Socioeconomic status and the risk of developing Rheumatoid Arthritis. Results from the Swedish EIRA study

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ABSTRACT

Objectives: To study whether formal education and occupational class are associated with incidence of rheumatoid arthritis (RA) overall and with the incidence of the two major subgroups of RA, i.e. seropositive (RF+) and seronegative (RF-) disease, respectively.
Methods: In a population-based case-control study using incident cases of RA, performed in Sweden during the period May 1996-June 2001, 930 cases and 1126 controls participated. The relative risk (RR) of developing RA with 95 % confidence interval (CI) was calculated for different levels of formal education compared with university degree and for different occupational classes compared with higher non-manual employees.
Results: Subjects without a university degree had an increased risk of RA compared with those with a university degree (RR=1.4 (95% CI 1.2-1.8)). For manual employees, assistant and intermediate non-manual employees together, the risk of developing RA was about 20 % higher compared with higher non-manual employees. These increased risks were more pronounced for RF+ RA as compared to RF- RA and mainly confined to women. Smoking could not alone explain the observed associations between risk of RA in different socioeconomic groups in Sweden.
Conclusions: We found an association between high socioeconomic status and lower risk of RA in an investigation that was population-based and representative for the Swedish population. The study demonstrates that as yet unexplained environmental and/or lifestyle factors influence the risk of RA, even in the relatively egalitarian Swedish society.

Abbreviations: ACR, American College of Rheumatology; CI, confidence interval; EIRA, Epidemiological Investigation of rheumatoid arthritis; FoB, Folk- och bostadsräkning (Swedish census); ISCED, International Standard for Classification system of education; NYK, Nordisk yrkesklassificering (Swedish classification system of occupations); RA, rheumatoid arthritis; RF, rheumatoid factor; RR, relative risk; SAS, Statistical Analysis System; SUN Svensk utbildningsnomenklatur (Swedish classification system of education)

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic inflammatory disease of almost unknown aetiology. Even if RA seems to cluster in families, it is known from epidemiological studies in twins that environmental factors are likely to be of importance for the development of the disease. The concordance for RA is only about 12-15 per cent in monozygotic twins[1-2].
Socioeconomic differences in health have been shown to exist in all industrialised countries where such differences have been studied. Low socioeconomic strata are disadvantaged concerning the vast majority of diseases investigated.[3] Evidence of differences in RA incidence between social classes is of interest from a public health point of view, but it is also of value in generating hypotheses about possible association between environmental/lifestyle factors and the risk of developing RA. A low social class has been associated with a worse clinical outcome in RA[4-10] (for a summary, see also [11]), but socioeconomic status in relation to disease incidence has as yet been poorly investigated. In two studies[12-13] social class according to occupation was not related to RA incidence, while in another study[14] a relationship was observed. Low formal education has been found to be associated with an increased risk of arthritis including RA[12,14-20] but one study presented contradicting results[21]. Overall, the results of previous studies are somewhat inconsistent, which might be due to methodological limitations. The studies were either based on prevalent cases[12,15-20], on a relatively small number of cases[13-14,16,21], had a low response rate[12,16] or were not restricted to RA cases alone[14,17-20].
In 1996 we initiated the so-called EIRA-study (Epidemiological Investigation of Rheumatoid Arthritis) in Sweden, which is a large population-based case-control study using incident cases of RA. In the present report from the EIRA study, our objective was to investigate whether indicators of socioeconomic status (formal education and occupational class) are associated with RA incidence and, if so, to investigate whether such an association may be explained by smoking, which is the best established environmental risk factor of RA to date. An additional aim was to study whether formal education and occupational class are associated with the two major subgroups of RA, i.e. seropositive (RF+) and seronegative (RF-) disease, respectively. This subdivision was made because of the knowledge that both environmental factors (such as smoking[12,22-25]) and key genetic factors (such as HLA-DR SE[22]) may have different effects on RF+ as compared to RF- RA. Therefore, RF+ and RF- RA ought to be studied separately in all investigations aimed at understanding the influences of unknown risk factors on RA.

