	71.8	31160
Total AGE[3]	115.7	104.7	81.9	52.4	100.0		
Tot. INCOME[4]	106.0	106.5	90.2	71.6			
Obs.years	220939	56339	55953	59430	(+3288#)		395949
975 deaths, overall rate=246.4/100 000 obs.years					#missing ed.		

1 Adjusted for age. Log-linear trend income=-0.16(95% CI -0.19 to -0.12)
2 Adjusted for age and education. Log-linear trend income=-0.09(95% CI -0.13 to -0.06)
3 Adjusted for age. Log-linear trend education=-0.23(95% CI -0.29 to -0.17)
4 Adjusted for age and income. Log-linear trend education=-0.11(95% CI -0.17 to -0.04)
* Less than 5 deaths in cell.

Figure 55, CHD mortality (SMR) by education and selected incomes, men, attenders

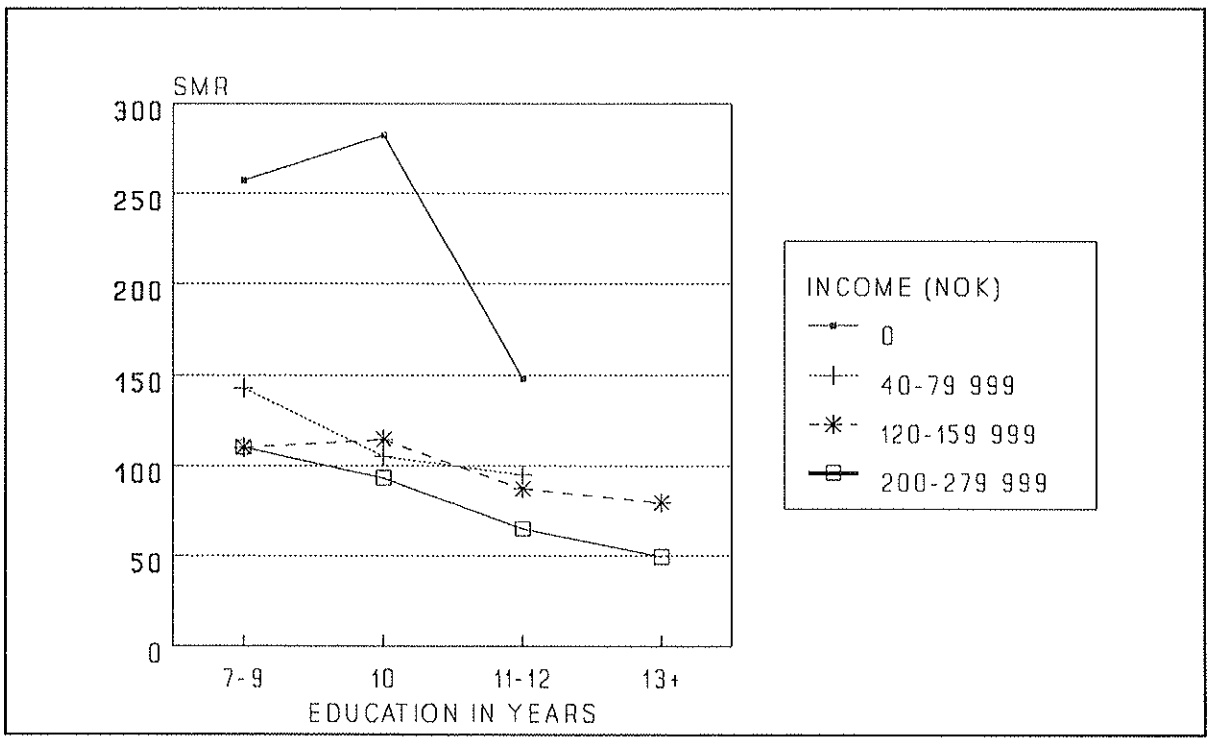

Table 77 All cause mortality, SMR, by education and income, women, attenders

	Highest completed education in years.						
Income (x1000)	7-9	10	11-12	13+	Total AGE[1]	Total EDUCAT[2]	Obs. years
0	109.8	123.9	25.4*	162.8*	108.5	107.3	55065
1-39	99.3	136.0	51.4*	61.2*	100.4	102.1	47817
40-79	92.5	136.0	73.2*	137.8*	97.3	96.7	31764
80-119	96.5	66.3	127.1	41.1*	92.1	93.2	20910
120-159	77.2	130.2	71.6*	121.5	91.8	90.3	13209
160+	69.2	143.1	-	68.6	68.8	75.4	5822
Total AGE[1]	99.3	123.0	58.6	86.4	100.0		
Tot. INCOME[3]	98.4	125.6	60.2	98.2		100.0	
Obs.years	140114	200098	7684	6691			176159

420 deaths, overall rate=238.4/100 000 obs.years

[1] Adjusted for age. Log-linear trend income=-0.06(95% CI -0.13 to 0.02)
[2] Adjusted for age and education. Log-linear trend income=-0.05(95% CI -0.12 to 0.02)
[3] Adjusted for age. Log-linear trend education= -0.05(95% CI -0.19 to 0.02)
[4] Adjusted for age and income. Log-linear trend education=-0.02(95% CI -0.16 to 0.12)
* Less than 5 deaths in cell.

Figure 56 All cause mortality (SMR) by education and income, women, attenders

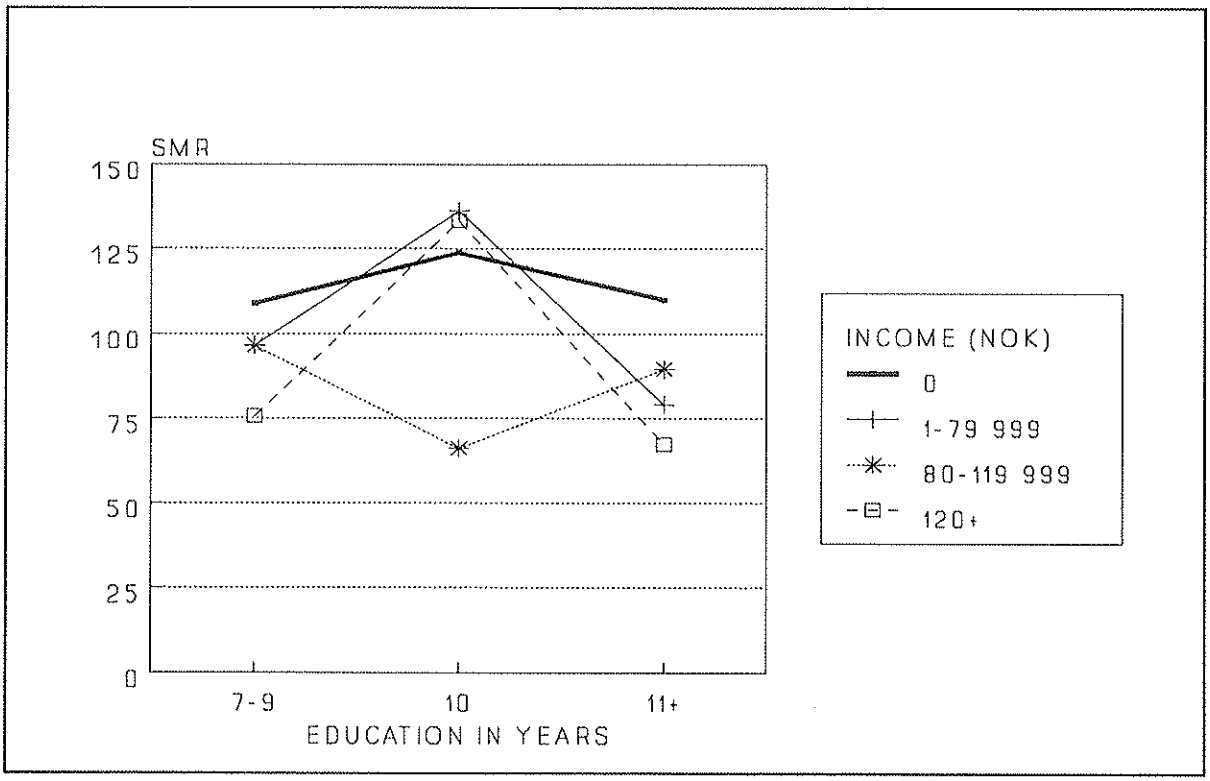

Table 78 CHD mortality, SMR, by education and income, women, attenders.

	Highest completed education in years.						
Income (x1000)	7-9	10	11-12	13+	Total AGE[1]	Total EDUCAT[2]	Obs. years
0	98.7	118.7*	186.0*	-	102.3	101.9	55065
1-39	124.6	144.4*	-	-	120.2	124.7	47816
40-79	129.3	-	-	-	108.7	107.6	31764
80-119	78.3	-	-	-	60.0	62.1	20910
120-159	38.8	-	-	308.5*	47.6	54.4	13209
160+	-	-	-	127.4*	50.1	56.2	5822
Total AGE[1]	104.9	65.2	39.4*	99.2	100.0		
Tot. INCOME[3]	102.1	71.1	42.2	133.0		100.0	
Obs.years	140114	20098	7684	6691	(+1571)		174588

56 deaths, overall rate=30.9/100 000 obs.years (2 deaths with missing education)

[1] Adjusted for age. Log-linear trend income= -0.15(95% CI -0.35 to 0.05)
[2] Adjusted for age and education. Log-linear trend income= -0.13(95% CI -0.33 to 0.08)
[3] Adjusted for age. Log-linear trend education= -0.20(95% CI -0.64 to 0.25)
[4] Adjusted for age and income. Log-linear trend education=-0.12(95% CI -0.55 to 0.33)
* Less than 5 deaths in cell.

Figure 57 CHD mortality (SMR) by education and income, women, attenders

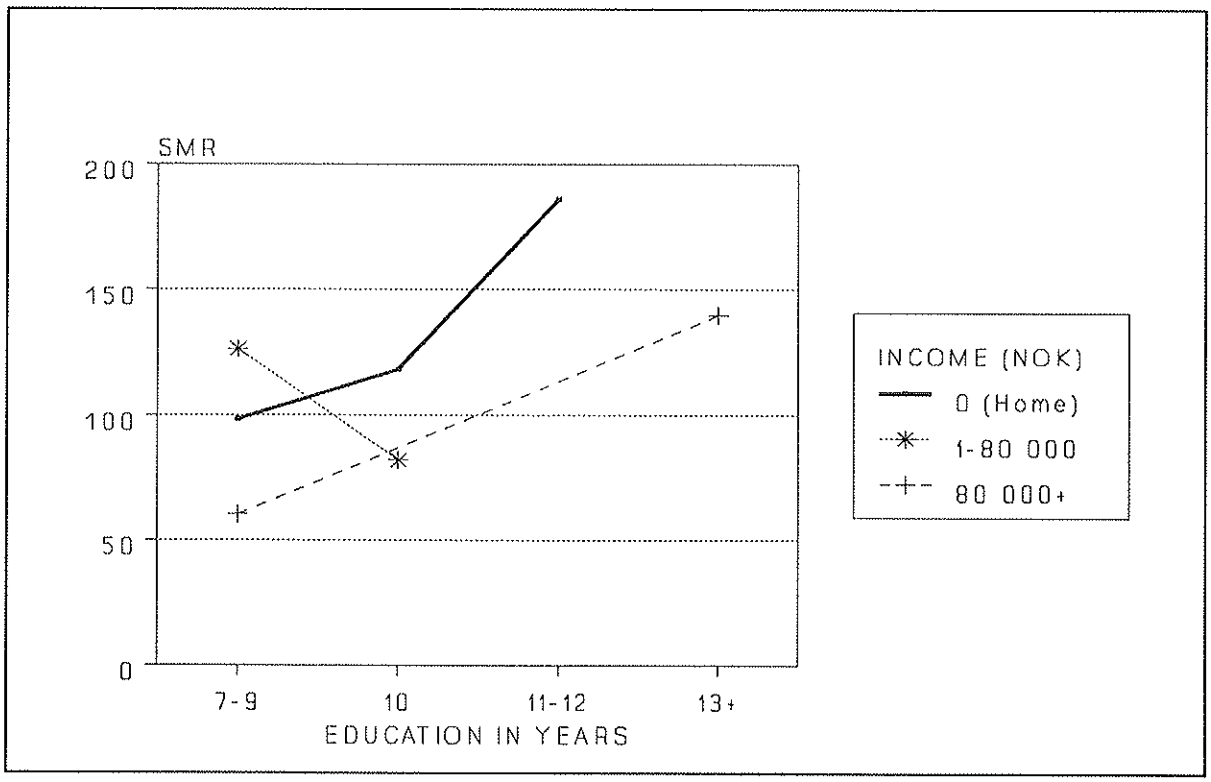

Table 79 CHD mortality, SMR, by education and income, men, adjusted for age and score, attenders

Income (x1000)	Highest completed education in years. 7-9	10	11-12	13+	Total A·S[1]	Total A·S·E[2]	Obs. years
0	195.3	231.6*	120.2*	-	186.9	179.6	4597
1-39	114.3	127.7	162.2	-	116.7	115.3	13190
40-79	117.5	110.9	113.3*	-	114.8	112.1	21306
80-119	110.3	122.5	128.4	270.8*	114.8	108.3	43075
120-159	102.4	121.7	92.0	93.7	103.7	99.7	109653
160-199	95.9	106.3	95.3	81.7	96.6	93.2	97810
200-279	103.0	101.3	73.8	65.5	84.8	94.6	72044
280+	103.8	49.9*	49.6	57.7	61.1	76.0	30985
Total A·S[3]	106.1	110.3	88.0	68.4	100.0		
Total A·S·I[4]	101.6	110.8	91.9	86.2			
Obs.years	220939	56339	55953	59430			392661

975 deaths, overall rate=246.8/100 000 obs.years

[1] Adjusted for age and score. Log-linear trend income=-0.10(95% CI -0.13 to -0.06)
[2] Adj. for age, score and education. Log-linear trend income=-0.07(95% CI -0.11 to -0.03)
[3] Adjusted for age and score. Log-linear trend education=-0.12(95% CI -0.18 to -0.05)
[4] Adj. for age, score and income. Log-linear trend education=-0.05(95% CI -0.11 to 0.02)
* Less than 5 deaths in cell.

Figure 58 CHD mortality (SMR) by education and selected incomes, men, adjusted for age and score.

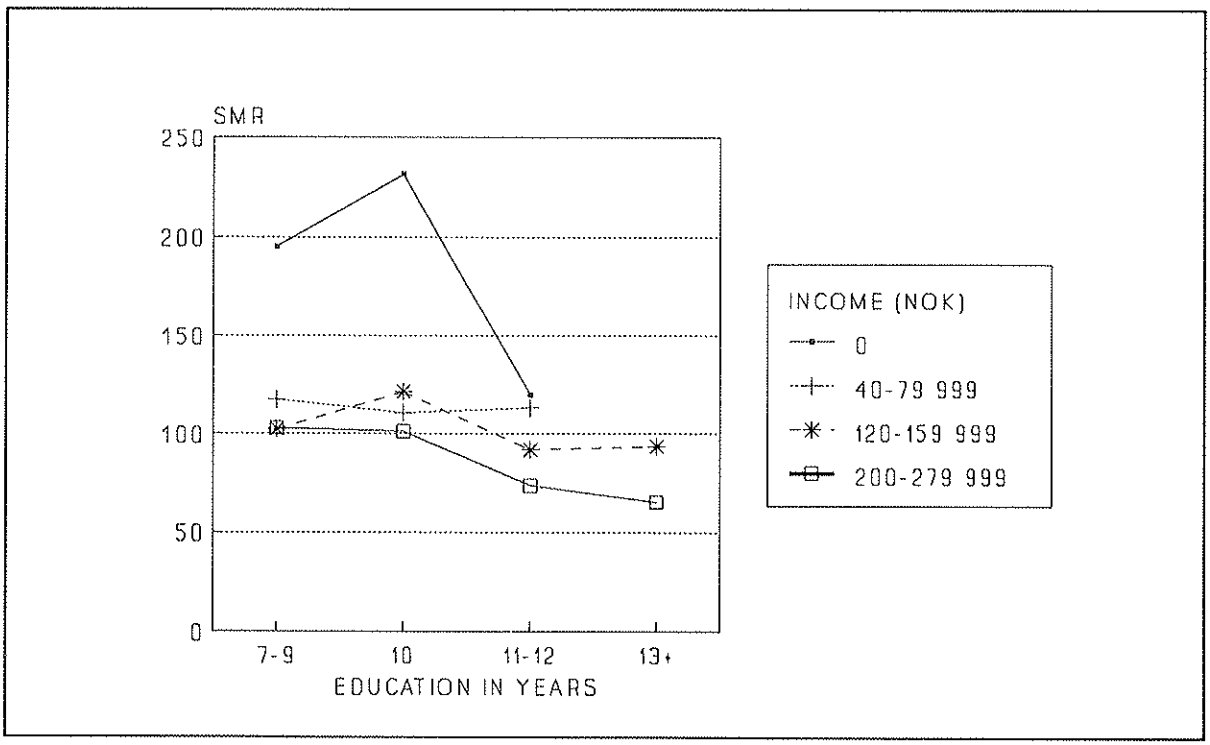

Table 80 Mean income by cause of death and in survivors, men, all invited.

