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Changes over time in absolute and relative socioeconomic differences in smoking: A comparison of cohort studies from Britain, Finland and Japan

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Abstract

Introduction: Socioeconomic differences in smoking over time and across national contexts are poorly understood. We assessed the magnitude of relative and absolute social class differences in smoking in cohorts from Britain, Finland and Japan over 5-7 years.
Methods: The British Whitehall II study (n=4350), Finnish Helsinki Health Study (n=6328), and Japanese Civil Servants Study (n=1993) all included employed men and women aged 35-68 at baseline in 1997-2002. Follow-up was in 2003-2007 (mean follow-up 5.1, 6.5 and 3.6 years, respectively). Occupational social class (managers, professionals and clerical employees) was measured at baseline. Current smoking and covariates (age, marital status, body mass index and self-rated health) were measured at baseline and follow-up. We assessed relative social class differences using the Relative Index of Inequality (RII) and absolute differences using the Slope Index of Inequality (SII).
Results: Social class differences in smoking were found in Britain and Finland, but not in Japan. Age-adjusted relative differences at baseline ranged from RII 3.08 (95% confidence interval 1.99-4.78) among Finnish men to 2.32 (1.24-4.32) among British women, with differences at follow-up greater by 8-58%. Absolute differences remained stable and varied from SII 0.27 (0.15-0.40) among Finnish men to 0.10 (0.03-0.16) among British women. Further adjustment for covariates had modest effects on inequality indices.
Conclusions: Large social class differences in smoking persisted among British and Finnish men and women, with widening tendencies in relative differences over time. No differences could be confirmed among Japanese men or women.

Key words: Smoking, social class, follow-up, Britain, Finland, Japan

Implications

Changes over time in social class differences in smoking are poorly understood across countries. Our study focused on employees from Britain, Finland and Japan, and found relative and absolute and class differences among British and Finnish men and women. Key covariates had modest effects on the differences. Relative differences tended to widen over the 4 to 7 year follow-up, whereas absolute differences remained stable. In contrast, class differences in smoking among Japanese men or women were not found. Britain and Finland are at the late stage of the smoking epidemic model, whereas Japan may not follow the same model.

Introduction

Tobacco smoking is global public health issue. Prevalence varies substantially between countries and is higher in men than women.[1] In Western European countries the prevalence of daily smoking is between a fifth and a third in men and between a tenth and a quarter in women, with a decline particularly among men.[2] As expected, in Britain and Finland smoking patterns follow those for Western European countries. However, the pattern is different in Japan where smoking prevalence in men is very high and among women very low. In addition to sex differences, there are also socioeconomic differences in smoking. Irrespective of whether socioeconomic position is measured by education, occupational class or income, smoking prevalence appears to follow a gradient.[3] The steep socioeconomic gradient in smoking in men takes a heavy toll on men in lower socioeconomic groups worldwide. Socioeconomic differences in women tend to be smaller, non-existent or even reverse.[4-5]

The evolution of smoking behaviour across countries has been characterised by the smoking epidemic model and its four temporal stages.[6-7] In the beginning of the epidemic smoking is relatively uncommon and found principally among men, with limited consequences for mortality. Next, male smoking prevalence rapidly peaks at 40% or even 80%, and female smoking starts to increase. This marks the increase in smoking attributed-mortality. At the third stage male smoking stagnates and declines and some convergence between sexes is seen, but smoking-attributed mortality rises steeply. At the final stage there is a downturn in the prevalence, with mortality peaking at about one-third of all male deaths before a decline. The epidemic model has been extended to include also socioeconomic differences.[8-10] At the early stages, the upper classes are the first to take up smoking, but over time the habit spreads disproportionately to the lower classes, with emerging socioeconomic differences. The patterning of smoking over time is further shaped by macro level national developments, such as economic fluctuations and social structural transformations,[11-13] as well as individual level sociodemographic and health-related factors.[14-16]

The epidemic model finds support from western time trend studies suggesting that socioeconomic differences in smoking remain or even widen,[8-10,17] and it offers a framework and context for examining socioeconomic differences in smoking over time and across countries. Longitudinal studies following the same participants are, nevertheless, lacking although they would add to our understanding of the dynamics of both relative and absolute socioeconomic differences in smoking.