METHODS

Study base

We studied the population, aged 18-70 years, in a geographically defined area in the middle and southern parts of Sweden. The recruitment period for cases and controls contributing to the present report was May 1996-June 2001. The general design of the study has been described in detail in the first report from the EIRA study[23].

Case identification

All public rheumatology units in the study area, as well as almost all of the, very few, privately run units, reported cases to the study. A case was defined as a person in the study base who for the first time received a diagnosis of RA (newly diagnosed cases) and fulfilled the American College of Rheumatology (ACR) criteria of 1987[26]. At the start some centres

also reported cases that did not satisfy the criteria in order to enable investigations of undifferentiated arthritis, but these subjects were eventually excluded from the study. All cases were assessed and diagnosed by a rheumatologist at a participating unit. A blood sample was taken locally and rheumatoid factor (RF) was determined as positive or negative using local standard methodology. Results were reported as RF+ or RF-.

Selection of controls

When a case was identified, a control was randomly selected from the study base, taking age, gender and residential area (county or in some occasion municipality) into consideration. The selection of controls was made by means of the national population register, which covers the entire population and is continuously updated (see also[23]). If a control refused to participate, was not traceable or reported having RA, a new control was selected using the same principles. Controls belonging to excluded cases due to not fulfilling the ACR criteria remained in the study.

Data collection

Cases and controls were given the opportunity to answer an identical questionnaire containing a wide range of questions regarding for instance formal education, employment, heredity, occupational exposures, life events, drug use and lifestyle factors. The questionnaire was given to the cases at their first visit to the rheumatology unit and sent by post to the controls. All questionnaires were supposed to be answered at home. Purpose-trained persons completed, by post or telephone, questionnaires with incomplete answers. In total, 967 cases and 1357 controls (i.e. all controls that were selected, including those who refused or were untraceable) were identified and of these, 930 cases (654 women and 276 men) and 1126 controls (791 women and 335 men) answered the questionnaire, giving a participation rate of 96 % for cases and 83 % for controls. All cases and controls consented to the study after receiving written information, and all aspects of the study were approved by the ethics committee of Karolinska Institutet.

Exposure

Socioeconomic status involves different aspects. In this report we consider formal education and occupational class as markers of socioeconomic status. Information about education and occupation was obtained from the questionnaire.

Formal education was divided into five levels: compulsory school, vocational upper secondary school, theoretical upper secondary school, other education and university degree. Some education programmes did not fit into any of these categories. This concerns for example vocational training courses for those who are unemployed, as well as studies within the military and commercial schools. Such programmes with a duration of at least one year were classified as “other education”. All study subjects could be classified according to education, except for one female case and three female controls.

The categorisation was done with guidance from Svensk utbildningsnomenklatur, SUN, which is a Swedish classification system of education. It is used by Statistics Sweden in classifying the education of the population, and is adjusted to the International Standard for Classification of Education, ISCED 97. (For a detailed description of the categorisation of formal education, please contact the first author).

Occupational class. Cases and controls gave an extensive description of their recent and previous occupations. For each occupation lasting at least one year, information about type of employment and time period of the employment was collected. Each occupation was given an occupational class code according to the Nordisk yrkesklassificering, NYK[27], which is a Swedish classification system of occupations adjusted to international standards. The occupational classes we have used are skilled and unskilled manual workers; assistant,

intermediate and higher non-manual employees. At the rheumatology unit each case was given a year and a month of onset of RA. The year in which symptoms first occurred was defined as the index year and was also used for the corresponding control. In general, employment during the index year has been used to classify occupational class. Those with a retirement pension, received their most recent socioeconomic code, and students were not classified at all. Those who were unemployed, housewives, on sickness or disablement pension, in employment measures or on sick leave for more than three months, were classified according to the occupational class they had before they left the labour market. If they had left working life more than two years earlier than the index year they were not classified. In total, 181 cases (132 women, 49 men) and 218 controls (163 women, 55 men) could not be classified according to occupational class, which means that an equal amount (19 %) of the cases and controls was not classified. Among these cases and controls, almost a third was on sickness or disablement pension; approximately a fifth was students and 4 % was on sick leave for more than three months, respectively. For two cases and eight controls data were missing.