Cause of death.	Mean Income	S.D.	n=
Total population, including survivors	164980	103460	44690
Multiple Sclerosis (28)	37020	34130	7
Gastrointestinal ulcer (42-45)	82380	75900	29
Pneumonia (36)	82430	106130	62
Infections, Tbc (1,2,27)	100550	68660	31
Cancer pharynx/larynx (9,10)	102730	78240	31
Urogenital disease (51,52,54)	106340	81960	23
Accidents (62-66)	107370	81830	260
Diabetes mellitus (25)	108850	76940	48
Unknown (68)	109860	89070	239
Hepatic cirrhosis (48)	116500	88050	133
Other Respiratory than pneumonia/Tbc (37-41)	117810	79470	96
Homicide, other accidents (67)	119890	104340	110
Skin and bone diseases (55)	124290	92950	11
Ileus, hernia, other GI disease (46,50)	125580	86660	41
Suicide (57-61)	128650	97210	202
Sudden Death, SD (35)	131000	95510	99
Stroke (26)	132810	93520	149
Other CVD (33,34)	134080	110840	167
Valvular/degenerative heart disease (31,32)	134250	80780	69
Cancer urinary bladder (17)	139320	60560	23
Cancer pulm.(11)	140510	71890	282
Cancer stomach/oesophagus (3,4)	143840	82150	96
Subarachnoid haemorrhage (70)	146320	99970	47
Coronary Heart Disease, CHD (30)	146400	93430	1496
Cancer hepar/biliary (7,8)	152640	87780	85
Cancer colon/rectum (5,6)	152790	84410	93
Other malignant disease (20,24)	162500	158450	270
Alive, survived follow-up (0)	168070	103580	40367
Cancer prostate (16)	169810	83180	33
Myeloma/leukemia/lymphoma (21-23)	171210	74950	56
Malignant melanoma (18)	194650	108230	35

Table 81 Mean income by cause of death and in survivors, women, all invited

Cause of death.	Mean	S.D.	n=
Total population, including survivors	43760	52970	17540
Multiple Sclerosis (28)	2830	5047	9
Infections, Tbc (1,2,27)	5310	12989	7
Diabetes mellitus (25)	7139	17490	6
Hepatic cirrhosis (48)	18054	22388	5
Other Respiratory than Tbc (36-41)	18254	32749	23
Cancer cervix/corpus uteri	24603	40984	22
Cancer oesophagus/ventricle	26779	39382	17
Apoplexy (26)	26841	32783	28
Unknown (68)	27247	48622	33
Sudden Death (35)	28831	30743	9
GI/Urogenital disease (46,49-54)	31828	49085	11
Other malignant disease (17,19,20,24)	33239	43459	57
CHD (33,34)	33933	49990	56
Suicide (57-61)	36619	45916	18
Cancer larynx/lung (10,11)	38811	54054	22
Cancer breast (12)	43849	55115	53
Other CVD (31-34)	43883	54784	28
Alive, survived follow-up (0)	43997	53010	16997
Cancer colon/rectum (5,6)	46138	57274	27
Cancer ovarii (15)	46767	56651	27
Malignant melanoma (18)	47861	21602	5
Violent deaths, accidents (62-67)	49290	60434	21
Cancer hepar/pancreas (7,8)	49525	41824	10
Skin and bone diseases (55)	50167	65010	7
Subarachnoid haemorrhage (70)	54978	56164	23
Myeloma/leukemia/lymphoma (21-23)	56156	101939	19

Table 82 Men with no income compared with the total population, number of deaths and age adjusted mortality (SMR) by cause and attendance

Cause of death (Short code in ( ))	Non-attenders		Attenders		All invited	
	Deaths	SMR	Deaths	SMR	Deaths	SMR
Tuberculosis, other infections (1,2,27)	1	197	2	642	3	367
Cancer, oesophagus/stomach (3,4)	3	193	4	412	7	277
Cancer, colon/rectum (5,6)	4	263	1	106	5	203
Cancer, hepar/pancreas (7,8)	3	221	1	116	4	180
Cancer, pharynx/larynx (9,10)	4	777	1	310	5	597
Cancer, lung (11)	12	260	4	139	16	214
Malignant melanoma (18)	1	178			1	109
Cancer, brain (19)	1	129			1	79
Lymphoma/myeloma/leukemia (21-23)	2	223			2	138
Other malignant disease (20,24)	6	168	3	133	9	154
Diabetes (25)	5	638	2	417	7	554
Apoplexy (26)	9	374	3	201	12	307
Subarachnoidal haemorrhage (70)	3	398	1	212	4	326
Multiple sclerosis (28)	2	1887			2	1180
Coronary heart disease (30)	47	192	25	166	72	182
Other myocardial degeneration (31)	4	663	1	272	5	515
Other CVD (33,34)	8	247	3	150	11	210
Sudden death (35)	8	502	4	406	12	465
Pneumonia (36)	9	885	3	479	12	730
Other respiratory (37-41)	8	506	5	513	13	509
Ulcer (42-44)	5	1072	2	686	7	923
Hepatic cirrhosis (48)	12	564	2	150	14	404
Other gastrointestinal (46,50)	4	637	2	523	6	594
Urogenital disease (51,52,54)	2	531	1	466	3	508
Skin and bone disease (55)	1	535	1	889	2	668
Suicide (57-61)	12	368	3	150	15	285
Accidents (62-66)	23	553	8	315	31	463
Other violent deaths (67)	10	558	3	278	13	453
Other and unknown causes (68)	29	753	6	250	35	560
All causes (1-70)	238	339	91	210	329	289
Number of men with income < 1000 NOK	884		489		1373	
Number of men in total population	11517	177	33173	73	44690	100

Table 83 CHD mortality by education, stratified by MI risk score, men

Education (Years)	Obs.years	No. of Deaths Obs.	Exp.	SMR	Rate/ 1000
7-9	220939.5	638	601.80	106	2.61
10-12	112291.9	255	256.63	99	2.45
13+	59429.8	75	109.57	68	1.69
Total	392661.2	968	968.00	100	2.47

Education	RR (95% CI) 7-9 years	RR (95% CI) 10-12 years
7-9 years	1.00	
10-12 years	0.94 (0.81-1.09)	1.00
13+ years	0.65 (0.51-0.82)	0.68 (0.53-0.89)

Log-linear trend coefficient β of education versus CHD mortality based on: Age-adjusted and MI risk score stratified number of deaths, education as 1,2,3:

β= -0.16(-0.26 - -0.07), Relative Risk= 0.86.(0.77 - 0.93)

Figure 59 CHD mortality by stratified MI risk score and education, men

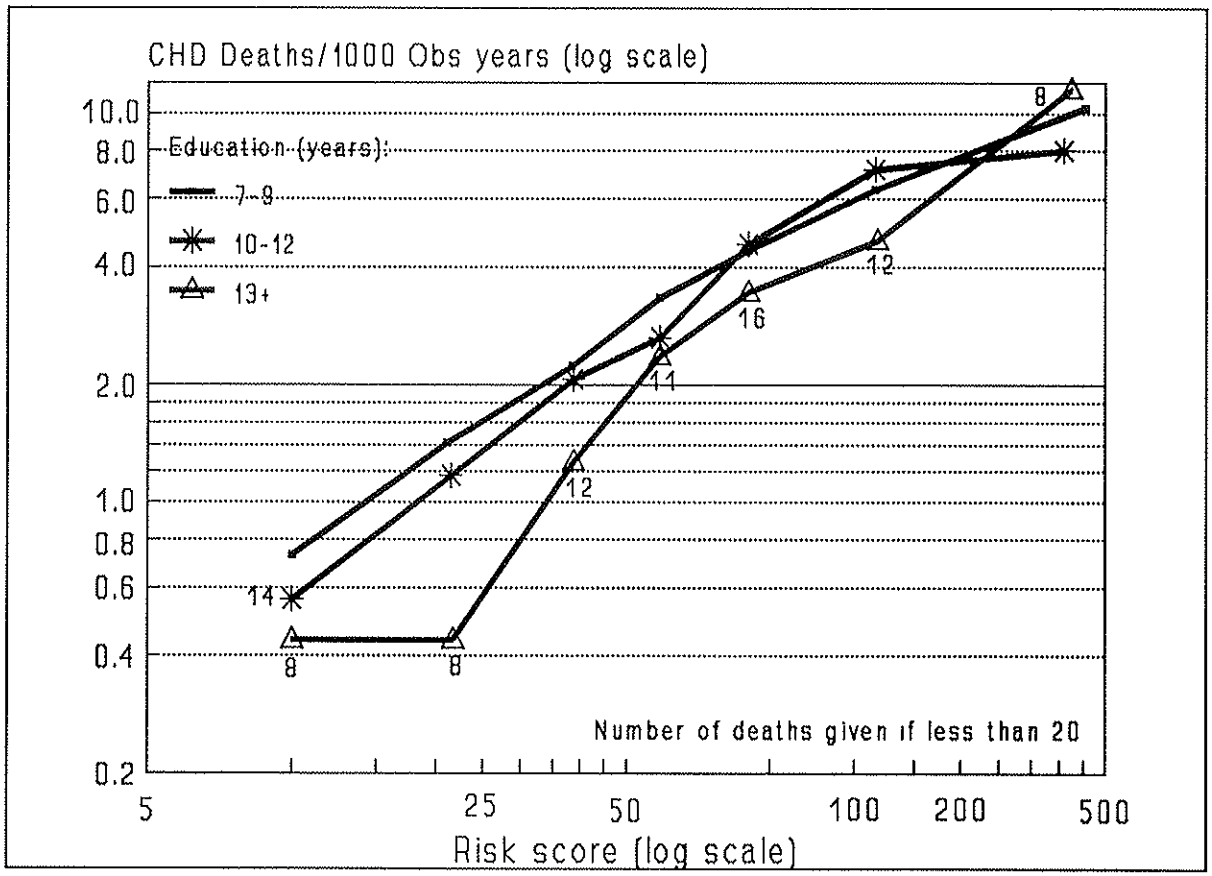

Table 84 CHD mortality by income, stratified by MI risk score, men

Income NOK	Obs. year	No. of Deaths Obs.	Exp.	SMR	Rate/ 1000
0	6232.7	32	19.3	166	4.08
1-159999	194368.7	560	517.6	108	2.66
160000+	195361.2	383	438.1	087	2.15
Total	395962.6	975	975.0	100	2.47

Statistics based on age and score adjusted expected no of deaths:

Income	RR (95% CI) 0	RR (95% CI) 1-159999
0	1.00	
1-159999	0.65 (0.46-0.93)	1.00
160000+	0.53 (0.37-0.76)	0.81 (0.71-0.92)

Log-linear trend coefficient β based on the above age- and score-adjusted number of deaths and scaling income as no income=0, 1-159999=1, 160000+=2.

β= -0.24(-0.36 to -0.13), Relative Risk=0.78. (0.70-0.88)

Figure 60 CHD mortality by stratified MI risk score and income, men

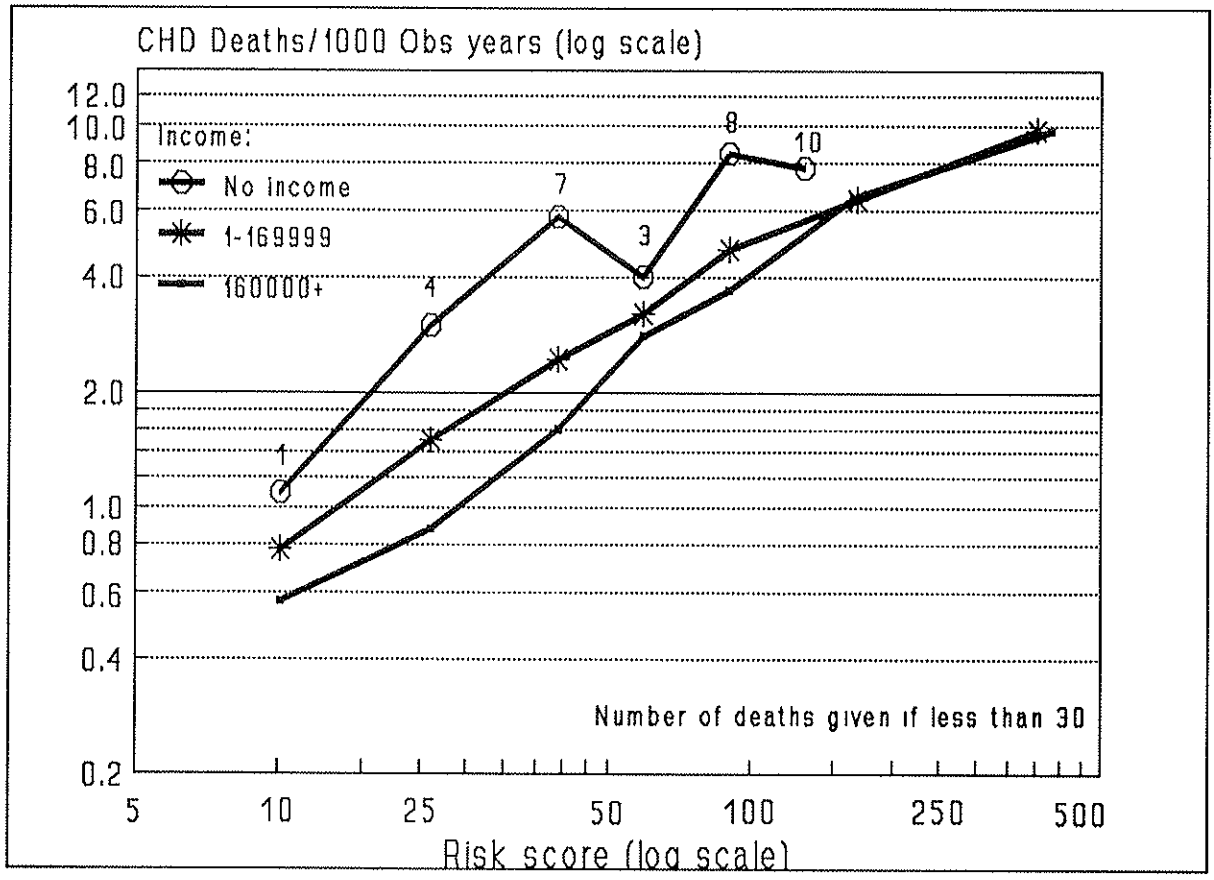

Table 85 CHD mortality by socal class, stratified by MI risk score, men

Br. Registrar's Class	Obs. years	Obs.	Exp.	SMR	Rate/ 1000
I+II	84339.27	148	177.49	83	2.05
III	151647.50	349	362.96	96	2.37
IV+V	158300.55	474	430.55	110	2.71
Total	394287.32	971	971.00	100	2.46

Class	RR (95% CI) I+II	RR (95% CI) III
I+II	1.00	
III	1.16 (0.95-1.40)	1.00
IV+V	1.32 (1.15-1.52)	1.14 (1.00-1.31)

Log-linear trend coefficient β based on the above age- and score-adjusted number of deaths and scaling class I+II=1, IIIn+m=2, IV+V=3.

β = 0.138 (0.06-0.21), Relative Risk = 1.15 (1.06-1.24)

Figure 61 CHD mortality by stratified MI risk score and social class, men

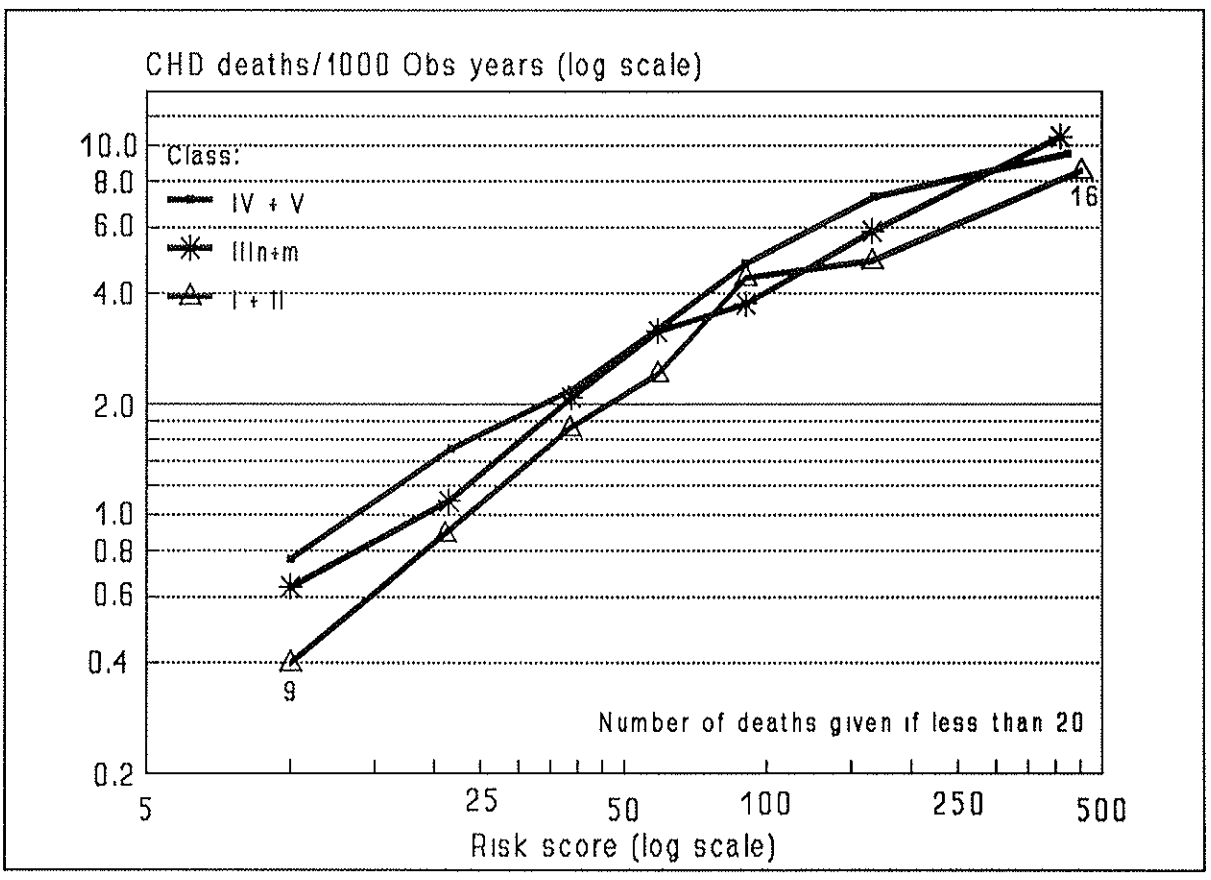

Table 86 CHD mortality by Treiman prestige score, stratified by MI risk score, men

Treiman Prestige	Obs.years	Obs.	Exp.	SMR	Rate
Missing or < 20	11058.3	47	31.49	149	3.68
20-49	274782.1	748	713.10	105	2.58
50+	110122.1	180	230.41	78	1.92
Total	395962.6	975.00	975.00	100	2.46

Statistics based on age and score adjusted expected no of deaths:

	RR (95% CI)	RR (95% CI)
Treiman Prestige	None/1-19.9	20-49.9
None/1-19	1.00	
20-49	0.70 (0.52-0.94)	1.00
50+	0.52 (0.38-0.72)	0.74 (0.63-0.88)

Log-linear trend coefficient β based on the above age- and score-adjusted number of deaths and scaling Treiman <20=0, 20-49=1, 50+=2:

β= -0.31(-0.44 to -0.17), Relative Risk=0.73.(0.64-0.84)

Figure 62 CHD mortality by stratified MI risk score and Treiman prestige score, men