Relative differences across the social hierarchy are rate ratio between a lower and a higher social class, whereas absolute differences are rate differences between a lower and a higher social class.[18] When smoking prevalence declines, as predicted by the epidemic model, relative differences tend to widen as smoking becomes concentrated disproportionately in the lower classes, whereas absolute differences tend to narrow as they do not necessarily follow changes in the distribution of smoking. Although relative differences in smoking have been the most often examined, absolute differences are also important, in particular to anti-smoking policies, as uptake will among smokers in the lower classes be reflected in these differences.

Our study follows changes over time in relative and absolute socioeconomic differences in smoking among men and women in employee cohorts from Britain, Finland and Japan. We compare two northern European countries at the late stage of the smoking epidemic with a country at an earlier stage, albeit one in which social norms have prevented women taking up smoking. The labour markets and social structures in Britain and Finland share similarities for men and women. In Japan, men's high employment participation is contrasted with women's low participation and few female managers.[19] First, we expect to find both relative and absolute socioeconomic differences in smoking in both sexes in our cohorts from Britain and Finland. Second, we expect these relative

socioeconomic differences to widen but absolute differences to remain as smoking declines. Third, we expect socioeconomic differences in smoking in Japan to be emerging as the smoking epidemic proceeds. Our specific aim was to follow the magnitude of relative and absolute occupational social class differences in smoking among cohorts from Britain, Finland and Japan at baseline in 1998-2002 and at follow-up in 2003-2007, considering key covariates.

Data and methods

Data sources

We used three prospective occupational cohorts, the London based Whitehall II study from Britain, the Helsinki based Helsinki Health Study from Finland, and the western Japan based Japanese Civil Servants Study. The Finnish and the Japanese cohorts have made use of the Whitehall II study protocol. All cohorts were established to enable the study of social determinants of health-related outcomes among public sector employees.

The Whitehall II study started in 1985-1988 and focused on government employees working for the civil service in 20 departments in London at the time of recruitment (n=10308, response rate 73%).[20-21] We included employed participants from phase 5 in 1997-1999 (response rate 73%) as our baseline and participants from phase 7 in 2003-2004 as our follow-up (response rate 76%). The data analysed were for white-collar employees aged 45-68 at baseline participating in both phases (n=4350, 26% women) (Table 1).

The Helsinki Health Study baseline data were collected in 2000-2002 among local government employees aged 40-60 years working for the City of Helsinki (n=8960, response rate 67%). Follow-up data were collected in 2007 (response rate 83%).[22-23] The data analysed were from white-collar employees participating in both phases (n=6328, 84% women).

The Japanese Civil Servants Study baseline data were collected in 1998-1999 among local government employees working for a western Japanese province (n=6431, response rate 73%). Follow-up data were collected in 2003 (response rate 76%).[24-24] The data analysed included white-collar employees aged 35-60 at baseline participating in both phases (n=1993, 31% women).

At baseline and at follow-up employees from each cohort were mailed a self-assessed questionnaire. Similar measurements were used in the cohorts and the data were harmonised for maximal comparability.

Occupational social class

Our socioeconomic indicator was occupational social class measured at baseline. The Whitehall II study only includes white-collar employees whereas the Finnish and the Japanese cohorts also include blue-collar employees, but they were excluded from the main analyses. The analyses thus used three hierarchical white-collar classes. The social class classifications were based on occupational titles, organisational positions, educational qualifications of occupations and salary levels following our earlier comparisons:[26-27] 1) managers and administrative staff, 2) professionals and semi-professionals, and 3) clerical and other non-professional employees. In the Whitehall II study, social classes were derived from questionnaires by collapsing 12 non-industrial salary based employment grade levels.[28] In the Helsinki Health Study, social classes based on occupational titles were derived from the employer's personnel registers for those consenting to linkage (80%) and completed from questionnaires.[22] In the Japanese Civil Servants Study, social classes based on

occupational titles were derived from questionnaires using the Japanese national survey for occupations that distinguishes between 13 broad occupational categories.

In the Whitehall II study, the two largest social classes among men were managers and professionals whereas clerical employees formed a small class (Table 1). The largest class in women was professionals whereas clerical employees and managers formed smaller classes. In the Helsinki Health Study professionals formed the largest class in men whereas managers and clerical employees formed smaller classes. Professionals and clerical employees formed large classes in women whereas managers formed a small class. In the Japanese Civil Servants Study the largest class in men was professionals, the second largest was clerical employees and the smallest was managers. Professionals formed a particularly large class among Japanese women, clerical employees a smaller one and there were no female managers.