Potential explanatory factors

There are several potential environmental and lifestyle factors that could explain the possible association between socioeconomic status and RA. Smoking is, however, the only environmental factor so far that has been unambiguously demonstrated to be related to RA in several studies[12,22-25] and was therefore considered as the only potential explanatory factor in this study. All results were adjusted for age and residential area according to the principle of control selection. In the analyses, age was categorised into ten strata (18-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64 and 65-70 years of age) and smoking into four (never smokers, current smokers, ex-smokers and non-regular smokers). For proportion of smokers among different occupational and educational groups, please visit http://ard.bmjjournals.com/.

Analysis of non-response

We performed an analysis in order to evaluate possible bias due to non-response (4 % and 17 % of identified cases and controls, respectively, did not participate). For all identified study subjects (967 cases and 1357 controls), information on education and occupational class was collected from the census of 1990, which is managed by Statistics Sweden. The sub study was separately approved by the ethics committee of Karolinska Institutet.

Statistical analysis

Subjects with different levels of education were compared with those with a university degree and subjects in different occupational classes were compared with higher non-manual employees. All analyses were performed with regard to the incidence of seropositive rheumatoid arthritis (RF+ RA), seronegative rheumatoid arthritis (RF- RA) and RA overall, respectively. Men and women were analysed separately, as well as together. Odds ratios with 95 % confidence interval (95% CI) were calculated by means of the Mantel-Haenszel method (unmatched analyses) and by means of conditional logistic regression analysis (matched analyses). Only results from the unmatched analyses are presented, as these were in close agreement with those from the matched analyses but, in general, had higher precision. Odds ratios were interpreted as relative risks (RR), as the study was population based and the controls were a random sample from the study base[28]. Estimates of relative risk (RR) were adjusted for age, residential area and smoking. All analyses were performed using the Statistical Analysis System (SAS) version 8.2.

RESULTS

In total, 930 cases participated in this study and of these, 654 were women and 276 men. Mean age at index year was 50 years for women and 53 years for men. The mean duration of disease at inclusion in the study was ten months, and 65 % of the female and 67 % of the male cases were RF-positive.

Formal education

Subjects without a university degree had an increased risk of RA compared with those with a university degree (RR for women and men together=1.4 (95% CI 1.2-1.8)) (table 1). When the cases were subdivided according to RF status at inclusion the increased risk for individuals without a university degree was overall mostly associated with RF+ RA (RR=1.6 (95% CI 1.3-2.1)). When educational level lower than university degree was divided into compulsory school, vocational/theoretical upper secondary school and other education, almost all of these programmes were associated with an increased risk of developing RA compared with those with a university degree (men and women together) (table 2). Also in this analysis, educational level appeared to have a larger impact on the risk of RF+ RA compared to RF- RA and this impact appeared to be mainly confined to women. The subanalyses on men are however uncertain, due to the relatively low numbers of individuals in the subgroups, especially in the comparison group. Adjustment for smoking only marginally altered the estimated relative risks associated with educational attainment (table 1).

Occupational class

Taking women and men together, employees other than higher non-manual employees had an approximately 20 % higher risk of developing RA compared with higher non-manual employees, but the confidence interval was wide (table 3). After dividing cases into RF+ RA and RF- RA, the influence of occupational class was mainly associated with RF+ RA, at least for women. From the relatively few observations on men, no substantial difference was observed with regard to RF-status. Table 4 displays the results when the occupational classes unskilled and skilled manual workers; assistant and intermediate non-manual employees, respectively, were compared with higher non-manual employees. For both sexes together, a tendency towards increased risks was observed for all these occupational classes regarding RF+ RA, while no increased risks of developing RF- RA were observed. Adjustment for smoking seemed to explain only a minor part of the association between occupational class and RA (table 3).