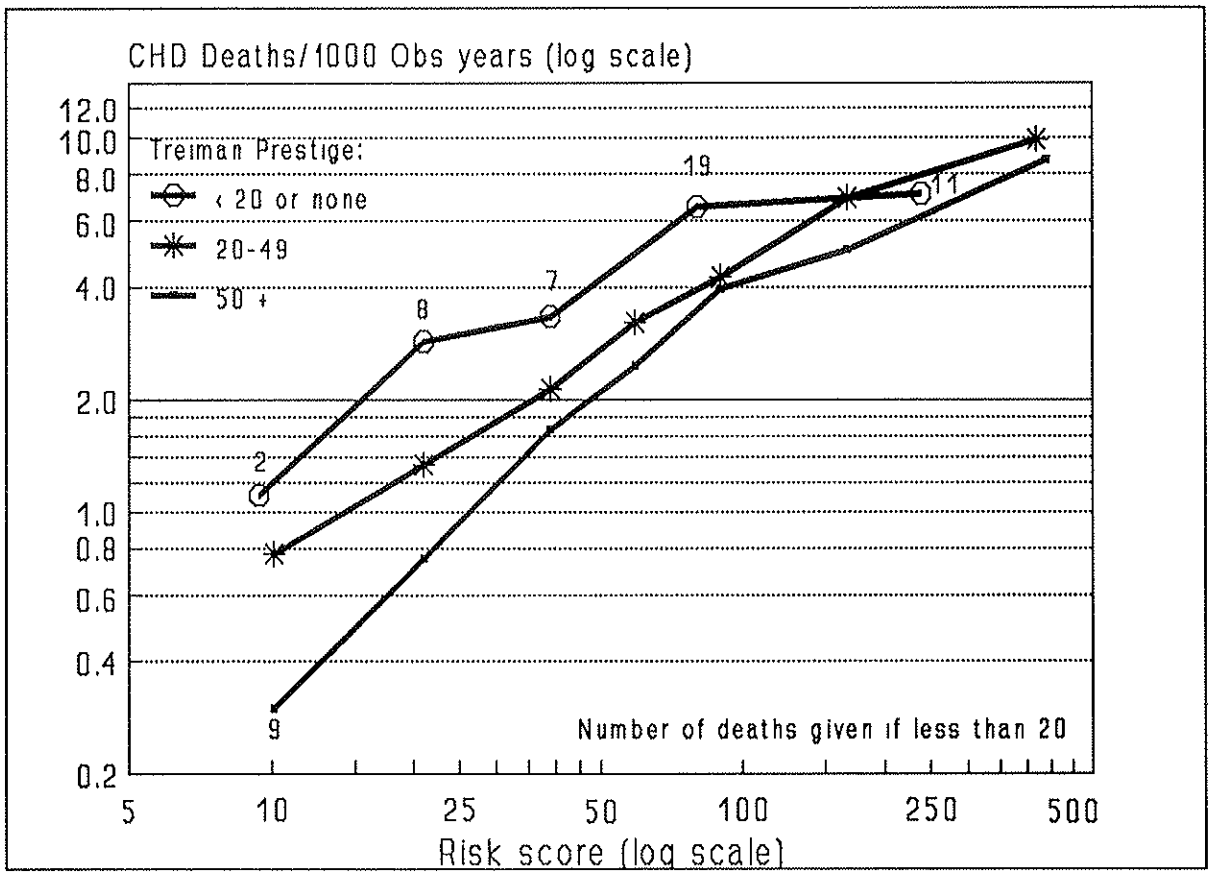

Table 87 Cox regression: CHD mortality by socioeconomy, men, attenders

Adjusted for age: Each socioeconomic factor alone:	Coefficient	Coeff/S.e.	e^{Coeff}
Education 7-9=1, 10-12=2, 13+=3	-0.372	-7.48	0.69
Income, 0=0, 1-159999=1, 160000+=2	-0.453	- 7.53	0.64
Class I+II=1, III=2, IV+V=3	0.276	6.14	1.32
Treiman, 0-19=0, 20-49=1, 50+=2	-0.543	-7.90	0.58
All socioecomic factors combined: n=30709			
Education 7-9=1, 10-12=2, 13+=3	-0.194	-3.02	0.82
Income, 0=0, 1-159999=1, 160000+=2	-0.237	-3.35	0.79
Class I+II=1, III=2, IV+V=3	0.044	0.69	1.04
Treiman, 0-19=0, 20-49=1, 50+=2	-0.200	-1.80	0.82
Age (1-year)	0.112	9.38	1.12
Adjusted for age, and MI risk score (7 levels)			
Each socioeconomic factor alone:	Coefficient	Coeff/S.e.	e^{Coeff}
Education 7-9=1, 10-12=2, 13+=3	-0.214	-4.25	0.81
Income, 0=0, 1-159999=1, 160000+=2	-0.305	-5.05	0.74
Class I+II=1, III=2, IV+V=3	0.154	3.39	1.17
Treiman, 0-19=0, 20-49=1, 50+=2	-0.371	-5.28	0.69
All socioeconomic factors combined: n=30709			
Education 7-9=1, 10-12=2, 13+=3	-0.087	-1.34	0.92
Income, 0=0, 1-159999=1, 160000+=2	-0.178	-2.54	0.84
Class I+II=1, III=2, IV+V=3	-0.002	-0.03	1.00
Treiman, 0-19=0, 20-49=1, 50+=2	-0.178	-1.60	0.84
Score (7 levels)	0.424	23.06	1.53
Age (1-year)	0.096	7.97	1.10

Table 88 Cox regression: CHD mortality by socioeconomy, stratified by county, adjusting for age and group AB or C, men, attenders

Each socioeconomic factor alone:	Coefficient	Coeff/S.e.	e^{Coeff}
Education 7-9=1, 10-12=2, 13+=3	-0.325	-6.31	0.72
Income, 0=0, 1-159999=1, 160000+=2	-0.342	- 5.49	0.71
Class I+II=1, III=2, IV+V=3	0.231	5.02	1.26
Treiman, 0-19=0, 20-49=1, 50+=2	-0.456	-6.61	0.63
All socioecomic factors combined, n=30709 with score			
Education 7-9=1, 10-12=2, 13+=3	-0.186	-2.87	0.83
Income, 0=0, 1-159999=1, 160000+=2	-0.165	-2.32	0.85
Class I+II=1, III=2, IV+V=3	0.024	0.38	1.02
Treiman, 0-19=0, 20-49=1, 50+=2	-0.222	-1.99	0.80
Age (1-year)	0.100	8.28	1.10
Group ABC (AB=1, C=0)	1.454	20.86	4.28
Adjusted for MI risk score (7 levels)			
Each socioeconomic factor alone	Coefficient	Coeff/S.e.	e^{Coeff}
Education 7-9=1, 10-12=2, 13+=3	-0.213	-4.09	0.81
Income, 0=0, 1-159999=1, 160000+=2	-0.246	-3.94	0.78
Class I+II=1, III=2, IV+V=3	0.151	3.29	1.16
Treiman, 0-19=0, 20-49=1, 50+=2	-0.358	-5.08	0.70
All socioeconomic factors combined:, n=30709			
Education 7-9=1, 10-12=2, 13+=3	-0.103	-1.59	0.90
Income, 0=0, 1-159999=1, 160000+=2	-0.123	1.73	0.88
Class I+II=1, III=2, IV+V=3	-0.001	-0.02	1.00
Treiman, 0-19=0, 20-49=1, 50+=2	-0.206	-1.85	0.81
Score (7 levels)	0.385	20.48	1.47
Age (1-year)	0.086	7.14	1.09
Group ABC, (AB=1, C=0)	1.228	17.39	3.41

Table 89 Cox regression: CHD mortality by socioeconomy, women, attenders

	Coefficient	Coeff/S.e.	e^{Coeff}
Adjusted for age:			
Each socioeconomic factor alone:			
Education 7-9=1, 10-12=2, 13+=3	-0.24	-0.77	0.78
Income, 0=1, 1-79999=2, 80000+=3	-0.18	-1.00	0.83
Class I+II=1, III=2, IV+V=3	-0.23	-0.59	0.79
Homemaker Yes=1, No=0	0.70	2.44	2.02
Treiman, 0-19=1, 20-49=2, 50+=3	0.13	0.40	1.14
All socioeconomic factors combined,			
Education 7-9=1, 10-12=2, 13+=3	-0.25	-0.75	0.78
Income, 0=1, 1-79999=2, 80000+=3	0.02	0.09	1.01
Homemaker Yes=1, No=0	0.69	2.21	1.99
Treiman, 0-19=1, 20-49=2, 50+=3	0.45	1.11	1.57
Age (1-year)	0.16	3.16	1.18
Adjusted for age and MI risk score			
Each socioeconomic factor alone			
Education 7-9=1, 10-12=2, 13+=3	0.01	0.03	1.00
Income, 0=1, 1-79999=2, 80000+=3	-0.13	-0.71	0.88
Class I+II=1, III=2, IV+V=3	-0.38	-0.97	0.69
Homemaker Yes=1, No=0	0.61	2.11	1.84
Treiman, 0-19=1, 20-49=2, 50+=3	0.27	0.78	1.31
All socioeconomic factors combined:			
Education 7-9=1, 10-12=2, 13+=3	-0.02	-0.05	0.98
Income, 0=1, 1-79999=2, 80000+=3	0.05	0.23	1.05
Homemaker Yes=1, No=0	0.62	1.97	1.85
Treiman, 0-19=1, 20-49=2, 50+=3	0.48	1.16	1.61
Age (1-year)	0.09	1.68	1.09
MI risk score (7 levels)	0.66	8.25	1.93

Table 90 Cox regression: CHD mortality by socioeconomy, stratified by county, adjusted for age and group AB or C, women, attenders

Each socioeconomic factor alone:	Coefficient	Coeff/S.e.	e^{Coeff}
Education 7-9=1, 10-12=2, 13+=3	-0.13	-0.40	0.88
Income, 0=0, 1-79999=1, 80000+=2	-0.17	-0.89	0.85
Class I+II=1, III=2, IV+V=3	-0.24	-0.63	0.79
Homemaker Yes=1, No=0	0.63	2.20	1.88
Treiman, 0-19=0, 20-49=1, 50+=2	0.17	0.51	1.18
All socioecomic factors combined:			
Education 7-9=1, 10-12=2, 13+=3	-0.14	-0.42	0.87
Income, 0=0, 1-79999=1, 80000+=2	0.019	0.092	0.87
Homemaker Yes=1, No=0	0.63	2.00	1.87
Treiman, 0-19=0, 20-49=1, 50+=2	0.42	1.03	1.52
Age (1-year)	0.13	2.60	1.14
Group ABC (AB=1, C=0)	1.81	6.57	6.13
Adjusted for MI risk score (7 levels)			
Each socioeconomic factor alone	Coefficient	Coeff/S.e.	e^{Coeff}
Education 7-9=1, 10-12=2, 13+=3	0.07	0.21	1.07
Income, 0=0, 1-79999=1, 80000+=2	-0.13	-0.66	0.88
Class I+II=1, III=2, IV+V=3	-0.39	-1.03	0.67
Homemaker Yes=1, No=0	0.60	2.09	1.82
Treiman, 0-19=0, 20-49=1, 50+=2	0.27	0.76	1.31
All socioeconomic factors combined,			
Education 7-9=1, 10-12=2, 13+=3	0.04	0.11	1.04
Income, 0=0, 1-79999=1, 80000+=2	0.05	0.23	1.05
Homemaker Yes=1, No=0	0.60	1.93	1.83
Treiman, 0-19=0, 20-49=1, 50+=2	0.44	1.05	1.56
Score (7 levels)	0.60	7.33	1.83
Age (1-year)	0.07	1.37	1.07
Group ABC, (AB=1, C=0)	1.49	5.33	4.41

Table 91 Per cent dead from any cause by 65 occupations, men, all invited

Code	Rank	Occupation	Per cent	S.E	Deaths	n=
Total population			9.7	0.14	4323	44690
202021	1	Architect	2.8	1.4	4	144
202710	2	Religious	3.9	2.2	3	78
202622	3	Univ. lecturer	4.3	1.6	7	163
202322	4	Dentist	4.8	2.1	5	104
212123	5	Adm. secretary	4.9	1.2	15	309
242410	6	Logger	4.9	1.5	10	203
202410	7	Nurse	5.1	2.2	5	98
202623	8	Teacher	5.3	1.0	26	493
202624	9	Vocational teacher	5.5	0.9	33	595
242021	10	Farming etc.	5.6	0.5	132	2347
202110	11	Science, natural	5.7	1.8	9	159
272710	12	Wood work	5.7	1.2	22	383
202022	13	Chief engineer	6.1	1.0	34	560
202810	14	Jurists	6.2	1.9	10	162
202310	15	Physician	6.6	1.8	13	198
212024	16	Local administration	7.0	1.5	20	287
242028	17	Reindeer herder	7.0	2.6	7	100
202023	18	Engineer	7.0	0.6	127	1811
232310	19	Sales, from office	7.1	0.9	58	817
222010	20	Book keeping	7.4	1.1	41	558
202925	21	Editor, journalist	7.4	1.8	16	215
232322	22	Shop keeper	7.5	1.2	39	520
212110	23	Business administration	7.6	0.6	165	2170
204021	24	Accountant	7.7	1.8	18	233
204026	25	Staff service	7.7	1.6	23	297
212010	26	Cent. Public administration	7.9	2.0	15	190
301010	27	Military	8.0	1.1	45	565
292929	28	Personal service	8.0	1.3	26	327
202510	29	Health professional	8.1	2.6	9	111
242110	30	Farm worker	8.4	1.1	53	632
212129	31	Other leader	8.5	1.3	41	480
272310	32	Smelterwork	8.7	1.2	45	520
202910	33	Artistic	8.7	1.5	32	366
232010	34	Sales, whole/retail	8.8	1.1	63	713
282710	35	Machine operator	9.0	0.9	94	1044
272724	36	Carpenter	9.0	0.6	197	2182
222910	37	Office work NEC	9.1	0.6	220	2432
262610	38	Traffic control	9.1	2.3	14	154
272610	39	Electrician	9.4	0.7	149	1581
252929	40.5	Mine/quarry	9.6	1.7	30	312
232323	40.5	Cashier, shop	9.6	1.1	65	676
272910	42.5	Construction else	9.7	0.8	133	1378
242310	42.5	Fishing	9.7	1.0	83	860
272510	44	Iron/metal work	10.1	0.5	351	3466
262710	45	Post/telecommunication	10.4	1.4	54	512
272821	46	Building painter	10.5	1.4	50	478
282210	47	Food processing	10.7	1.0	94	880
292310	48	Janitor, cleaning	10.8	1.2	73	674
262110	49	Seamen	10.9	1.9	30	275

Table 91 continued

Code	Rank	Occupation	Per cent	S.E.	Deaths	n=
232110	50	Real estate	10.9	1.8	33	302
292010	51	Surveillance	11.0	1.3	66	603
282310	52	Chemical processing	11.3	1.9	31	275
272010	53	Textile industry	11.5	1.8	37	323
232210	54	Sales, personal	11.5	1.3	66	575
202630	55	Students	11.5	3.4	10	87
262510	56	Conductor etc.	11.6	1.5	53	458
262425	57	Driver	11.6	0.6	307	2651
272410	58	Fine mechanic	11.6	2.0	31	267
272525	59	Plumber	11.8	1.6	47	400
282022	60	Repro/graphic industry	11.9	1.3	77	650
262010	61	Ship officer	12.0	1.7	42	349
292110	62	Hotel/restaurant	12.6	1.6	55	437
282523	63	Production, plastic etc.	14.1	2.1	38	269
282810	64	Dock work	14.5	0.9	213	1474
101010	65	No occupation	23.5	1.0	409	1751

Analysis of Variance (based on proportions)	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between groups	64	55.5	0.87	10.05	<0.0005
Within groups	44625	3849.4	0.086		

Table 92 CHD mortality by 18 main occupations, adjusted for age and county, or age, county and MI risk score, men, attenders with MI risk score

	Obs.years	CHD deaths	SMR age	SMR score	n=
Pedagogical work	12393	15	51.5	67.2	1040
Executive admin.	30926	44	54.9	60.1	2420
Science/technical	29925	45	62.8	79.0	2358
Other occupation	5035	8	64.4	57.4	402
Humanistic/artistic	12446	22	69.6	83.0	967
Military	8851	19	83.0	85.1	706
Farming	32505	65	93.5	96.5	3040
Office work	28270	68	94.5	101.5	2235
Trade	31830	74	94.6	90.9	2595
Building work	55757	144	105.7	101.9	4817
Fishing	8417	28	106.3	94.1	728
Processing work	27446	80	117.4	109.8	2343
Mining and metal	42862	121	117.7	109.6	3625
Transport else	13128	40	121.1	115.4	1097
Hotel + janitor	8174	26	122.0	113.1	675
Driver	22862	73	131.6	114.6	1931
Light industry	17418	64	144.7	135.9	1463
No occupation	7719	39	196.0	183.4	706
Total	395963	975	100.0	100.0	33148

Figure 63 CHD mortality (deviations from SMR) by 18 main occupations, adjusted for age and county, or age, county and MI risk score, attending men

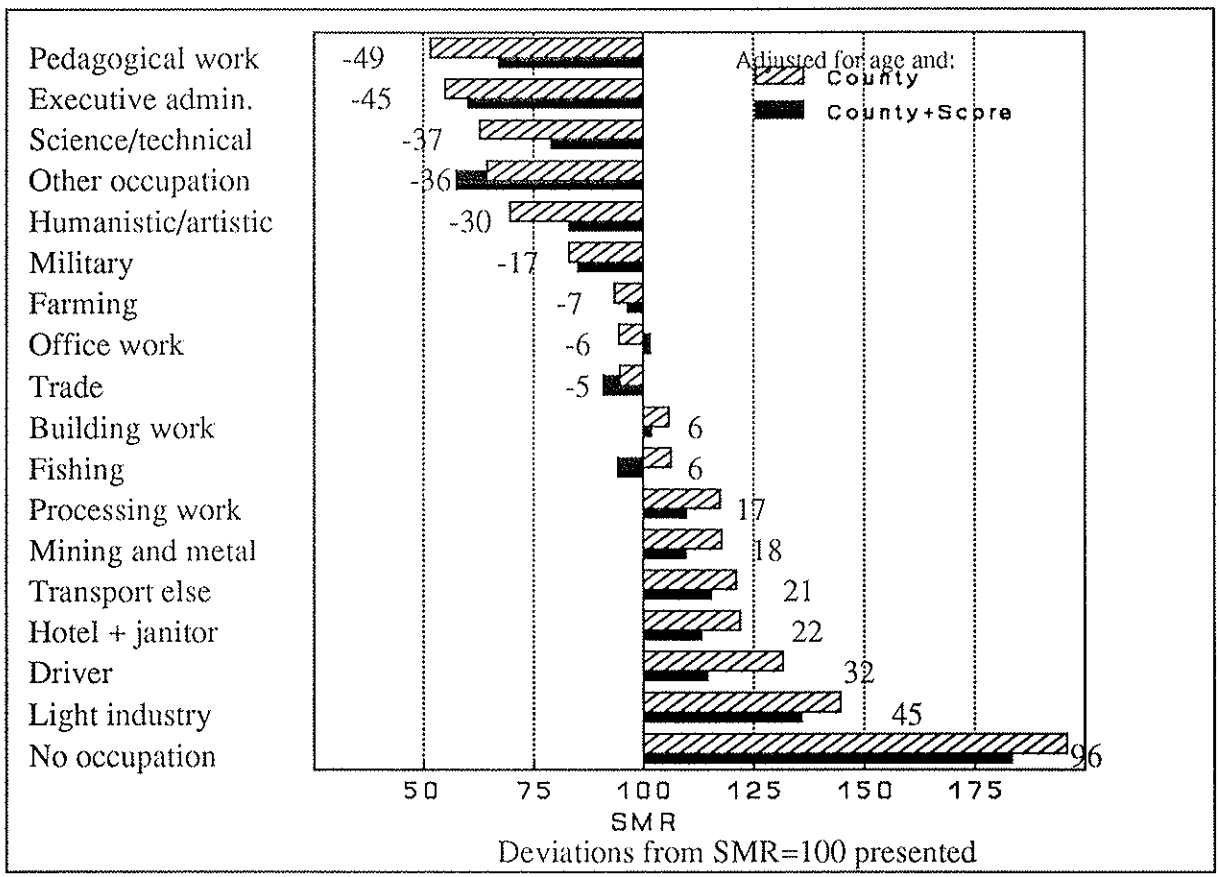

Table 93 Stroke mortality by 18 main occupations, adjusted for age and county, or age, county and MI risk score, men, attenders with MI risk score