Analysis of non-response

The relative risks of RA associated with different educational levels, according to the census of 1990, were compared among responders separately, and among responders and non-responders together. The relative risks were about the same in these comparisons. The same procedure was carried out for different occupational classes and with the same result. Only minor differences were observed between the two groups.

DISCUSSION

According to the results of our study, women as well as men, with a university degree or working as higher non-manual employees, had a lower risk of developing RA. These effects of socioeconomic status on risk of RA were more pronounced for RF+ RA as compared to RF- RA, and were entirely confined to RF+ RA for women.

Our study was designed as a population-based case-control study with incident cases. This design might introduce differential misclassification of exposure due to recall bias. However, it is most unlikely that cases would recall the exposures of interest in the present report (formal education and occupational class) differently from controls.

Another potential methodological problem with our study is the possible introduction of selection bias. Some cases might have been unidentified, for instance cases diagnosed in primary care but never referred to a rheumatology unit. Since we know that almost all RA cases in the Swedish system are referred to rheumatology units[29], it is unlikely that the unidentified cases in primary care would have any great impact on our results. At some participating rheumatology units, cases with symptoms lasting more than one year were not reported to the EIRA study. If socioeconomic status influences the time from disease onset to diagnosis, this might constitute a potential bias in the present study. In order to evaluate this potential bias, we performed separate conditional logistic analyses confined to cases where the duration of disease differed. According to this analysis, disease duration had no impact on the studied associations between formal education and occupational class, respectively, and incidence of RA. Another selection bias might have been introduced if socioeconomic status had differed between responding and non-responding cases and controls, respectively. To investigate this potential bias we performed an analysis of non-response, based on census data regarding education and occupational class, which showed that non-response only had a minor impact on our estimated relative risks.

The Swedish general welfare system provides universal access to medical care. All rheumatology units linked to the general welfare system, as well as most of the (few) private rheumatology units in the study area, reported cases to our study. It is therefore unlikely that the recognised association between high socioeconomic position and a lower incidence of RA could be explained by unequal distribution of medical care. In conclusion we consider that our estimated relative risks do not suffer from severe bias.

Previous investigations on the potential influence of socioeconomic factors on the risk of developing RA are somewhat conflicting. Thus, seven studies from Norway[12], the UK[14], Finland[15] and the US[17-20] respectively, also observed an association between low formal education and an increased risk of arthritis including RA, but a study from the US presented contradicting results[21]. Social class according to occupation was not related to RA incidence in a study from Norway[12] and a study from the UK[13], but in another study from the UK[14] a relationship was shown. Finally, a recent Swedish investigation[16] on prevalent cases (in a region different from the one in our present study) reported a link between higher education and a low risk of RA. One possible explanation for the divergent results from these previous investigations may be methodological: these studies were either based on relatively few cases[13-14,16,21], used prevalent cases[12,15-20], were not restricted to RA cases alone[14,17-20] or had a low response rate[12,16]. It is also likely that accuracy of responses may decrease with time of disease, and that studies on incident cases may thus provide more accurate results than studies on prevalent cases.

Taking these considerations into account, the results from our current study on incident cases of RA add to the likelihood that socioeconomic status indeed influences the risk of developing RA even today, and even in Western Europe, including the highly egalitarian societies in Scandinavia[12,15-16]. It is thus of great interest to identify risk factors in the environment and/or in lifestyle that are responsible for the observed differences, but this was beyond the primary scope of our study. Explanations for social class differences in RA may possibly be found in the social structure (for example as variations in social capital between living areas) as well as in the so called life-style of the individual (e.g. smoking). They may also be found in conditions during youth and upbringing or in conditions more close to the onset of disease[30].