	Obs.years	Stroke deaths	SMR age	SMR score	n=
Humanistic/artistic	12446	-	-	-	967
Driver	22862	2	38	34	1931
Science/technical	29925	4	60	72	2358
Transport else	13128	2	62	59	1097
Mining and metal	42862	7	71	67	3625
Pedagogical work	12393	2	73	93	1040
Trade	31830	7	97	92	2595
No occupation	7719	2	100	96	706
Fishing	8417	3	110	110	728
Executive admin.	30926	8	111	118	2420
Farming	32505	8	114	120	3040
Light industry	17418	5	115	116	1463
Processing work	27446	8	122	115	2343
Military	8851	3	134	129	706
Building work	55757	18	136	128	4817
Office work	28270	9	136	146	2235
Hotel + janitor	8174	3	149	145	675
Other occupation	5035	2	178	158	402
Total	395963	93	100.0	100.0	33148

Figure 64 Stroke mortality (SMR) by 18 main occupations, adjusted for age and county, or age, county and MI risk score, attending men

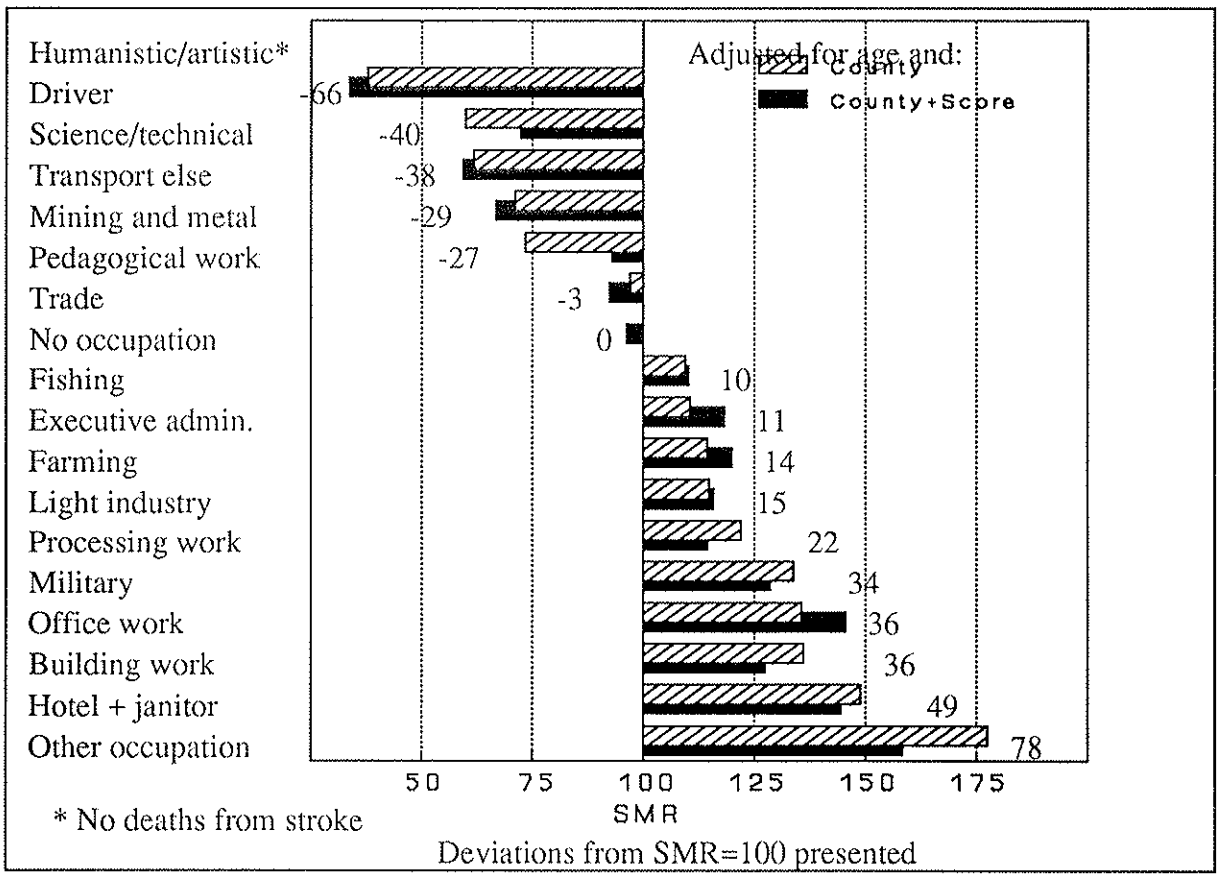

Table 94 All cause mortality by 18 main occupations, adjusted for age, all counties combined and Oslo separately, men, attenders

	Obs.years	Deaths (Oslo)	SMR county	SMR Oslo	n=
Pedagogical work	12393	45 (16)	64.4	43.4	1040
Executive admin.	30926	126 (92)	65.7	60.9	2420
Humanistic/artistic	12446	50 (42)	66.1	66.1	967
Science/technical	29925	119 (89)	69.2	66.8	2358
Military	8851	47 (35)	84.7	93.4	706
Office work	28270	155(121)	90.0	90.3	2235
Farming	32505	157 (10)	91.4	114.0	3040
Other occupation	5035	28 (22)	93.8	103.6	402
Trade	31830	178(129)	95.3	90.3	2595
Fishing	8417	61 (0)	98.6	-	728
Building work	55757	346(165)	105.5	118.8	4817
Mining and metal	42862	268(176)	108.1	132.5	3625
Transport else	13128	92 (50)	115.9	119.0	1097
Processing work	27446	195(112)	119.3	135.7	2343
Driver	22862	160 (91)	120.8	125.7	1931
Hotel + janitor	8174	63 (47)	123.1	146.6	675
Light industry	17418	134 (83)	126.9	152.1	1463
No occupation	7719	119 (46)	247.8	268.5	706
Total	395963	2343(1326)	100.0	102.9	33148

Figure 65 All cause mortality (SMR) by 18 main occupations, all counties combined, and Oslo separately, men, attenders

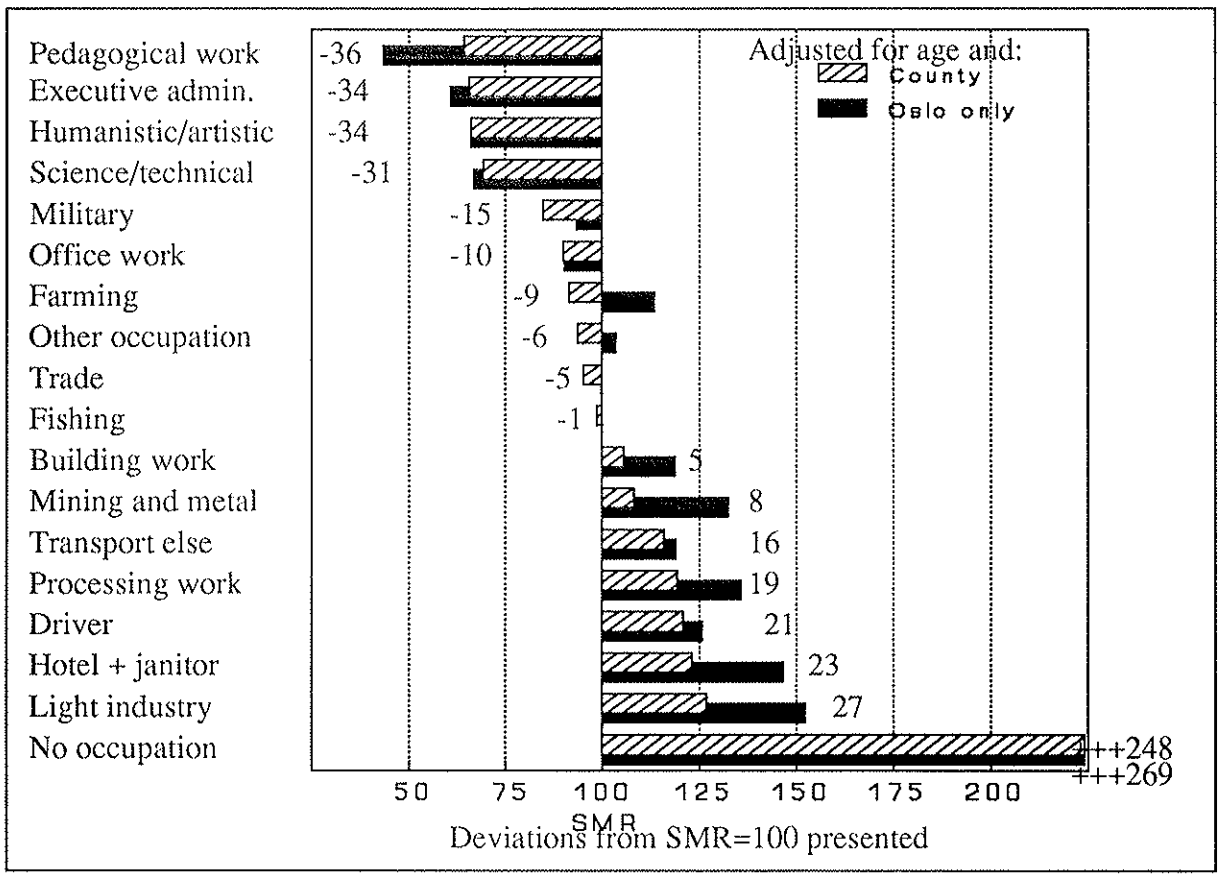

Table 95 Violent death mortality by 18 main occupations, adjusted for age, all counties combined and Oslo separately, men, attenders

	Obs.years	Deaths (Oslo)	SMR county	SMR Oslo	n=
Science/technical	29925	9(6)	50	37	2358
Executive admin.	30926	11(8)	57	45	2420
Light industry	17418	9(7)	69	106	1463
Trade	31830	15(9)	74	58	2595
Military	8851	5(3)	81	67	706
Humanistic/artistic	12446	6(5)	82	66	967
Mining and metal	42862	27(17)	90	107	3625
Other occupation	5035	3(2)	93	77	402
Office work	28270	17(12)	97	75	2235
Farming	32505	26(1)	98	98	3040
Driver	22862	17(4)	105	46	1931
Pedagogical work	12393	9(4)	105	90	1040
Building work	55757	46(16)	109	97	4817
Transport else	13128	11(2)	113	40	1097
Hotel + janitor	8174	7(5)	120	133	675
Fishing	8417	14(0)	134	-	728
Processing work	27446	33(11)	163	113	2343
No occupation	7719	16(5)	249	151	706
Total	395963	281(117)	100.0	76.2	33148

Figure 66 Violent deaths (SMR) by 18 main occupations, all counties combined and Oslo separately, men, attenders

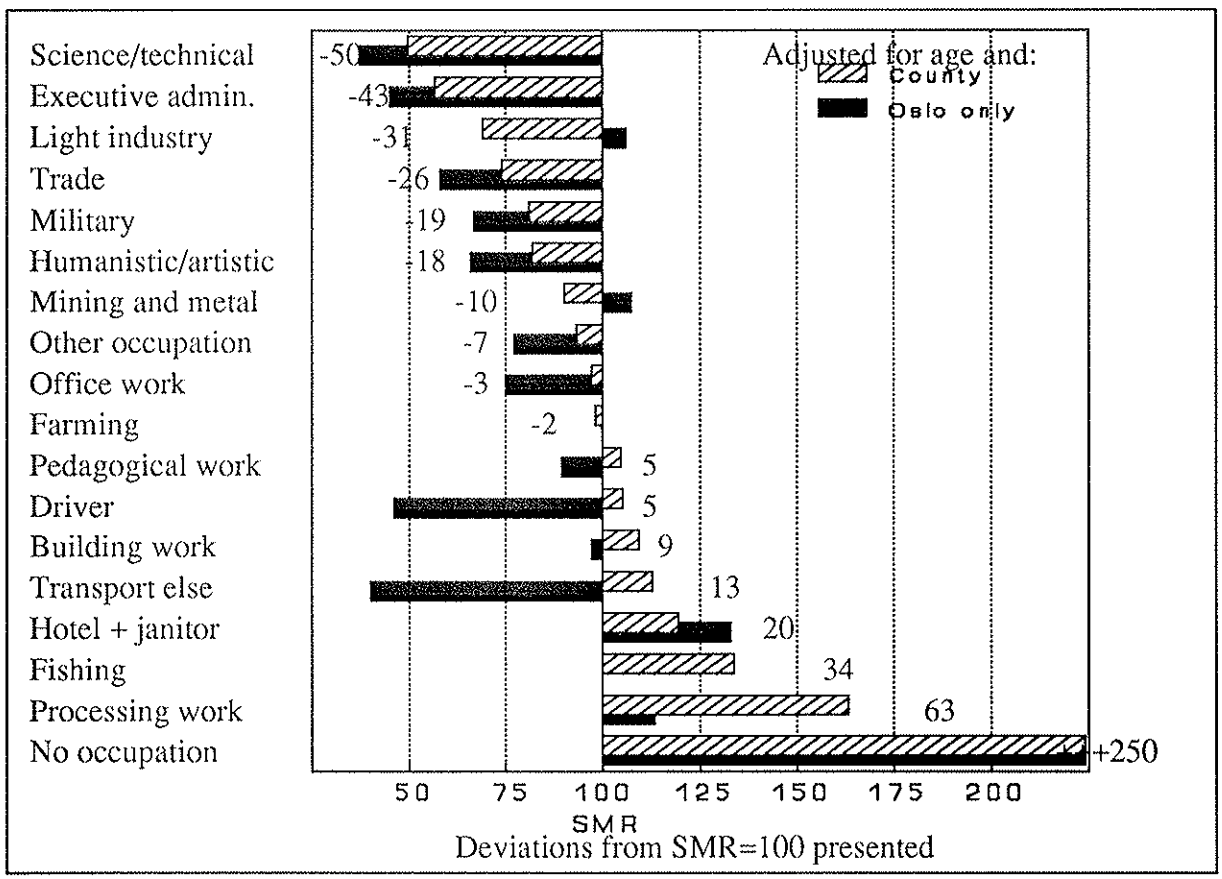

Table 96 CHD mortality by 65 occupations, adjusted for age and county, men, attenders

Code	Rank	Occupation	SMR	Deaths Observed	Expexted	n=	Obs. years
202310	1	Physician	-	0	1.7	66	786
202322	1	Dentist	-	0	1.9	77	924
202410	1	Nurse	-	0	2.0	68	818
202710	1	Religious	-	0	1.4	48	582
202925	5	Editor, journalist	26.0	1	3.8	115	1487
202624	6	Vocational teacher	28.4	4	14.1	507	5997
202110	7	Science, natural	30.0	1	3.3	130	1519
202622	8	Univ. lecturer	34.9	1	2.9	93	1264
212010	9	Cent. Public administration	38.1	2	5.3	155	1937
212024	10	Local administration	42.6	3	7.0	201	2639
242028	11	Reindeer herder	52.2	2	3.8	91	1109
212110	12	Business administration	55.3	27	48.8	1486	18846
202021	13	Architect	57.0	2	3.5	104	1381
212123	14	Adm. secretary	58.8	5	8.5	244	3184
202910	15	Artistic	60.3	4	6.6	222	2770
262010	16	Ship officer	61.0	3	4.9	171	1980
202023	17	Engineer	65.9	30	45.6	1454	18588
212129	18	Other leader	66.2	7	10.6	334	4319
262110	19	Seamen	66.5	2	3.0	111	1293
222010	20	Book keeping	66.7	10	15.0	452	5779
272410	21	Fine mechanic	69.8	4	5.7	188	2412
232110	22	Real estate	70.2	5	7.1	220	2877
202810	23	Jurists	70.5	2	2.8	89	1156
232323	24	Cashier, shop	70.6	10	14.2	504	5942
301010	25	Military	72.1	7	9.7	328	4047
292929	26	Personal service	73.5	5	6.8	221	2689
202630	27	Students	73.6	1	1.4	48	557
202510	28	Health professional	74.8	2	2.7	84	1056
232310	29	Sales, from office	76.4	15	19.6	617	8234
232322	30	Shop keeper	79.5	10	12.6	413	5013
272710	31	Wood work	81.5	7	8.6	349	3743
202623	32	Teacher	83.0	9	10.8	392	4575
272310	33	Smelterwork	84.7	9	10.6	436	5060
204026	34	Staff service	87.5	6	6.9	205	2615
292010	35	Surveillance	89.3	12	13.4	388	4938
242021	36	Farming etc.	94.8	47	49.6	2238	23766
202022	37	Chief engineer	95.0	12	12.6	426	5498
272821	38	Building painter	96.9	10	10.3	354	4206
252929	39	Mine/quarry	98.7	9	9.1	279	3141
242110	40	Farm worker	99.0	12	12.1	533	5779
204021	41	Accountant	99.6	6	6.0	183	2513
242410	42	Logger	101.3	4	3.9	178	1851
272910	43	Construction else	101.6	32	31.5	1095	12581
222910	44	Office work NEC	101.8	58	57.0	1783	22491
272724	45	Carpenter	102.0	52	51.0	1817	20604
242310	46	Fishing	106.3	28	26.3	728	8417
262610	47	Traffic control	107.6	4	3.7	130	1549
282710	48	Machine operator	108.6	25	23.0	866	9780
292310	49	Janitor, cleaning	113.0	17	15.0	458	5532
282523	50	Production, plastic etc.	114.0	6	5.3	174	2100

Table 96 continued

Code	Rank	Occupation	SMR	Deaths Observed	Deaths Expected	n=	Obs. years
272610	51	Electrician	118.4	43	36.3	1255	15230
272510	52	Iron/metal work	119.5	89	74.5	2602	31004
282810	53	Dock work	121.5	38	31.3	979	12006
232010	54	Sales, whole/retail	121.6	19	15.6	550	6362
282210	55	Food processing	129.6	30	23.2	728	8417
292110	56	Hotel/restaurant	129.9	8	6.2	210	2576
262425	57	Driver	131.6	73	55.5	1931	22862
232210	58	Sales, personal	139.1	18	12.9	405	4926
262710	59	Post/telecommunication	139.4	14	10.0	320	3797
262510	60	Conductor etc.	153.0	17	11.1	355	4376
282310	61	Chemical processing	157.5	9	5.7	211	2305
282022	62	Repro/graphic industry	159.6	23	14.4	478	6069
272525	63	Plumber	163.8	14	8.5	308	3657
272010	64	Textile industry	165.3	11	6.7	257	2932
101010	65	No occupation	196.3	39	19.9	705	7705
		Total population	100.0	975	975	33174	395948

Total deaths=975 (CHD+SD), Obs.years=395 948, Overall rate=246.2/100 000 Obs.years.