We hope to return to these questions later in the course of the EIRA project when the web of causation may be somewhat better elucidated.
In our current study, as well as in the Norwegian[12] and the Swedish study[16], the interference of smoking, the major environmental risk factor identified so far, was yet studied. However, the observed differences could not be explained by differences in smoking habits. We also investigated whether differences in socioeconomic status had different effects regarding RF+ RA as compared to RF- RA and in men as compared to women. Interestingly, the socioeconomic status appeared to have its major effects on RF+ RA, and we also observed some differences between women and men in this respect, although these latter investigations are less precise, mainly due to the relatively few individuals in some of the investigated groups.
So far, we do not know which individual factors are responsible, either for the overall influence of socioeconomic factors on the risk of developing RA, or for the different effects on subgroups of RA patients. In the Norwegian study[12] the association between low formal education and higher risk of RA was explained by adjusting for age, sex, marital status, body mass index, employment category and current smoking in a multivariate model. In order to compare our results with the Norwegian study, we adjusted our results for marital status and body mass index separately, but this had only a minor impact on our estimated relative risks (data not shown). In the Swedish study[16] adjustment for smoking and employment in high risk occupations could not explain the association between low formal education and higher risk of RA.
In summary, we observed that high socioeconomic status, independent of smoking habits, is associated with lower risk of developing RA in Sweden, and also that this association may be different regarding seropositive RA as compared to seronegative RA, and among men and women. The existence of these differences points to interesting challenges in the identification of aetiological factors responsible for the findings within this society, whether they are protective factors amongst those of higher socioeconomic status and/or risk factors amongst those of lower socioeconomic status. The lower risk of RA in individuals with high education and less manual work, may in addition reflect fundamental, but as yet unidentified factors that may have changed the overall pattern of RA in many Western societies towards lower overall incidence and higher age of onset of the disease.

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COMPETING INTEREST

The authors declare that they have no conflict of interest in connection with this paper

ETHICS APPROVAL

All aspects of the study were approved by the ethics committee of Karolinska Institutet, Stockholm, Sweden.

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Table 1. Relative risk (RR) with 95% confidence interval (95% CI) of developing RF+ RA, RF- RA and RA overall (Total RA), for subjects without a university degree compared with subjects with a university degree, by gender.

				Women		
		ca/co *	RR **	95 % CI	RR ***	95 % CI
RF+ RA	No university degree	340/584	1.5	1.1-2.0	1.6	1.1-2.2
	University degree †	82/204	1.0	-	1.0	-
RF- RA	No university degree	170/584	0.9	0.7-1.3	0.8	0.6-1.3
	University degree †	61/204	1.0	-	1.0	-
Total RA	No university degree	510/584	1.3	1.0-1.6	1.3	1.0-1.7
	University degree †	143/204	1.0	-	1.0	-
				Men		
		ca/co *	RR **	95 % CI	RR ***	95 % CI
RF+ RA	No university degree	162/260	2.1	1.3-3.6	2.0	1.1-3.6
	University degree †	22/75	1.0	-	1.0	-
RF- RA	No university degree	80/260	2.3	1.1-4.7	2.6	1.2-5.5
	University degree †	12/75	1.0	-	1.0	-
Total RA	No university degree	242/260	2.2	1.4-3.4	2.2	1.3-3.6
	University degree †	34/75	1.0	-	1.0	-
				All		
		ca/co *	RR §	95 % CI	RR §§	95 % CI
RF+ RA	No university degree	502/844	1.6	1.3-2.1	1.7	1.2-2.2
	University degree †	104/279	1.0	-	1.0	-
RF- RA	No university degree	250/844	1.2	0.8-1.6	1.1	0.8-1.6
	University degree †	73/279	1.0	-	1.0	-
Total RA	No university degree	752/844	1.4	1.2-1.8	1.5	1.1-1.9
	University degree †	177/279	1.0	-	1.0	-

* ca/co = number of exposed cases/number of exposed controls
** RR adjusted for age and residential area
*** RR adjusted for age, residential area and smoking
§ RR adjusted for age, residential area and gender
§§ RR adjusted for age, residential area, gender and smoking
† Reference group

Table 2. Relative risk (RR) with 95% confidence interval (95% CI) of developing RF+ RA, RF- RA and RA overall (Total RA), for subjects with different levels of formal education compared with a university degree, by gender.