Table 97 All cause mortality by occupation, adjusted for age and county, women

Code	Rank	Occupation	SMR	Deaths Observed	Deaths Expected	n=	Obs. years
292929	1	Other service	27.3	1	3.7	121	1326
282621	2	Packing	46.4	1	2.2	84	864
292310	3	Cleaning etc.	53.8	13	24.1	826	9036
272010	4	Textile industry	65.8	4	6.1	260	2668
202623	5	Teacher	72.7	7	9.6	414	4357
242110	6	Farming	74.4	45	60.4	2451	26534
282210	7	Food processing etc.	79.6	7	8.8	266	3084
202421	8	Nurse	87.3	4	4.6	177	1887
232323	9	Cashier, shop	88.5	19	21.5	810	8650
262710	10	Post and telecomm.	93.2	6	6.4	253	2770
202429	11	Aux. nurse	96.3	5	5.2	218	2284
212010	12	Administration	105.7	4	3.8	137	1465
222010	13	Clerks	107.1	20	18.7	697	7432
292130	14	House work	113.0	214	189.4	7462	80422
101010	15	No occupation	121.3	35	28.9	1198	12611
202910	16	Artists, students	123.7	1	0.81	35	352
292110	17	Hotel/restaurant	129.4	22	17.0	631	6744
201010	18	Technical/Science	134.4	4	3.0	123	1302
242310	19	Industry, manual work	135.3	8	5.9	232	2380
Total population:			100.0	420	420	16395	176159

Total n deaths=420 (All causes), Obs.years=176 159, Overall rate=238.4/100 000 Obs.years.
X^2=21.0, d.f.= 18, ns

Table 98 CHD mortality by 65 occupations, adjusted for age, county and risk score, men, attenders

Code	Rank	Occupation	SMR	Observed	Expected	n=	years
202322	1	Dentist	-	0	1.5	77	924
202310	1	Physician	-	0	1.0	66	786
202710	1	Religious	-	0	0.73	48	582
202410	1	Nurse	-	0	2.0	68	818
202925	5	Editor, journalist	31.6	1	3.2	115	1487
202624	6	Vocational teacher	35.0	4	11.4	507	5997
202110	7	Science, natural	44.2	1	2.3	130	1519
212010	8	Cent. Public administration	45.2	2	4.4	155	1937
242028	9	Reindeer herder	49.1	2	4.1	91	1109
262010	10	Ship officer	51.3	3	5.8	171	1980
202622	11	Univ. lecturer	52.8	1	1.9	93	1264
262110	12	Seamen	55.5	2	3.6	111	1293
212024	13	Local administration	56.2	3	5.3	201	2639
212110	14	Business administration	61.9	27	43.6	1486	18846
212123	15	Adm. secretary	63.1	5	7.9	244	3184
272310	16	Smelterwork	66.7	9	13.5	436	5060
232323	17	Cashier, shop	67.4	10	14.8	504	5942
272410	18	Fine mechanic	67.5	4	5.9	188	2412
202910	19	Artistic	67.5	4	5.9	222	2770
292929	20	Personal service	72.8	5	6.9	221	2689
301010	21	Military	75.8	7	9.2	328	4047
202021	22	Architect	78.7	2	2.5	104	1381
212129	23	Other leader	79.5	7	8.8	334	4319
232110	24	Real estate	79.6	5	6.3	220	2877
272710	25	Wood work	81.3	7	8.6	349	3743
232310	26	Sales, from office	81.4	15	18.4	617	8234
222010	27	Book keeping	81.7	10	12.2	452	5779
202023	28	Engineer	82.2	30	36.5	1454	18588
242021	29	Farming etc.	85.2	47	55.2	2238	23766
232322	30	Shop keeper	85.3	10	11.7	413	5013
272910	31	Construction else	88.1	32	36.3	1095	12581
242310	32	Fishing	89.2	28	31.4	728	8417
242410	33	Logger	90.8	4	4.4	178	1851
242110	34	Farm worker	91.5	12	13.1	533	5779
272821	35	Building painter	93.6	10	10.7	354	4206
282710	36	Machine operator	94.4	25	26.5	866	9780
292010	37	Surveillance	97.8	12	12.3	388	4938
272724	38	Carpenter	99.1	52	52.5	1817	20604
202510	39	Health professional	99.8	2	2.0	84	1056
202630	40	Students	103.1	1	1.0	48	557
292310	41	Janitor, cleaning	104.6	17	16.2	458	5532
252929	42	Mine/quarry	105.2	9	8.6	279	3141
262610	43	Traffic control	110.7	4	3.6	130	1549
202623	44	Teacher	110.9	9	8.1	392	4575
204026	45	Staff service	111.3	6	5.4	205	2615
222910	46	Office work NEC	111.4	58	52.1	1783	22491
204021	47	Accountant	111.5	6	5.4	183	2513
292110	48	Hotel/restaurant	112.1	8	7.1	210	2576
282523	49	Production, plastic etc.	112.8	6	5.3	174	2100
272610	50	Electrician	113.3	43	38.0	1255	15230

Table 98 continued

Code	Rank	Occupation	SMR	Observed	Expected	n=	years
232010	51	Sales, whole/retail	113.3	19	16.8	550	6362
272510	52	Iron/metal work	114.1	89	78.0	2602	31004
262425	53	Driver	116.4	73	62.7	1931	22862
282810	54	Dock work	116.4	38	32.7	979	12006
202810	55	Jurists	122.7	2	1.6	89	1156
282210	56	Food processing	124.2	30	24.1	728	8417
232210	57	Sales, personal	127.7	18	14.1	405	4926
202022	58	Chief engineer	134.3	12	8.9	426	5498
262710	59	Post/telecommunication	136.9	14	10.2	320	3797
272525	60	Plumber	144.9	14	9.7	308	3657
282310	61	Chemical processing	151.5	9	5.9	211	2305
262510	62	Conductor etc.	153.0	17	11.1	355	4376
272010	63	Textile industry	155.8	11	7.1	257	2932
282022	64	Repro/graphic industry	159.0	23	14.5	478	6069
101010	65	No occupation	175.2	39	22.3	705	7705
		Total population	100.0	975	975	33174	395948

Total deaths=975 (CHD+SD), Obs.years=395 948, Overall rate=246.2/100 000 Obs.years.

Table 99 All cause mortality, adjusted for age, county and risk score, women

Code	Rank	Occupation	SMR	Observed	Expected	n=	years
292929	1	Other service	29.4	1	3.4	121	1326
282621	2	Packing	44.1	1	2.3	84	864
292310	3	Cleaning etc.	54.9	13	23.7	826	9036
272010	4	Textile industry	65.6	4	6.1	260	2668
242110	5	Farming	73.2	45	61.4	2451	26534
282210	6	Food processing etc.	81.1	7	8.6	266	3084
202623	7	Teacher	86.1	7	8.1	414	4357
262710	8	Post and telecomm.	91.0	6	6.6	253	2770
202421	9	Nurse	92.7	4	4.3	177	1887
212010	10	Administration	93.3	4	4.3	137	1465
232323	11	Cashier, shop	93.9	19	20.2	810	8650
202429	12	Aux. nurse	100.5	5	5.0	218	2284
222010	13	Clerks	111.6	20	17.9	697	7432
292130	14	House work	112.0	214	191.1	7462	80422
101010	15	No occupation	119.8	35	29.2	1198	12611
201010	16	Technical/Science	121.8	4	3.3	123	1302
242310	17	Industry, manual work	126.5	8	6.3	232	2380
292110	18	Hotel/restaurant	127.3	22	17.3	631	6744
202910	19	Artists, students	127.5	1	0.78	35	352
Total population:			100.0	420	420	16395	176159

Total deaths=420 (All causes), Obs.years=176 159, Overall rate=238.4/100 000 Obs.years.
X^2=19.1, 18 d.f., ns

Table 100 Age adjusted risk factors and CHD mortality by county, education and income, attending drivers

Expected number of deaths based on total male attending population
Age adjusted:

		Sys BP mm	Chol mmol/l	Smoke %	Risk Score	CHD Rate/ 1000	CHD Deaths O/E	n=
Oslo		137.2	7.11	82	66.0	4.0	49/30.2	920
Standard deviation		15.2	1.35	38	33.5			
Income	<142600	137.6	7.06	87	73.0			393
	≥142600	136.9	7.17	79	66.5			527
Education	7-9	137.3	7.15	83	69.3			810
	10+	136.5	6.95	81	69.0			110
Oppland		137.5	7.03	70	57.0	1.8	9/12.5	539
Standard deviation		16.6	1.28	46	59.6			
Income	<142600	139.2	7.05	73	60.5			236
	≥142600	136.1	7.02	68	54.3			303
Education	7-9	137.5	7.02	71	54.8			512
	10+	135.9	7.21	57	98.6			27
Sogn og Fjordane		135.2	6.92	60	55.3	3.3	9/6.7	258
Standard deviation		17.2	1.43	49	60.9			
Income	<142600	134.6	6.91	65	56.0			112
	≥142600	135.6	6.92	56	54.7			146
Education	7-9	135.4	6.93	60	56.2			240
	10+	131.8	6.80	53	43.2			18
Finnmark		138.7	7.48	75	88.8	2.5	6/6.0	214
Standard deviation		16.7	1.39	43	86.7			
Income	<142600	138.0	7.61	79	90.9			114
	≥142600	138.0	7.33	70	84.2			100
Education	7-9	139.0	7.48	76	89.6			196
	10+	135.1	7.41	61	67.7			18

Relative Risk (RR) of dying from CHD:
Drivers vs. other occupations =1.32 (95% CI 1.04-1.68) Adjusted for age and county.
Oslo vs Oppland drivers =2.26 (95% CI 1.11-4.6) Adjusted for age.

No other mortality comparisons between counties were significantly different from 1.

Drivers, mean Treiman Prestige score 32, mean income 142600 NOK,
mean SMR 130, CHD mortality rate 3.3/1000 obs.yrs. Age 40-49 at screening.
Systolic blood pressure (Sys BP), Serum cholesterol (chol) and MI risk score (Score) are age adjusted (1-year age groups).

Table 101 Age adjusted risk factors and CHD mortality by county, education and income, attending fishermen

Due to few fishermen in Oppland and Oslo, only Sogn og Fjordane and Finnmark counties will be compared. Expected number of deaths based on total male attending population.

		Sys BP	Chol.	Smoke %	Score	Age adj. CHD Rate/ 1000yrs	Age adj. CHD Deaths O/E	n=
Sogn og Fjordane		135.8	7.10	72	70.2	2.6	6/5.6	206
Standard deviation		15.9	1.5	45	94.3			
Income	<99000	138.0	7.32	71	78.9			102
	≥99000	133.7	6.88	74	61.7			104
Education	7-9	135.8	7.03	73	67.5			192
	10+	136.2	8.06	63	107.4			14
Finnmark		139.1	7.85	76	109.7	3.7	22/14.6	520
Standard deviation		17.5	1.4	43	133.6			
Income	<99000	139.5	7.85	76	113.0			279
	≥99000	138.6	7.85	74	105.8			241
Education	7-9	138.9	7.84	76	109.6			499
	10+	142.6	8.03	68	111.5			21

Relative Risk (RR) of dying from CHD:
Fishermen vs. other occupations =1.05, ns.
Finnmark vs. Sogn og Fjordane fishermen=1.24 (0.57-3.47) Adjusted for age

SMR 106, CHD mortality rate 2.6/1000 obs. yrs, 40-49 years at screening.
Mean Treiman Prestige score =30, mean income =99000 NOK,
Systolic blood pressure (Sys BP), Serum cholesterol (chol) and MI risk score (Score) are age adjusted (1-year age groups).

Table 102 Age adjusted risk factors and CHD mortality by county, education and income, attending farmers

Due to few farmers in Oslo, only Oppland, Sogn og Fjordane and Finnmark counties will be compared. Expected number of deaths based on total male attending population.

		Sys BP mm	Chol mmol/l	Smoke %	Risk Score	Age adj. CHD Rate/ 1000	CHD Deaths O/E	n=
Oppland		138.0	6.88	60	45.1	2.1	27/32.2	1255
Standard deviation		16.8	1.27	49	59.6			
Income	<113700	140.1	6.95	66	52.2			311
	≥113700	136.4	6.82	55	39.7			104
Education	7-9	138.8	6.93	64	47.6			944
	10+	135.3	6.73	48	37.8			311
Sogn og Fjordane		138.3	6.92	45	46.7	1.7	16/23.5	832
Standard deviation		17.2	1.43	50	60.9			
Income	<113700	139.2	6.91	47	47.6			578
	≥113700	136.2	6.95	41	44.8			255
Education	7-9	138.7	6.95	46	47.7			616
	10+	137.3	6.84	42	44.0			217
Finnmark		137.4	7.72	62	84.7	1.7	4/6.0	121
Standard deviation		16.7	1.39	49	86.7			
Income	<113700	138.1	7.75	61	88.0			95
	≥113700	134.7	7.62	65	73.3			26
Education	7-9	138.1	7.76	62	90.1			99
	10+	134.4	7.53	64	59.9			22

Relative Risk (RR) of dying from CHD:
Farmers vs. other occupations =0.91 (0.68-1.21) Adjusted for age and county.
Oppland vs. Sogn og Fjordane farmers =1.23 (0.66-2.28) Adjusted for age.

SMR 0.91, CHD mortality rate 2.2/1000 obs. yrs. Age 40-49 at screening.
Mean Treiman Prestige Score 47, mean income 113700 NOK,

Systolic blood pressure (Sys BP), Serum cholesterol (chol) and MI risk score (Score) are age adjusted (1-year age groups).

Table 103 Age adjusted risk factors and CHD mortality by county, education and income, attending iron and metal workers

Expected number of deaths based on total male attending population

		Sys BP mm	Chol mmol/l	Smoke %	CHD Risk Score	CHD Rate/ 1000	Deaths O/E	n=
Oslo		137.2	7.04	71	58.9	3.44	71/50.9	1390
Standard deviation		16.6	1.24	45	85.8			
Income	<146200	137.1	7.02	76	61.1			498
	≥146200	137.2	7.04	68	57.7			892
Education	7-9	136.8	7.04	73	59.1			1040
	10+	138.2	7.02	66	58.4			350
Oppland		136.8	6.84	66	49.8	1.99	15/18.6	723
Standard deviation		15.7	1.28	47	63.9			
Income	<146200	137.3	6.84	73	54.9			323
	≥146200	136.4	6.83	60	45.7			400
Education	7-9	137.3	6.87	67	51.7			566
	10+	134.7	6.71	60	42.1			157
Sogn og Fjordane		138.0	6.89	58	61.6	1.37	5/9.0	314
Standard deviation		16.1	1.45	49	102.7			
Income	<146200	138.3	6.90	62	61.1			117
	≥146200	137.8	6.88	56	61.9			197
Education	7-9	138.1	6.97	59	66.0			253
	10+	137.4	6.56	54	43.4			61
Finnmark		135.9	7.73	70	108.7	5.11	12/5.8	175
Standard deviation		17.6	1.71	4.6	170.5			
Income	<146200	137.5	7.97	71	132.9			91
	≥146200	134.3	7.46	69	82.4			84
Education	7-9	136.4	7.76	72	109.7			132
	10+	134.6	7.64	65	105.4			43

Relative Risk (RR) for dying from CHD:
Iron/metal vs. other occupations: RR = 1.24 (95% CI 1.01-1.52) adjusted for age and county.
Finnmark vs. Oslo RR =1.48 (95% CI 0.81-2.74) adjusted age.
Finnmark vs. Oppland RR = 2.57 (95% CI 1.20-5.48) adjusted age.
Finnmark vs. Sogn og Fjordane RR = 3.74 (95% CI 1.32-10.7) adjusted age.

Iron/metal, mean Treiman Prestige score 39, mean income 146200 NOK, SMR=124, CHD rate=3.1/1000 Observation years.
Systolic blood pressure (Sys BP), Serum cholesterol (chol) and MI risk score (Score) are age adjusted (1-year age groups).

Appendix A
Questionnaire used in the cardiovascular disease study in Norwegian counties
English translation
The reply is marked as "yes/no", or "yes", if appropriate.

Part A

Have you, or have you had:
- heart infarction?
- angina pectoris(heart cramp)?
- other heart disease?
- arteriosclerosis of legs?
- cerebral stroke?
- diabetes?

Are you being treated for:
- hypertension?

Do you use:
- nitroglycerine?

Part B

Do you get pain or discomfort in the chest when:
- walking up hills, stairs or hurrying on level ground?
- walking at ordinary pace on the level?

If you get pain in the chest when walking do you usually:
(1) stop?
(2) slow down?
(3) carry on at the same pace?

If you stop or slow down, does the pain disappear:
(1) after less than 10 minutes?
(2) after more than 10 minutes?

Do you get pain in the calf while you are:
- walking?
- resting?

If you get pain in the calf, then answer:
- does the pain increase when moving at faster pace or uphill?
- does the pain disappear if you stop?

Do you usually have:
- cough in the morning?
- sputum from your chest in the morning?

Part C

Exercise and physical exertion during *leisure time*.

If your activity varies much, for example between summer and winter, then give an average. The questions apply only to the last year period.

Mark "YES" for the best fitting description:
(1) Reading, watching TV, or other sedentary activity?
(2) Walking, bicycling, or moving around in other ways least 4 hours a week?(including walking or cycling to place of work, walking tours on Sundays, etc.)
(3) Participating in recreational athletics, heavy garden work etc? (note: duration of activity at least 4 hours a week.)
(4) Participating in hard training or athletics competitions, regularly and several times a week?

Part D

Do you smoke daily at present?
If the answer was "Yes", then answer:
Do you smoke cigarettes daily? (handrolled or factory made)

If you do not smoke cigarettes now, then answer:
Have you smoked cigarettes daily before?

If you answered "Yes", how long is it since you stopped?
(1) Less than 3 months?
(2) 3 months to 1 year?
(3) 1 to 5 years?
(4) More than 5 years?

For those who smoke or have smoked previously:
For how many years altogether have you smoked daily?

Number of years.....

How many cigarettes do you, or did you, smoke daily?
Give number of cigarettes per day (handrolled + factory made)

Number of cigarettes.....

Do you smoke daily tobacco products other than cigarettes?
- cigars or cigarillos?
- a pipe?

If you smoke a pipe, how many packs of tobacco (50 grams) do you use for pipe-smoking per week?
Give average number of packs per week.

Number of tobacco packs.....

Part E

Do you usually have shift work or night work?
Can you usually return home from work:
- every day?
- every weekend?

Are there periods during which your working days are longer than usual? (example: fishing season, harvest work)

During the last year, have you had:(mark"YES" for the best fitting description)
(1) mostly sedentary work? (e.g. office work, watchmaker, mounting of instruments)
(2) work leading to much walking? (e.g. shop assistant, light industrial work, education)
(3) work leading to much walking and lifting? (e.g. postman, heavy industrial work, construction)
(4) heavy manual labour? (e.g. forestry work, heavy farmwork, heavy construction work)

During the last 12 months, have you had to move from your home area for reasons of changes in your work situation?

Is domestic work your main occupation?

Have you within the last 12 months received unemployment insurance?

Are you at present on sick leave, or receiving rehabilitation wages?

Do you receive a complete or partial disability pension?

Part F (alternative replies: yes, no, don't know)

Have one or more of your parents or sisters or brothers had a heart infarction (heart wound) or angina pectoris (heart cramp)?

In Finnmark only:
Are two or more of your grandparents of Finnish origin?
Are two or more of your grandparents of Lapp origin?