Women

	RF+ RA			*RF- RA*			*Total RA*		
	ca/co *	RR **	95% CI	ca/co *	RR **	95% CI	ca/co *	RR**	95% CI
Compulsory school	140/212	1.6	1.1-2.4	60/212	1.0	0.6-1.7	200/212	1.3	0.9-1.9
Vocational upper secondary school	46/69	1.8	1.1-3.0	29/69	1.4	0.8-2.5	75/69	1.6	1.0-2.5
Theoretical upper secondary school	49/94	1.6	0.9-2.6	25/94	0.9	0.5-1.6	74/94	1.2	0.8-1.8
Other education	105/209	1.3	0.9-1.9	56/209	0.8	0.5-1.2	161/209	1.1	0.8-1.5
University degree †	82/204	1.0	-	61/204	1.0	-	143/204	1.0	-

Men

	RF+ RA			*RF- RA*			*Total RA*		
	ca/co *	RR **	95% CI	ca/co *	RR **	95% CI	ca/co *	RR**	95% CI
Compulsory school	62/95	2.1	1.1-4.1	28/95	1.7	0.7-4.1	90/95	2.0	1.1-3.5
Vocational upper secondary school	33/65	1.5	0.7-3.2	18/65	2.0	0.7-5.3	51/65	1.7	0.9-3.3
Theoretical upper secondary school	27/38	2.2	0.9-5.1	9/38	1.5	0.5-4.8	36/38	2.0	1.0-4.2
Other education	40/62	2.1	1.1-4.0	25/62	4.0	1.5-10.5	65/62	2.5	1.4-4.5
University degree †	22/75	1.0	-	12/75	1.0	-	34/75	1.0	-

All

	RF+ RA			*RF- RA*			*Total RA*		
	ca/co *	RR ***	95% CI	ca/co *	RR ***	95% CI	ca/co *	RR***	95% CI
Compulsory school	202/307	1.7	1.2-2.5	88/307	1.2	0.8-1.8	290/307	1.5	1.1-2.0
Vocational upper secondary school	79/134	1.7	1.1-2.6	47/134	1.5	0.9-2.5	126/134	1.6	1.1-2.3
Theoretical upper secondary school	76/132	1.7	1.1-2.6	34/132	1.0	0.6-1.7	110/132	1.3	0.9-1.9
Other education	145/271	1.4	1.0-2.0	81/271	1.1	0.7-1.6	226/271	1.3	1.0-1.7
University degree †	104/279	1.0	-	73/279	1.0	-	177/279	1.0	-

* ca/co = number of exposed cases/number of exposed controls
** RR adjusted for age and residential area
*** RR adjusted for age, residential area and gender
† Reference group

Table 3. Relative risk (RR) with 95% confidence interval (95% CI) of developing RF+ RA, RF- RA and RA overall (Total RA), for subjects that are not higher non-manual employees compared with higher non-manual employees, by gender.

				Women		
		ca/co *	RR **	95 % CI	RR ***	95 % CI
RF+ RA	Not higher non-manual employees	298/529	1.6	1.1-2.5	1.6	1.0-2.6
	Higher non-manual employees †	35/99	1.0	-	1.0	-
RF- RA	Not higher non-manual employees	155/529	0.8	0.5-1.2	0.9	0.5-1.5
	Higher non-manual employees †	34/99	1.0	-	1.0	-
Total RA	Not higher non-manual employees	453/529	1.2	0.8-1.6	1.3	0.9-1.9
	Higher non-manual employees †	69/99	1.0	-	1.0	-
				Men		
		ca/co *	RR **	95 % CI	RR ***	95 % CI
RF+ RA	Not higher non-manual employees	120/207	1.2	0.8-2.0	1.2	0.7-2.2
	Higher non-manual employees †	34/73	1.0	-	1.0	-
RF- RA	Not higher non-manual employees	53/207	1.0	0.6-1.9	0.9	0.5-1.8
	Higher non-manual employees †	20/73	1.0	-	1.0	-
Total RA	Not higher non-manual employees	173/207	1.2	0.8-1.8	1.1	0.7-1.8
	Higher non-manual employees †	54/73	1.0	-	1.0	-
				All		
		ca/co *	RR §	95 % CI	RR §§	95 % CI
RF+ RA	Not higher non-manual employees	418/736	1.4	1.0-2.0	1.5	1.0-2.1
	Higher non-manual employees †	69/172	1.0	-	1.0	-
RF- RA	Not higher non-manual employees	208/736	0.8	0.6-1.2	0.9	0.6-1.3
	Higher non-manual employees †	54/172	1.0	-	1.0	-
Total RA	Not higher non-manual employees	626/736	1.2	0.9-1.5	1.2	0.9-1.6
	Higher non-manual employees †	123/172	1.0	-	1.0	-