Appendix B: Short codes of deaths and ICD-7, ICD-8 and ICD-9

Short Code	Cause of death	ICD VII 1951-68	ICD VIII 1969-85	ICD IX 1986-
01	Tuberculosis	001-019	010-019	010-018, 137
02	Other infectious diseases.	020-138	000-008,009.0, 020-136	001-008,009.0, 020-136,138-139
03	Cancer esophagus	150	150	150
04	" ventriculi	151	151	151
05	" colon	153	153	153
06	" rectum	154	154	154
07	" hepar, gall system	155	155-156	155-156
08	" pancreas	157	157	157
09	" pharynx	145-148	146-149	146-149
10	" larynx	161	161	161
11	" lung	162-163	162	162
12	" mammae	170	174	174-175
13	" cervix uteri	171	180	180
14	" corpus uteri	172	182.0	182
15	" ovary	175.0	183.0	183.0
16	" prostate	177	185	185
17	" urinary bladder	181	188	188
18	Malignant melanoma	190	172	172
19	Cancer brain	193	191	191
20	" thyroid	194	193	193
21	Malign.lymphogranulomatosis	201	201	201
22	Myelomatosis	203	203	203,238.6
23	Leukemia og aleukemia	204	204-207	204-208
24	Other malignant tumors	Rest 140-205	Rest 140-203	Rest 140-208

...continued

Code	Cause of death	ICD VII 1951-68	ICD VIII 1969-85	ICD IX 1986-
25	Diabetes	260	250	250
26	Apoplexy	331-334	431-438	431-438
27	Meningitis	340	320	320,322
28	Multiple sclerosis	345	340	340
29	Paralysis agitans	350	342	332
30	Coronary heart disease	420	410-411,412.0-412.3,413	410-413, 414.0-414.1,414.9
31	Other myocardial degeneration	422	412.4-412.8, 428,429.0	414.2,414.8, 428,429.0-429.2
32	Valvular disease	410-414,421	394-397,424	394-397,424
33	Hypertony	440-447	400-404	401-404
34	Other cardiovascul. diseases	400-402,415-416,430-435, 450-468	Rest 390-458	Rest 390-459
35	Sudden death	782.4,795.2	782.4,795	798.1-798.2
36	Pneumonia	490-493	480-486	480-486
37	Asthma bronchiale	241	493	493
38	Bronchitis	500-502	466,490-491	466,490-491
39	Emphysema	527.1	492	492
40	Bronkiectasia	526	518	494
41	Other diseases in respiratory passages	470-475,480-483, Rest 510-527	Rest 460-519	Rest 460-519
42	Ulcus ventriculi	540	531	531
43	Ulcus duodeni	541	532	532
44	Peptic ulcer nud.	Udef,(i 540)	533	533
45	Ulcus gastrojejunali	542	534	534
46	Ileus and hernia	560-561,570	550-553,560	550-553,560
47	Appendicitis	550-553	540-543	540-543

...continued

Code	Cause of death	ICD VII 1951-68	ICD VIII 1969-85	ICD IX 1986-
48	Cirrhosis of liver	581	571	571
49	Diseases of biliary ducts and gall bladder	584-586	574-576	574-576
50	Other diseases of digestive organs	530-539,543-545,571-580, 582-583,587	009.1-009.9, Rest 520-577	009.1-009.3 Rest 520-577
51	Chronic nephritis	592	582	582
52	Inf./calc. kidney, urin. tract	600,602,604	590,592,594	590,592,594
53	Hypertrophy of prostate	610	600	600
54	Other diseases in uro-genital organs	Rest 590-637	Rest 580-629	Rest 580-629
55	Disease of skin, bone etc.	690-749	680-738	680-739
56	Senility	794	794	797
57	Suicide, poisoning	E 970-973	E 950-952	E 950-952
58	" Hanging etc.	E 974	E 953	E 953
59	" Drowning	E 975	E 954	E 954
60	" Fire arms	E 976	E 955	E 955
61	" Other	E 963, E 977-979	E 956-959	E 956-959
62	Accidents, motor vehicle	E 810-836	E 810-823	E 810-825
63	" Sea transport	E 850-858	E 830-839	E 830-838
64	" Drowning, other	E 929	E 910	E 910
65	" Poisoning	E 870-895	E 850-877	E 850-869
66	" Falls	E 900-904	E 880-887	E 880-888
67	Other accidents and homicide	Rest E 800-999	Rest E 800-999	Rest E 800-999
68	Other and unknow causes	Rest 001-799	Rest 000-799	Rest 001-799
70	Subarachnoidal haemmorhage	330	430	430

If diagnosis 2 > 800 and diagnosis 1 > 800, Short code 2 is set to 99

Appendix C: Detailed procedure for the recoding of occupations

Introduction:

The 1970 census coded occupations by the Nordic Classification of occupations, NYK[55]. This coding system is based on a 5-digit code, the first 3 were kept in the match with the cardiovascular screening files, and form the basis of the present recode. The first digit indicate the field of work, the first and second indicate the occupational group, and all three digits are needed to identify single occupations. The NYK classification complies with the International Standard Classification of Occupations (ISCO) by the International Organization of Labor (ILO), Geneva 1958. There are only minor deviations at the two-digit level, the Norwgian three-digit codes are more detailed than the ISCO codes.

Purpose of recode:

The NYK codes proved too fine, many occupation codes contained less than 5 screenees. The purpose of the recoding was to keep occupations with sufficient number of responders, and to group similar job titles with few responders into logical units. Several occupations with few members were often grouped with one major occupation and the code of the major occupation used for the entire group. The grouping is quite detailed, especially for men. As occupational group was one of the main socio-economic markers in this study, this was considered appropriate.

Methods:

The NYK classification did not assign codes to housewives or students. These groups were identified through the screening questionnaire, and they were given codes following the pattern of the NYK codes. Through this procedure more than 50% of the women could be classified as housewives, instead of "missing". The criteria and procedure for classifying subjects as housewives or students are described in methods.

The nordic classification used A, X and blank in addition to the numbers 0 through 9. To avoid the alphanumeric mixture, the three-digit codes were expanded to 6 digits. All blanks were replaced with 10, A's with 30, X's with 40 and 20 added to all numbers. The original codes may usually be found by reading the 2., 4., and 6. digit only. The Nordic occupation codes included trailing blanks, now replaced by "20".

Results:

The men were grouped into 65 new occupation groups. In women the final number was reduced to 19 occupations, two of which were housewives and farm wives, occupations not in the NYK. In women very broad categorization was necessary to obtain sufficient numbers. Women chose between fewer occupations, and there were only 17540 women compared with the 44690 men.

Discussion

Grouping of occupations will always have an element of personal judgment. As far as possible, the recoding tried to follow the main pattern of the NYK, and not cross the 1-digit boundaries. This was usually also the most natural and "intuitively best " categorization. However, similar socioeconomic status was given higher priority than being in the same 1-digit group if several recodes were possible. Some very small groups were grouped together with occupations doing virtually the same operations, even when this entailed going to an entirely different group.

6-digit code	Occupation	Original Census code
(101010)	No Occupation	( )
(201010)	Technology/Science	(0)
(202010)	Technology	(00)
(202021)	Architect	(001)
(202022)	Chief/Department engineer.	(002)
(202023)	Engineer NEC (not elsewhere classified)	(003)
(202025)	Auto control engineer	(005)
(202027)	Surveying engineer	(007)
(202028)	Surveying technician	(008)
(202029)	Draftsman/Tracer	(009)
(202110)	Science, natural	(01)
(202121)	Chemist	(011)
(202122)	Physicist	(012)
(202123)	Lab. assistant	(013)
(202124)	Geologist	(014)
(202125)	Meteorologist	(015)
(202129)	"01" NEC	(019)
(202210)	Science, biological	(02)
(202221)	Veterinarian	(021)
(202222)	Biologist	(022)
(202223)	Agricultural research	(023)
(202224)	Forest research	(024)
(202310)	Medicine	(03)
(202320)	Chief physician/surgeon	(030)
(202321)	Physician/Surgeon	(031)
(202322)	Dentist	(032)
(202410)	Nursing	(04)
(202420)	Head nurse	(040)
(202421)	Nurse	(041)
(202422)	Midwife	(042)
(202423)	Nurse, psychiatry	(043)
(202424)	Aux. nurse, psychiatry	(044)
(202425)	Aux. nurse, medicine	(045)
(202426)	Assistant, dental care	(046)
(202427)	Aux. nurse, pediatric	(047)
(202429)	Nurse/Health assistant NEC	(049)
(202510)	Health related, professional	(05)
(202520)	Pharmacist	(050)
(202521)	Certified med. dispenser	(051)
(202522)	Physiotherapist	(052)
(202523)	Public health inspector	(053)
(202529)	Health care NEC	(059)

6-digit code	Occupation	Original Census code
(202610)	Pedagogical	(06)
(202620)	School principal	(060)
(202621)	Professor	(061)
(202622)	University lecturer	(062)
(202623)	Teacher	(063)
(202624)	Vocational teacher	(064)
(202626)	Kindergarten teacher	(066)
(202627)	Education consultants	(067)
(202629)	Pedagogical work NEC	(069)
(202630)	Students+some work[1]	None
(202640)	Students	None
(202710)	Religious	(07)
(202721)	Priest	(071)
(202722)	Missionary	(072)
(202723)	Salvation Army	(073)
(202729)	Religious NEC	(079)
(202810)	Jurists	(08)
(202821)	Barrister	(081)
(202822)	Public prosecutor	(082)
(202823)	Barrister, lawyer in private practice	(083)
(202824)	Legal advisor	(084)
(202829)	Jurists NEC	(089)
(202910)	Artistic	(09)
(202930)	Sculptor	(09A)
(202920)	Artist/painter	(090)
(202921)	Advertizing/Decorator	(091)
(202922)	Window display	(092)
(202923)	Designer	(093)
(202924)	Author	(094)
(202925)	Editor, journalist, author	(095)
(202926)	Actor	(096)
(202927)	Musician	(097)
(202928)	TV/radio announcer	(098)
(202929)	Artistic NEC	(099)
(204010)	Various occupations in "2040"	(0X)
(204021)	Accountant	(0X1)
(204022)	Civil servant	(0X2)
(204023)	Librarian	(0X3)
(204024)	Statistician	(0X4)
(204025)	Psychologist	(0X5)
(204026)	Staff administration.	(0X6)
(204029)	"2040" NEC	(0X9)

[1] Students with no occupation code, but working in the work force status question.

6-digit code	Occupation	Original Census code
(211010)	Public administration	(1)
(212010)	Central public administration	(10)
(212021)	Central administration high level	(101)
(212022)	Central administration NEC	(102)
(212023)	Local administration high level	(103)
(212024)	Local administration NEC	(104)
(212025)	Municipal administration high level	(105)
(212026)	Municipal administration NEC	(106)
(212027)	County administration high level	(107)
(212028)	County administration NEC	(108)
(212029)	Public administration NEC	(109)
(212110)	Private administration	(11)
(212121)	Business leader	(111)
(212122)	Organization leader	(112)
(212123)	Administrative secretary	(113)
(212129)	Leader NEC	(119)
(221010)	Clerks, office work	(2)
(222010)	Book keeping	(20)
(222021)	Accountant	(201)
(222022)	Cashier, bank, insurance	(202)
(222023)	Cashier, shop, restaurant	(203)
(222029)	Book keeping NEC	(209)
(222110)	Office work	(21)
(222121)	Secretary	(211)
(222122)	Typist	(212)
(222910)	Clerks	(29)
(222921)	Computer operator	(291)
(222922)	Clerks, bank	(292)
(222923)	Clerks, insurance	(293)
(222924)	Civil servants	(294)
(222925)	Clerks, travel agency	(295)
(222926)	Dispatcher, broker	(296)
(222927)	Manager of estate or store	(297)
(222928)	Tender evaluator	(298)
(222929)	Clerks, NEC	(299)
(231010) Trade		(3)
(232010)	Distribution	(30)
(232021)	Wholesale	(301)
(232022)	Retail sale	(302)
(232110)	Sale of stock, real estate etc.	(31)
(232121)	Insurance sale	(311)
(232122)	Real estate, stock	(312)

6-digit code	Occupation	Original Census code
(232123)	Public relations	(313)
(232129)	Sale NEC	(319)
(232210)	Sales, personal	(32)
(232221)	Salesman	(321)
(232222)	Agents	(322)
(232310)	Sales, from office or store	(33)
(232320)	Purchasing agent	(330)
(232321)	Sales clerk	(331)
(232322)	Shop keeper	(332)
(232323)	Cashier, shop	(333)
(232324)	Ambulant Salesman	(334)
(232329)	Sales, NEC	(339)
(241010)	Farming, foresting, fishing	(4)
(242010)	Farm managing	(40)
(242021)	Farmer	(401)
(242022)	Forester	(402)
(242023)	Gardener	(403)
(242024)	Farm foremen	(404)
(242025)	Head gardener	(405)
(242026)	Head forester	(406)
(242027)	Fur farmer	(407)
(242028)	Reindeer owner	(408)
(242110)	Farm work	(41)
(242121)	Farm work	(411)
(242122)	Tender of livestock or fur	(412)
(242123)	Gardener	(413)
(242124)	Fur farm hand	(414)
(242125)	Reindeer herder	(415)
(242129)	Farm work NEC	(419)
(242130)	Farm, mostly housework	None
(242310)	Fishing/hunting	(43)
(242320)	Skipper, fishing	(430)
(242321)	Fisherman	(431)
(242322)	Fish farming	(432)
(242323)	Whaler	(433)
(242324)	Sealer	(434)
(242410)	Logger	(44)
(242421)	Logger	(441)
(242422)	Timber cruiser	(442)
(251010)	Miner	(5)
(252010)	Miner	(50)
(252021)	Miner	(501)

6-digit code	Occupation	Original Census code
(252110)	Well driller	(51)
(252121)	Well driller	(511)
(252210)	Rigger	(52)
(252221)	Rigger	(521)
(252310)	Mineral oil production	(53)
(252320)	Mineral oil supervisor	(530)
(252321)	Mineral oil worker	(531)
(252910)	Mine/quarry NEC	(59)
(252929)	Mine/quarry NEC	(599)
(261010)	Transport	(6)
(262010)	Ship officer	(60)
(262020)	Ship officers	(600)
(262021)	Navigator, 1st mate	(601)
(262022)	Ship's pilot	(602)
(262023)	Machine officers	(603)
(262024)	Machinists NEC	(604)
(262110)	Deck/machine work	(61)
(262121)	Boatswain	(611)
(262122)	Ship's mate	(612)
(262123)	Ship carpenter	(613)
(262124)	Deck hand	(614)
(262125)	Pump men	(615)
(262126)	Motor men	(616)
(262127)	Stoker	(617)
(262128)	Machine hand	(618)
(262210)	Air transport	(62)
(262221)	Flight pilots	(621)
(262222)	Flight navigator	(622)
(262223)	Flight machinist	(622)
(262229)	Air transport NEC	(629)
(262310)	Railroad transport	(63)
(262321)	Locomotive driver	(631)
(262410)	Road transport	(64)
(262421)	Bus driver	(641)
(262422)	Tram driver	(642)
(262423)	Taxi driver	(643)
(262424)	Truck driver	(644)
(262425)	Driver	(645)
(262426)	Delivery	(646)

6-digit code	Occupation	Original Census code
(262510)	Conductor	(65)
(262521)	Airline traffic assistant	(651)
(262522)	Railroad conductor	(652)
(262523)	Telegraph operator, railroad	(653)
(262524)	Station crew	(654)
(262525)	Bus conductor	(655)
(262610)	Traffic control	(66)
(262621)	Port authority	(661)
(262622)	Air traffic control	(662)
(262623)	Rail traffic control	(663)
(262624)	Road traffic control	(664)
(262710)	Post/telecommunication	(67)
(262720)	Postmaster	(670)
(262721)	Post opener	(671)
(262722)	Telecommunication officer	(672)
(262723)	Telephonist	(673)
(262724)	Switchboard operator	(674)
(262725)	Telegraph clerks	(675)
(262726)	Radio telegraphist	(676)
(262729)	Telecommunication NEC	(679)
(262810)	Mail distribution	(68)
(262821)	Postman	(681)
(262822)	Dispatcher	(682)
(262910)	Transport NEC	(69)
(262921)	Light house	(691)
(262922)	Harbour/Canal guard	(692)
(262923)	Barge pilot	(693)
(262929)	Transport NEC	(699)
(271010)	Industry/building/Construction	(7)
(272010)	Textile industry	(70)
(272021)	Yarn preparer	(701)
(272022)	Spinner	(702)
(272023)	Weaver	(703)
(272024)	Knitting machine operator	(704)
(272025)	Textile machine operator	(705)
(272026)	Textile processor	(706)
(272027)	Cloth inspector	(707)
(272029)	Textile industry NEC	(709)
(272110)	Garment industry	(71)
(272121)	Tailor	(711)
(272122)	Furrier	(712)
(272123)	Milliner	(713)
(272124)	Upholsterer	(714)

6-digit code	Occupation	Original Census code
(272125)	Garment cutter	(715)
(272126)	Cutter NEC	(716)
(272129)	Tailor NEC	(719)
(272210)	Shoemakers and leatherwork.	(72)
(272221)	Shoemaker	(721)
(272222)	Shoe cutter	(722)
(272223)	Shoe stitcher	(723)
(272224)	Specified shoemaking NEC	(724)
(272225)	Shoemaker NEC	(725)
(272226)	Saddle maker	(726)
(272310)	Smelterwork/metal industry	(73)
(272321)	Smelter	(731)
(272322)	Heater/temperer	(732)
(272326)	Blacksmith	(736)
(272327)	Caster	(737)
(272329)	Smelterwork NEC	(739)
(272410)	Fine mechanics	(74)
(272421)	Fine fitter	(741)
(272422)	Watch makers	(742)
(272424)	Dental technician	(744)
(272425)	Jeweler/goldsmith	(745)
(272426)	Engraver	(746)
(272510)	Iron and metal work	(75)
(272521)	Garage mechanic	(751)
(272522)	Machine mounter/installer	(752)
(272523)	Machinist	(753)
(272524)	Sheet metal worker	(754)
(272525)	Plumber	(755)
(272526)	Welder	(756)
(272527)	Steel/metal construction	(757)
(272528)	Surface treatment	(758)
(272529)	Mechanic NEC	(759)
(272610)	Electricians	(76)
(272621)	Electrician	(761)
(272622)	Electro-machinist	(762)
(272623)	Electro repair	(763)
(272624)	Telecommunications repair	(764)
(272625)	Power lineman	(765)
(272629)	Electricians NEC	(769)
(272710)	Wood work	(77)
(272721)	Timber intake	(771)
(272722)	Sawmill	(772)
(272723)	Wood/plywood	(773)
(272724)	Construction carpenter	(774)

6-digit code	Occupation	Original Census code
(272725)	Boat builder	(775)
(272726)	Furniture maker	(776)
(272727)	Industrial carpenter	(777)
(272729)	Wood work NEC	(779)
(272810)	Painter/paper hanger	(78)
(272821)	House painter	(781)
(272822)	Paper hanger	(782)
(272823)	Lacquer/varnish worker	(783)
(272829)	Painter NEC	(789)
(272910)	Construction	(79)
(272921)	Mason	(791)
(272923)	Cement, stone work	(793)
(272925)	Insulator	(795)
(272926)	Glazier	(796)
(272929)	Construction NEC	(799)
(281010)	Industry/Production	(8)
(282010)	Graphic industry	(80)
(282021)	Printers	(801)
(282022)	Repro/graphic	(802)
(282023)	Printing press operator	(803)
(282024)	Book binder	(804)
(282029)	Graphic NEC	(809)
(282110)	Glass/ceramic/tile	(81)
(282121)	Glass blower/glass worker	(811)
(282122)	Glass shaper/ceramist/potter	(812)
(282123)	Kiln operator	(813)
(282124)	Decorator	(814)
(282129)	Glass work NEC	(819)
(282210)	Food processing	(82)
(282221)	Grain miller	(821)
(282222)	Baker	(822)
(282223)	Chocolate industry	(823)
(282224)	Beer brewer	(824)
(282225)	Canner	(825)
(282226)	Butcher	(826)
(282227)	Dairy technician	(827)
(282229)	Other Food NEC	(829)
(282310)	Chemical processing	(83)
(282321)	Distiller	(831)
(282322)	Cookers/roaster	(832)
(282323)	Crusher/grinder	(833)
(282324)	Pulp maker	(834)
(282325)	Cellulose	(835)