* ca/co = number of exposed cases/number of exposed controls
** RR adjusted for age and residential area
*** RR adjusted for age, residential area and smoking
§ RR adjusted for age, residential area and gender
§§ RR adjusted for age, residential area, gender and smoking
† Reference group

Table 4. Relative risk (RR) with 95% confidence interval (95% CI) of developing RF+ RA, RF- RA and RA overall (Total RA), for subjects in different occupational classes compared with higher non-manual employees, by gender.

Women

	RF+ RA			*RF- RA*			*Total RA*		
	ca/co *	RR **	95% CI	ca/co *	RR **	95% CI	ca/co *	RR**	95% CI
Unskilled manual workers	96/160	1.7	1.0-2.7	51/160	0.7	0.4-1.3	147/160	1.2	0.8-1.8
Skilled manual workers	36/71	1.7	0.9-3.2	23/71	1.0	0.5-2.0	59/71	1.3	0.8-2.2
Assistant non-manual employees	88/139	2.2	1.3-3.6	36/139	0.7	0.4-1.2	124/139	1.4	0.9-2.1
Intermediate non-manual employees	78/159	1.4	0.8-2.4	45/159	0.8	0.5-1.4	123/159	1.1	0.7-1.7
Higher non-manual employees †	35/99	1.0	-	34/99	1.0	-	69/99	1.0	-

Men

	RF+ RA			*RF- RA*			*Total RA*		
	ca/co *	RR **	95% CI	ca/co *	RR **	95% CI	ca/co *	RR**	95% CI
Unskilled manual workers	34/55	1.3	0.6-2.5	11/55	0.9	0.4-2.2	45/55	1.1	0.6-2.0
Skilled manual workers	46/57	1.8	0.9-3.3	20/57	1.1	0.5-2.7	66/57	1.6	0.9-2.8
Assistant non-manual employees	13/32	0.6	0.2-1.5	11/32	1.7	0.7-4.6	24/32	1.0	0.5-2.0
Intermediate non-manual employees	27/63	1.1	0.6-2.2	11/63	0.8	0.3-2.0	38/63	1.0	0.6-1.8
Higher non-manual employees †	34/73	1.0	-	20/73	1.0	-	54/73	1.0	-

All

	RF+ RA			*RF- RA*			*Total RA*		
	ca/co *	RR ***	95% CI	ca/co *	RR ***	95% CI	ca/co *	RR***	95% CI
Unskilled manual workers	130/215	1.5	1.0-2.3	62/215	0.7	0.5-1.2	192/215	1.2	0.8-1.6
Skilled manual workers	82/128	1.7	1.1-2.7	43/128	1.0	0.6-1.8	125/128	1.4	1.0-2.1
Assistant non-manual employees	101/171	1.6	1.0-2.5	47/171	0.9	0.5-1.4	148/171	1.3	0.9-1.8
Intermediate non-manual employees	105/222	1.3	0.8-1.9	56/222	0.8	0.5-1.3	161/222	1.1	0.8-1.5
Higher non-manual employees †	69/172	1.0	-	54/172	1.0	-	123/172	1.0	-

* ca/co = number of exposed cases/number of exposed controls
** RR adjusted for age and residential area
*** RR adjusted for age, residential area and gender
† Reference group