6-digit code	Occupation	Original Census code
(282326)	Paper maker	(836)
(282329)	Chemical work NEC	(839)
(282410)	Tobacco manufacture	(84)
(282421)	Tobacco factory work	(841)
(282510)	Manufacture NEC	(85)
(282521)	Concrete work	(851)
(282522)	Rubber production	(852)
(282523)	Plastic production	(853)
(282524)	Tanner/fellmonger	(854)
(282525)	Photo lab work	(855)
(282526)	Musical instrument maker	(856)
(282527)	Stone mason	(857)
(282528)	Paper sheet production	(858)
(282529)	Production NEC	(859)
(282610)	Packer	(86)
(282621)	Packer etc	(861)
(282710)	Machine operation	(87)
(282721)	Stationary machine operator	(871)
(282722)	Crane/lift operator	(872)
(282723)	Riggers	(873)
(282724)	Construction machine driver	(874)
(282725)	Truck driver	(875)
(282726)	Greaser	(876)
(282810)	Dock work	(88)
(282821)	Longshoremen/hold worker	(881)
(282822)	Warehouse work	(882)
(282829)	Freight NEC	(889)
(282910)	Various unskilled work	(89)
(282921)	Worker NEC	(891)
(291010)	Personal service	(9)
(292010)	Surveillance	(90)
(292021)	Fire fighter	(901)
(292023)	Police	(903)
(292024)	Custom officer	(904)
(292025)	Prison guard	(905)
(292029)	Surveillance NEC	(909)
(292110)	Hotel/restaurant	(91)
(292121)	Chef	(911)
(292122)	Cook	(912)
(292123)	Cook's assistant	(913)
(292124)	House keeper	(914)

6-digit code	Occupation	Original Census code
(292125)	Mother's help	(915)
(292126)	Receptionist	(916)
(292127)	Purser	(917)
(292129)	Kitchen NEC	(919)
(292130)	House work	None
(292140)	House work + some work	None
(292210)	Waiting	(92)
(292221)	Waiter	(921)
(292222)	Waiting NEC	(922)
(292310)	Janitor/cleaning	(93)
(292321)	Janitor	(931)
(292322)	Cleaning	(932)
(292323)	Chimney sweep	(933)
(292324)	Garbage collector	(934)
(292410)	Hygiene	(94)
(292421)	Hair dresser/Barber	(941)
(292422)	Bath attendant	(942)
(292510)	Laundry/Dry cleaning	(95)
(292521)	Laundry/Press	(951)
(292522)	Dry clean/Press/Iron	(952)
(292610)	Sport	(96)
(292621)	Coach	(961)
(292710)	Photographer	(97)
(292721)	Photographer	(971)
(292810)	Funeral Home	(98)
(292821)	Funeral home worker	(981)
(292910)	Personal service NEC	(99)
(292929)	Service NEC	(999)
(402222)	Unknown	(X22)
(999999)	Uncodeable	*
(301010)	Military personnel	(A)
(302110)	Military private	(A1)
(302120)	Military private	(A10)
(302210)	Junior officer	(A2)
(302220)	Junior officer	(A20)
(302310)	Military officer	(A3)
(302320)	Military officer	(A30)

This section describes the "grouped occupation" categories made for men by collapsing approximately 200 single occupations from the census. In parenthesis is given the 6 digit code that identify each occupation, one of the original codes is usually kept as the group code, or the Nordic code of a higher level is used. Non-empty occupations shown. Attendance is defined as having a recorded systolic blood pressure (1-999) on file.

	Occupation	Group code	Attended 32672	Invited 44690
Grouped occupation:	No occupation	(101010)	636	1751
Census job title:	No occupation	(101010)	612	1667
Census job title:	Unknown	(402222)	24	84
Grouped occupation:	Architect	(202021)	104	144
Census job title:	Architect	(202021)	104	144
Grouped occupation:	Chief engineer	(202022)	420	560
Census job title:	Chief engineer	(202022)	420	560
Grouped occupation:	Engineer	(202023)	1454	1811
Census job title:	Engineer	(202023)	1299	1616
Census job title:	Auto control engineer	(202025)	27	40
Census job title:	Surveying engineer	(202027)	16	20
Census job title:	Surveying technician	(202028)	33	43
Census job title:	Draftsman/Tracer	(202029)	16	20
Census job title:	Lab. assistant	(202123)	63	72
Grouped occupation:	Science, natural	(202110)	129	159
Census job title:	Chemist	(202121)	23	30
Census job title:	Physicist	(202122)	5	11
Census job title:	Geologist	(202124)	2	5
Census job title:	Meteorologist	(202125)	16	17
Census job title:	Veterinarian	(202221)	12	14
Census job title:	Agricultural research	(202223)	40	46
Census job title:	Forest research	(202224)	31	36
Grouped occupation:	Physician	(202310)	66	198
Census job title:	Chief physician	(202320)	9	28
Census job title:	Physician/Surgeon	(202321)	57	170
Grouped occupation:	Dentist	(202322)	79	104
Census job title:	Dentist	(202322)	79	104
Grouped occupation:	Nursing	(202410)	61	98
Census job title:	Head nurse	(202420)	3	3
Census job title:	Nurse	(202421)	10	15
Census job title:	Aux. nurse, psychiatry	(202423)	16	21
Census job title:	Aux. nurse, medicine	(202425)	15	33
Census job title:	Nursing, NEC	(202429)	17	26
Grouped occupation:	Health care	(202510)	83	111
Census job title:	Pharmacist	(202520)	6	6
Census job title:	Certified dispenser	(202521)	10	10

Men	Occupation	Group code	Attended	Invited
Census job title:	Physiotherapist	(202522)	14	21
Census job title:	Public health inspector	(202523)	1	1
Census job title:	Health care NEC	(202529)	2	4
Census job title:	Statistician	(204024)	35	48
Census job title:	Psychologist	(204025)	15	21
Grouped occupation:	Professor/Lecturer	(202621)	92	163
Census job title:	Professor	(202621)	17	41
Census job title:	University lecturer	(202622)	75	122
Grouped occupation:	Teacher	(202623)	391	493
Census job title:	Principal	(202620)	158	182
Census job title:	Teacher	(202623)	211	281
Census job title:	Education	(202627)	21	27
Census job title:	Pedagogical NEC	(202629)	1	3
Grouped occupation:	Vocat. teacher	(202624)	504	595
Census job title:	Vocational teacher	(202624)	504	595
Grouped occupation:	Students	(202630)	48	87
* No census title:	Students+some work	(none)	47	84
* No census title:	Students only	(none)	1	3
Grouped occupation:	Religious work	(202710)	49	78
Census job title:	Clergy, priest	(202721)	22	37
Census job title:	Missionary	(202722)	2	3
Census job title:	Salvation Army	(202723)	9	12
Census job title:	Religious NEC	(202729)	16	26
Grouped occupation:	Jurists	(202810)	89	162
Census job title:	Barrister	(202821)	11	14
Census job title:	Public prosecutor	(202822)	7	14
Census job title:	Barrister, lawyer, priv. practice	(202823)	34	82
Census job title:	Legal advisor	(202824)	32	45
Census job title:	Jurist NEC	(202829)	5	7
Grouped occupation:	Artistic	(202910)	224	366
Census job title:	Artist/painter	(202920)	27	48
Census job title:	Commercial decorator	(202921)	34	51
Census job title:	Window display	(202922)	10	23
Census job title:	Designer	(202923)	38	52
Census job title:	Actor	(202926)	17	36
Census job title:	Musician	(202927)	23	50
Census job title:	Artistic NEC	(202929)	15	36
Census job title:	Glass hut work	(282121)	42	43
Census job title:	Glass shaper/ceramist/potter	(282122)	2	4
Census job title:	Kiln operator	(282123)	5	8
Census job title:	Decorator	(282124)	11	12
Census job title:	Glass NEC	(282129)	0	3

Men	Occupation	Group code	Attended	Invited
Grouped occupation:	Writers, news reporter	(202925)	118	215
Census job title:	Author	(202924)	2	9
Census job title:	Editor, journalist	(202925)	100	176
Census job title:	TV/radio announcer	(202928)	16	30
Grouped occupation:	Accountant	(204021)	181	233
Census job title:	Accountant	(204021)	181	233
Grouped occupation:	Staff service	(204026)	203	297
Census job title:	Civil servant	(204022)	30	50
Census job title:	Librarian	(204023)	33	48
Census job title:	Staff administration	(204026)	106	143
Census job title:	"2040" NEC	(204029)	34	56
Grouped occupation:	Public high level administr.	(212021)	153	190
Census job title:	Central public administration	(212010)	62	68
Census job title:	Central state administration	(212021)	56	85
Census job title:	Local high level administration	(212023)	35	37
Grouped occupation:	Public administration NEC	(212024)	201	287
Census job title:	Central administration NEC	(212022)	139	198
Census job title:	Local administration NEC	(212024)	60	83
Census job title:	Public administration NEC	(212029)	2	6
Grouped occupation:	Private administration	(212110)	1470	2209
Census job title:	Business leader	(212121)	1448	2170
Census job title:	Organization leader	(212122)	22	39
Grouped occupation:	Administrative Secretary	(212123)	244	309
Census job title:	Administrative Secretary	(212123)	244	309
Grouped occupation:	Leader NEC	(212129)	331	480
Census job title:	Leader NEC	(212129)	331	480
Grouped occupation:	Bookkeeping	(222010)	453	558
Census job title:	Book keeper/accountant	(222021)	336	422
Census job title:	Cashier, bank/insurance	(222022)	102	118
Census job title:	Cashier, shop/restaurant	(222023)	7	8
Census job title:	Book keeping, NEC	(222029)	8	10
Grouped occupation:	Office work	(222910)	1764	2432
Census job title:	Secretary	(222121)	182	255
Census job title:	Typist	(222122)	1	1
Census job title:	Computer operator	(222921)	36	53
Census job title:	Clerks, bank	(222922)	176	233
Census job title:	Clerks, insurance	(222923)	51	81
Census job title:	Civil servants	(222924)	41	48
Census job title:	Clerks, travel agency	(222925)	16	25
Census job title:	Dispatcher, broker	(222926)	87	151
Census job title:	Manager of estate or store	(222927)	289	372

Men	Occupation	Group code	Attended	Invited
Census job title:	Bid evaluator	(222928)	39	51
Census job title:	Clerks, NEC	(222929)	846	1162
Grouped occupation:	Wholesale/Retail	(232010)	545	713
Census job title:	Wholesale	(232021)	69	121
Census job title:	Retail sale	(232022)	476	592
Grouped occupation:	Sale of stock, real estate etc.	(232110)	217	302
Census job title:	Insurance	(232121)	82	108
Census job title:	Real estate, stock	(232122)	8	13
Census job title:	Public relations	(232123)	113	162
Census job title:	Sale NEC	(232129)	14	19
Grouped occupation:	Sales, personal	(232210)	400	575
Census job title:	Salesman	(232221)	295	418
Census job title:	Agents	(232222)	88	134
Census job title:	Sales, mail order	(232324)	10	15
Census job title:	Sales NEC	(232329)	7	8
Grouped occupation:	Sales, office	(232310)	615	817
Census job title:	Purchasing agent	(232320)	93	123
Census job title:	Sales clerk	(232321)	522	694
Grouped occupation:	Shop keeper	(232322)	408	520
Census job title:	Shop keeper	(232322)	408	520
Grouped occupation:	Cashier, shop	(232323)	494	676
Census job title:	Cashier, shop	(232323)	494	676
Grouped occupation:	Farming/Foresting	(242021)	2207	2347
Census job title:	Farmer	(242021)	2087	2208
Census job title:	Forester	(242022)	13	14
Census job title:	Gardener	(242023)	26	33
Census job title:	Farm foreman	(242024)	14	17
Census job title:	Head gardener	(242025)	19	23
Census job title:	Head forester	(242026)	22	23
Census job title:	Fur farmer	(242027)	26	29
Grouped occupation:	Reindeer herding	(242028)	85	100
Census job title:	Reindeer owner	(242028)	78	91
Census job title:	Reindeer herder	(242125)	7	9
Grouped occupation:	Farm work	(242110)	526	633
Census job title:	Farm work	(242121)	392	464
Census job title:	Tender of livestock	(242122)	42	53
Census job title:	Gardener	(242123)	60	83
Census job title:	Animal care, fur farm hand	(242124)	11	11
Census job title:	Farm work NEC	(242129)	5	5

Men	Occupation	Group code	Attended	Invited
*No census title:	Farm, mostly housework[1]	(None)	16	16
Census job title:	Game warden	(242220)	0	1
Grouped occupation:	Fishing	(242310)	709	860
Census job title:	Skipper, fishing	(242320)	160	187
Census job title:	Fisherman	(242321)	547	671
Census job title:	Fish farming	(242322)	1	1
Census job title:	Sealer	(242324)	1	1
Grouped occupation:	Logger	(242410)	176	203
Census job title:	Logger	(242421)	166	193
Census job title:	Timber cruiser	(242422)	10	10
Grouped occupation:	Miner	(252010)	269	312
Census job title:	Miner	(252021)	242	279
Census job title:	Well driller	(252121)	8	11
Census job title:	Rigger	(252221)	6	8
Census job title:	Mine/quarry NEC	(252929)	13	14
Grouped occupation:	Ship officers	(262010)	166	349
Census job title:	Ship officers	(262020)	37	74
Census job title:	Navigator/1st mate	(262021)	43	100
Census job title:	Ship's pilot	(262022)	6	10
Census job title:	Machine officers	(262023)	24	61
Census job title:	Machinists NEC	(262024)	56	104
Grouped occupation:	Deck/machine	(262110)	111	275
Census job title:	Boatswain	(262121)	12	26
Census job title:	Ship's mate	(262122)	45	143
Census job title:	Ship carpenter	(262123)	3	11
Census job title:	Deck hands	(262124)	1	3
Census job title:	Pump men	(262125)	2	8
Census job title:	Motor men	(262126)	17	40
Census job title:	Machine hand	(262128)	5	10
Census job title:	Harbor official	(262922)	0	1
Census job title:	Barge pilot	(262923)	26	33
Grouped occupation:	Driver	(262410)	1893	2651
Census job title:	Bus driver	(262421)	339	409
Census job title:	Tram driver	(262422)	41	52
Census job title:	Taxi driver	(262423)	200	307
Census job title:	Truck driver	(262424)	1270	1813
Census job title:	Driver	(262425)	35	51
Census job title:	Delivery	(262426)	8	19

[1] A few men fulfilled the criteria used to identify women as housewives or farm wives, i.e. they were not in the work force, and reported main work to be in the house.

Men	Occupation	Group code	Attended	Invited
Grouped occupation:	Conductor	(262510)	355	458
Census job title:	Locomotive driver	(262321)	72	96
Census job title:	Airline traffic assistant	(262521)	8	13
Census job title:	Railroad conductor	(262522)	48	58
Census job title:	Telegraph operator, railroad	(262523)	12	13
Census job title:	Station crew	(262524)	95	128
Census job title:	Bus conductor	(262525)	65	87
Census job title:	Transport NEC	(262929)	55	63
Grouped occupation:	Traffic control	(262610)	130	154
Census job title:	Port authority	(262621)	12	14
Census job title:	Air traffic control	(262622)	13	21
Census job title:	Rail traffic control	(262623)	79	84
Census job title:	Road traffic control	(262624)	26	35
Grouped occupation:	Post/telecommunication	(262710)	319	518
Census job title:	Postmaster	(262720)	29	47
Census job title:	Post opener	(262721)	52	83
Census job title:	Telecom.officer	(262722)	25	36
Census job title:	Telephonist	(262723)	5	8
Census job title:	Switchboard	(262724)	4	6
Census job title:	Telegraph clerks	(262725)	5	7
Census job title:	Radio telegraphist	(262726)	22	37
Census job title:	Telecom. NEC	(262729)	20	33
Census job title:	Post man	(262821)	136	223
Census job title:	Dispatcher	(262822)	17	32
Census job title:	Light house tender	(262921)	4	6
Grouped occupation:	Textile/Leather	(272010)	249	323
Census job title:	Yarn preparer	(272021)	3	4
Census job title:	Spinners	(272022)	12	13
Census job title:	Weavers	(272023)	17	19
Census job title:	Knitting machine operator	(272024)	1	1
Census job title:	Textile machine operator	(272025)	4	7
Census job title:	Textile processor	(272026)	17	25
Census job title:	Textile NEC	(272029)	6	6
Census job title:	Tailor	(272121)	18	23
Census job title:	Furrier	(272122)	23	32
Census job title:	Milliner	(272123)	3	5
Census job title:	Upholsterer	(272124)	27	38
Census job title:	Garment cutter	(272125)	20	27
Census job title:	Cutters NEC	(272126)	22	32
Census job title:	Tailor NEC	(272129)	1	5
Census job title:	Shoemaker	(272221)	17	19
Census job title:	Shoe cutter	(272222)	9	9
Census job title:	Lasters	(272223)	11	12
Census job title:	Specified shoemaker NEC	(272224)	2	3
Census job title:	Shoemaker NEC	(272225)	15	16
Census job title:	Saddle maker	(272226)	21	27

Men	Occupation	Group code	Attended	Invited
Grouped occupation:	Smelterwork	(272310)	430	520
Census job title:	Smelter	(272321)	259	279
Census job title:	Heater/temperer	(272322)	37	54
Census job title:	Blacksmith	(272326)	31	41
Census job title:	Caster	(272327)	86	125
Census job title:	Caster NEC	(272329)	17	21
Grouped occupation:	Fine mechanic	(272421)	189	267
Census job title:	Fine fitter	(272421)	66	99
Census job title:	Watch makers	(272422)	29	39
Census job title:	Dental technician	(272424)	35	49
Census job title:	Jeweler/gold smith	(272425)	46	62
Census job title:	Engraver	(272426)	13	18
Grouped occupation:	Iron and metal	(272510)	2578	3466
Census job title:	Garage mechanic	(272521)	657	826
Census job title:	Machine mounter/installer	(272522)	117	168
Census job title:	Machinist	(272523)	995	1310
Census job title:	Sheet metal worker	(272524)	141	206
Census job title:	Welder	(272526)	316	447
Census job title:	Steel/metal construction	(272527)	123	178
Census job title:	Surface treatment	(272528)	32	54
Census job title:	Mechanic NEC	(272529)	197	277
Grouped occupation:	Plumber	(272525)	307	400
Census job title:	Plumber	(272525)	307	400
Grouped occupation:	Electrician	(272610)	1241	1581
Census job title:	Electrician	(272621)	625	775
Census job title:	Electro-machinist	(272622)	49	55
Census job title:	Electro repair	(272623)	70	113
Census job title:	Telecomm. repair	(272624)	222	300
Census job title:	Power lineman	(272625)	139	153
Census job title:	Electrician NEC	(272629)	136	185
Grouped occupation:	Wood work	(272710)	348	383
Census job title:	Timber intake	(272721)	1	1
Census job title:	Sawmill	(272722)	168	182
Census job title:	Wood/plywood	(272723)	38	46
Census job title:	Boat builder	(272725)	18	22
Census job title:	Furniture maker	(272726)	117	126
Census job title:	Wood work NEC	(272729)	6	6
Grouped occupation:	Carpenters	(272723)	1794	2182
Census job title:	Construction carpenter	(272724)	1507	1855
Census job title:	Industrial carpenter	(272727)	287	327
Grouped occupation:	Painter/decorator	(272810)	347	478
Census job title:	House painter	(272821)	285	392
Census job title:	Paper hanger	(272822)	18	29
Census job title:	Lacquer/varnish worker	(272823)	44	57

Men	Occupation	Group code	Attended	Invited
Grouped occupation:	Construction	(272910)	1080	1378
Census job title:	Mason	(272921)	191	263
Census job title:	Cement, stone work	(272923)	791	976
Census job title:	Insulator	(272925)	14	24
Census job title:	Glazier	(272926)	28	41
Census job title:	Construction NEC	(272929)	3	7
Census job title:	Concrete work	(282521)	47	58
Census job title:	Stone mason	(282527)	6	9
Grouped occupation:	Graphic industry	(282010)	484	650
Census job title:	Printers	(282021)	157	207
Census job title:	Repro/graphic	(282022)	46	67
Census job title:	Printing press	(282023)	216	291
Census job title:	Book binder	(282024)	65	85
Grouped occupation:	Food processing	(282210)	712	880
Census job title:	Grain miller	(282221)	22	24
Census job title:	Baker	(282222)	130	166
Census job title:	Chocolate industry	(282223)	29	42
Census job title:	Beer brewer	(282224)	35	52
Census job title:	Canner	(282225)	265	319
Census job title:	Butcher	(282226)	118	138
Census job title:	Dairy technician	(282227)	85	93
Census job title:	Other food NEC	(282229)	20	23
Census job title:	Tobacco factory work	(282421)	8	23
Grouped occupation:	Chemical processing	(282310)	210	275
Census job title:	Distiller	(282321)	15	22
Census job title:	Cookers/roaster	(282322)	52	69
Census job title:	Crusher/grinder	(282323)	16	19
Census job title:	Pulp maker	(282324)	3	4
Census job title:	Cellulose	(282325)	25	27
Census job title:	Paper maker	(282326)	35	52
Census job title:	Chemical work NEC	(282329)	62	79
Census job title:	Tanner/fellmonger	(282524)	2	3
Grouped occupation:	Manufacture NEC	(282510)	168	269
Census job title:	Rubber production	(282522)	24	36
Census job title:	Plastic production	(282523)	43	70
Census job title:	Photo lab work	(282525)	6	11
Census job title:	Musical instrument maker	(282526)	10	12
Census job title:	Paper sheet production	(282528)	26	39
Census job title:	Production NEC	(282529)	59	101
Grouped occupation:	Machine operation	(282710)	843	1044
Census job title:	Stationary machine operator	(282721)	115	150
Census job title:	Crane/lift operator	(282722)	76	103
Census job title:	Riggers	(282723)	1	2
Census job title:	Construction machine driver	(282724)	510	608
Census job title:	Truck driver	(282725)	113	144
Census job title:	Greaser	(282726)	28	37

Men	Occupation	Group code	Attended	Invited
Grouped occupation:	Dock work	(282810)	962	1474
Census job title:	Packer etc	(282621)	52	82
Census job title:	Longshoremen/hold worker	(282821)	130	256
Census job title:	Warehouse work	(282822)	770	1121
Census job title:	Freight NEC	(282829)	10	15
Grouped occupation:	Surveillance	(292010)	383	603
Census job title:	Fire fighter	(292021)	68	84
Census job title:	Police	(292023)	175	226
Census job title:	Custom officer	(292024)	46	137
Census job title:	Prison guard	(292025)	22	34
Census job title:	Surveillance NEC	(292029)	72	122
Grouped occupation:	Hotel/restaurant	(292110)	210	437
Census job title:	Chef	(292121)	55	102
Census job title:	Cook	(292122)	52	94
Census job title:	Cook's assistant	(292123)	8	30
Census job title:	House keeper	(292124)	2	2
Census job title:	Kitchen NEC	(292129)	10	15
Census job title:	Waiter	(292221)	83	187
Census job title:	Waiting NEC	(292222)	0	7
Grouped occupation:	Janitor/cleaning	(292310)	453	674
Census job title:	Janitor	(292321)	318	468
Census job title:	Cleaning	(292322)	70	116
Census job title:	Chimney sweep	(292323)	20	24
Census job title:	Garbage collector	(292324)	45	66
Grouped occupation:	Personal service	(292910)	218	327
Census job title:	Mother's help	(292125)	0	1
Census job title:	Receptionist	(292126)	25	43
Census job title:	Purser	(292127)	11	15
Census job title:	House work	(292130)	16	16
Census job title:	Hair dresser/barber	(292421)	67	95
Census job title:	Bath attendant	(292422)	6	10
Census job title:	Laundry/press	(292521)	23	37
Census job title:	Dry clean/press/iron	(292522)	7	13
Census job title:	Coach	(292621)	5	11
Census job title:	Photographer	(292721)	45	68
Census job title:	Funeral home worker	(292821)	4	4
Census job title:	Service NEC	(292929)	9	14
Grouped occupation:	Military, flight pilots	(301010)	304	565
Census job title:	Flight pilots	(262221)	10	31
Census job title:	Flight navigator	(262222)	1	1
Census job title:	Military personnel	(301010)	293	532
Census job title:	Flight machinist	(262223)	0	1

Women 40-49, Oppland, Sogn og Fjordane og Finnmark. The number of women in the 40-49 year age group is substantially lower than the number of men, due to the all male screening in Oslo. In addition, about 50% of the women did not work outside the home. Women choose between fewer occupations than do men, and are recoded into 19 different occupations.

Women	Occupation	Code	16418	17540
Grouped occupation:	No occupation	(101010)	1200	1809
Census job title:	No occupation	(101010)	1198	1804
Census job title:	Unknown	(402222)	2	5
Grouped occupation:	Technical/Science	(202010)	125	130
Census job title:	Engineer NEC	(202023)	2	2
Census job title:	Lab. assistant	(202123)	21	22
Census job title:	Meteorologist	(202125)	1	1
Census job title:	Agricultural research	(202223)	2	2
Census job title:	Forest research	(202224)	2	2
Census job title:	Physician/Surgeon	(202321)	3	3
Census job title:	Dentist	(202322)	5	5
Census job title:	Pharmacist	(202520)	2	2
Census job title:	Certified medicine dispenser	(202521)	9	9
Census job title:	Physiotherapist	(202522)	23	23
Census job title:	Health care NEC	(202529)	12	14
Census job title:	Accountant	(204021)	7	7
Census job title:	Civil servant	(204022)	24	24
Census job title:	Librarian	(204023)	6	7
Census job title:	Psychologist	(204025)	1	2
Census job title:	"2040" NEC	(204029)	5	5
Grouped occupation:	Nursing	(202421)	177	201
Census job title:	Head nurse	(202420)	5	7
Census job title:	Nurse	(202421)	158	179
Census job title:	Midwife	(202422)	12	12
Census job title:	Nurse, psychiatry	(202423)	2	3
Grouped occupation:	Aux. nurse	(202429)	218	237
Census job title:	Aux nurse, med.	(202425)	169	185
Census job title:	Aux nurse, psych.	(202426)	25	26
Census job title:	Aux nurse, pediatric	(202427)	18	20
Census job title:	Nurse/health assistant NEC	(202429)	6	6
Grouped occupation:	Teacher	(202623)	415	437
Census job title:	School principal	(202620)	7	7
Census job title:	Teacher	(202623)	21	23
Census job title:	Vocational teacher	(202624)	369	388
Census job title:	Kindergarten teacher	(202626)	11	11
Census job title:	Education consultant	(202627)	6	7
Census job title:	Pedagogical work NEC	(202629)	1	1

Women	Occupation	Group code	Attended	Invited
Grouped occupation:	Artist/Student	(202910)	35	43
* No census title	Students+some work	(None)	20	26
* No census title	Student full time	(None)	1	1
Census job title:	Artist/painter	(202920)	1	1
Census job title:	Designer	(202923)	2	2
Census job title:	Editor, journalist, author	(202925)	1	2
Census job title:	Actor	(202926)	1	2
Census job title:	Musician	(202927)	8	8
Census job title:	TV/radio announcer	(202928)	1	1
Grouped occupation:	Administration	(212021)	137	142
Census job title:	Public administration	(212010)	1	1
Census job title:	Local administration high level	(212023)	6	6
Census job title:	Local administration NEC	(212024)	5	5
Census job title:	Business leader	(212121)	18	18
Census job title:	Administr. Secretary	(212123)	1	1
Census job title:	Leader, NEC	(212129)	9	9
Census job title:	Wholesale	(232021)	1	1
Census job title:	Retail sale	(232022)	55	58
Census job title:	Purchasing agent	(232320)	1	1
Census job title:	Sales clerk	(232321)	5	5
Census job title:	Shop keeper	(232322)	26	27
Census job title:	Sales NEC	(232329)	9	10
Grouped occupation:	Clerks	(222010)	699	736
Census job title:	Accountant	(222021)	33	37
Census job title:	Cashier, bank, insurance	(222022)	29	31
Census job title:	Cashier, shop, rest	(222023)	24	26
Census job title:	Secretary	(222121)	20	25
Census job title:	Typist	(222122)	1	1
Census job title:	Computer operator	(222921)	13	13
Census job title:	Clerks, bank	(222922)	23	26
Census job title:	Clerks, insurance	(222923)	3	3
Census job title:	Civil servants	(222924)	28	29
Census job title:	Clerks, NEC	(222929)	525	545
Grouped occupation:	Cashier, shop	(232323)	811	838
Census job title:	Cashier, shop	(232323)	811	838
Grouped occupation:	Farming/Foresting	(242021)	2454	2537
Census job title:	Farmer	(242021)	15	18
Census job title:	Gardener	(242023)	1	1
Census job title:	Reindeer owner	(242028)	5	5
Census job title:	Farm work	(242121)	122	154
Census job title:	Tender of livestock or fur	(242122)	90	117
Census job title:	Gardener	(242123)	13	14
Census job title:	Fur farm hand	(242124)	8	9
Census job title:	Reindeer herder	(242125)	12	13
Census job title:	Farm work NEC	(242129)	1	1
Census job title:	Farmer, mostly house work	(242130)	2187	2205

Women	Occupation	Group code	Attended	Invited
Grouped occupation:	Industry, manual	(281010)	232	253
Census job title:	Fisherman	(242321)	30	32
Census job title:	Logger	(242421)	6	6
Census job title:	Ship officers	(262020)	1	1
Census job title:	Deck hand	(262122)	1	2
Census job title:	Taxi driver	(262423)	9	9
Census job title:	Truck driver	(262424)	4	4
Census job title:	Driver	(262425)	1	1
Census job title:	Delivery	(262426)	12	13
Census job title:	Bus conductor	(262525)	1	1
Census job title:	Smelter	(272321)	2	2
Census job title:	Fine fitter	(272421)	1	1
Census job title:	Dental technician	(272424)	1	1
Census job title:	Jeweler/gold smith	(272425)	2	2
Census job title:	Garage mechanic	(272521)	16	20
Census job title:	Mechanic NEC	(272529)	35	38
Census job title:	Plumber	(272525)	1	1
Census job title:	Electrician	(272621)	4	4
Census job title:	Electro repair	(272623)	2	2
Census job title:	Telecomm. line repair	(272624)	0	2
Census job title:	Electrician NEC	(272629)	3	3
Census job title:	Industry carpenter	(272727)	3	3
Census job title:	House painter	(272821)	1	2
Census job title:	Cement, stone work	(272923)	1	1
Census job title:	Glazier	(272926)	1	1
Census job title:	Printers	(282021)	2	3
Census job title:	Printing press operator	(282023)	8	8
Census job title:	Book binder	(282024)	3	3
Census job title:	Glass blower/glass worker	(282121)	3	3
Census job title:	Glass shaper/ceramist/potter	(282122)	1	1
Census job title:	Glass work NEC	(282129)	1	1
Census job title:	Cookers/roaster	(282322)	1	1
Census job title:	Cellulose	(282325)	1	1
Census job title:	Paper maker	(282326)	1	1
Census job title:	Chemical work NEC	(282329)	11	12
Census job title:	Concrete work	(282521)	1	1
Census job title:	Plastic production	(282523)	13	13
Census job title:	Tanner/fellmonger	(282524)	1	1
Census job title:	Photo lab work	(282525)	4	5
Census job title:	Musical instrument maker	(282526)	0	1
Census job title:	Paper sheet production	(282528)	3	3
Census job title:	Production NEC	(282529)	11	14
Census job title:	Longshoremen/hold worker	(282821)	2	2
Census job title:	Warehouse work	(282822)	17	17
Census job title:	Surveillance NEC	(292029)	10	10
Grouped occupation:	Post/telecommunication	(262710)	253	267
Census job title:	Post opener	(262721)	54	57
Census job title:	Telecommunication officer	(262722)	30	30
Census job title:	Telephonist	(262723)	129	136
Census job title:	Switchboard operator	(262724)	17	18

Women	Occupation	Group code	Attended	Invited
Census job title:	Telegraph clerks	(262725)	10	10
Census job title:	Radio telegraphist	(262726)	1	4
Census job title:	Post man	(262821)	11	11
Census job title:	Dispatcher	(262822)	1	1
Grouped occupation:	Textile/Leather	(272010)	260	270
Census job title:	Yarn preparer	(272021)	0	0
Census job title:	Spinners	(272022)	6	6
Census job title:	Weavers	(272023)	17	19
Census job title:	Knitting machine operator	(272024)	5	6
Census job title:	Textile machine operator	(272025)	2	2
Census job title:	Textile processor	(272026)	7	7
Census job title:	Textile inspector	(272027)	5	6
Census job title:	Textile industry NEC	(272029)	1	1
Census job title:	Tailor	(272121)	3	3
Census job title:	Milliner	(272123)	4	4
Census job title:	Upholsterer	(272124)	0	0
Census job title:	Garment cutter	(272125)	10	11
Census job title:	Cutter NEC	(272126)	170	175
Census job title:	Tailor NEC	(272129)	1	1
Census job title:	Shoemaker	(272221)	1	1
Census job title:	Shoe cutter	(272222)	1	1
Census job title:	Shoe stitcher	(272223)	18	18
Census job title:	Specified shoemaker NEC	(272224)	2	2
Census job title:	Shoemaker NEC	(272225)	5	5
Census job title:	Saddle maker	(272226)	2	2
Grouped occupation:	Food processing	(282210)	267	291
Census job title:	Baker	(282222)	24	24
Census job title:	Beer brewer	(282224)	1	1
Census job title:	Canner	(282225)	209	232
Census job title:	Butcher	(282226)	9	10
Census job title:	Dairy technician	(282227)	22	22
Census job title:	Other food NEC	(282229)	2	2
Grouped occupation:	Packer	(282610)	84	91
Census job title:	Packer etc	(282621)	84	91
Grouped occupation:	Hotel/Restaurant	(292110)	632	710
Census job title:	Chef	(292121)	56	62
Census job title:	Cook	(292122)	105	124
Census job title:	Cook's assistant	(292123)	103	110
Census job title:	House keeper	(292124)	60	69
Census job title:	Mother's help	(292125)	84	92
Census job title:	Receptionist	(292126)	21	22
Census job title:	Purser	(292127)	1	1
Census job title:	Kitchen NEC	(292129)	26	35
Census job title:	Waiter	(292221)	148	164
Census job title:	Waiting NEC	(292222)	28	31

Women	Occupation	Group code	Attended	Invited
Grouped occupation:	Cleaning	(292310)	826	876
Census job title:	Janitor	(292321)	20	20
Census job title:	Cleaning	(292322)	801	851
Census job title:	Garbage collector	(292324)	5	5
Grouped occupation:	House work	(292130)	7474	7545
* No census title:	House work only	(None)	7395	7465
* No census title:	House work + some work	(None)	79	80
Grouped occupation:	Personal service NEC	(292910)	121	129
Census job title:	Missionary	(202722)	1	1
Census job title:	Salvation Army	(202723)	1	1
Census job title:	Religious NEC	(202729)	3	4
Census job title:	Hair dresser/barber	(292421)	48	49
Census job title:	Bath attendant	(292422)	4	4
Census job title:	Laundry/press	(292521)	49	54
Census job title:	Dry clean/press/iron	(292522)	7	8
Census job title:	Coach	(292621)	1	1
Census job title:	Photographer	(292721)	3	3
Census job title:	Service NEC	(292929)	4	4

17540 invited, 16418 attended

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Av Anders Forsdahl, 1976. (nytt opplag 1990)

2. Sunnhetstilstanden, hygieniske og sosiale forhold i Sør-Varanger kommune 1869-1975 belyst ved medisinal-beretningene.
Av Anders Forsdahl, 1977.

3. Hjerte-karundersøkelsen i Finnmark - et eksempel på en populasjonsundersøkelse rettet mot cardiovasculære sykdommer. Beskrivelse og analyse av etterundersøkelsesgruppen.
Av Jan-Ivar Kvamme og Trond Haider, 1979.

4. The Tromsø Heart Study: Population studies of coronary risk factors with special emphasis on high density lipoprotein and the family occurrence of myocardial infarction.
Av Olav Helge Førde og Dag Steinar Thelle, 1979.

5. Reformer i distriktshelsetjenesten III: Hypertensjon i distriktshelsetjenesten.
Av Jan-Ivar Kvamme, 1980.

6. Til professor Knut Westlund på hans 60-års dag, 1983.

7. Blodtrykksovervåkning og blodtrykksmåling.
Av Jan-Ivar Kvamme, Bernt Nesje og Anders Forsdahl, 1983.

8. Merkesteiner i norsk medisin reist av allmennpraktikere - og enkelte utdrag av medisinalberetninger av kulturhistorisk verdi.
Av Anders Forsdahl, 1984.

9. "Balsfjordsystemet." EDB-basert journal, arkiv og statistikksystem for primærhelsetjenesten.
Av Toralf Hasvold, 1984.

10. Tvunget psykisk helsevern i Norge. Rettsikkerheten ved slikt helsevern med særlig vurdering av kontrollkommisjonsordningen.
Av Georg Høyer, 1986.

11. The use of self-administered questionnaires about food habits. Relationships with risk factors for coronary heart disease and associations between coffee drinking and mortality and cancer incidence.
Av Bjarne Koster Jacobsen, 1988.

12. Helse og ulikhet. Vi trenger et handlingsprogram for Finnmark.
Av Anders Forsdahl, Atle Svendal, Aslak Syse og Dag Thelle, 1989.

13. Health education and self-care in dentistry - surveys and interventions.
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14. Helsekontroller i praksis. Erfaringer fra prosjektet helsekontroller i Troms 1983-1985.
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16. Diagnosis of cancer in general practice. A study of delay problems and warning signals of cancer, with implications for public cancer information and for cancer diagnostic strategies in general practice.
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Av Åge Wifstad, 1991.

19. Factors affecting self-evaluated general health status - and the use of professional health care services.
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Av Vinjar Fønnebø, 1992.

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23. Population studies on dyspepsia and peptic ulcer disease: Occurrence, aetiology, and diagnosis. From The Tromsø Heart Study and The Sørreisa Gastrointestinal Disorder Studie.
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Av Hasse Melbye, 1992.

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