Smoking

Smoking status was obtained from questions on current tobacco smoking, dichotomised into current smokers and non-smokers in accordance with previous studies.[9,29] The Whitehall II study and Helsinki Health Study measured cigarettes, cigars and pipes. The Japanese Civil Servants Study measured only cigarettes, but pipe and cigar smoking is very rare among Japanese men.[30]

Covariates

Covariates were assessed at baseline and follow-up. Age in years was included and adjusted for in all analyses. Marital status was dichotomised into those living with a partner, i.e. married or cohabiting versus those not living with a partner. Body mass index (BMI) was calculated from measured height and weight in the British and the Japanese cohort. In the Finnish cohort, self-reports were used; these tend to underestimate obesity.[31] A BMI of 30 or more indicated obesity among British and Finnish participants. Among Japanese participants only 1% had a BMI of 30 or over and, following recommendations, a BMI of 25 or over was taken to indicate obesity.[32] Self-rated health was asked with a similar question in each cohort and dichotomised to less than good versus good health. These variables have been related to social class and smoking in previous studies.[14,27]

Statistical methods

Relative social class differences in smoking were examined using the Relative Index of Inequality (RII) and absolute differences using the Slope Index of Inequality (SII).[33-36] These summary indices are suitable for comparing the magnitude of socioeconomic differences over time and across populations. Relative differences are regarded as indicating better causal effects and absolute differences public health relevance.[34,37] Ideally both relative and absolute differences should be measured.

The RII and SII are both regression based indices and take into account the size of the socioeconomic categories as well as the whole socioeconomic hierarchy instead of comparing only the extremes. The socioeconomic measure used is converted to a score between 0 (top of hierarchy) and 1 (bottom of hierarchy). The score is weighted, for each sex separately, by the population in each socioeconomic category in each cohort by calculating the midpoint of the proportion of the population in each category.

The RII and SII were obtained by using regression models with the socioeconomic score as independent variable and smoking as dependent variable. Generalised linear models with log-binomial regression were used to estimate the RII by using a logarithmic link function and the SII by using identity link function.[38] 95% confidence intervals (95% CI) were calculated. The RII can be interpreted as the rate ratio and the SII as the rate difference between the top and bottom of the socioeconomic hierarchy. RII values above 1.0 imply socioeconomic differences, i.e. a higher prevalence of smoking in the lower compared to the higher social classes, and values below 1.0 imply reverse differences. SII values above 0 imply higher smoking prevalence in lower classes and below 0 reverse differences. In the modelling, occupational class differences in smoking were adjusted for age (M1), additionally for marital status (M2), and in the full model additionally for BMI and self-rated health (M3). We tested the hypothesis whether the absolute (SII) and relative (RII) class differences had changed over the follow-up against the null hypothesis that the differences had remained stable. This was done by including the cross-product term of occupational class and time in the models for each cohort and sex.

To control for missing values we used multiple imputation with the aregImpute function in the Hmisc package for R software. All baseline and follow-up variables included were imputed. Multiple imputation was based on additive regression, bootstrapping, and predictive mean matching.[39] Ten imputed datasets were created, assuming that items were missing at random. These estimates were obtained by averaging across the results from each of these ten datasets using Rubin's rules.[40] Missing values for the study variables are shown in Appendix Table 1. Additionally, complete case analyses were made. Analyses were made using R software, version 2.13.0.

Results

The overall prevalence of smoking among Japanese men was 43% at baseline and 36% at follow-up. Among British and Finnish men and women the prevalence varied from 11% to 24% with a declining trend over the follow-up (Table 1). Among Japanese women the prevalence remained at 5%. Social class differences in the prevalence followed a gradient in Britain and Finland. In Japan the prevalence was lower in managers and similar in professionals and clericals.

Relative differences in smoking

Age-adjusted relative social class differences in smoking at baseline measured by the RII were large among British (RII 2.50, 95% CI 1.80, 3.46) and Finnish men (RII 3.08, 95% CI 2.25, 4.79) (Table 2). Adjusting for sociodemographic and health-related covariates attenuated these differences by 15-29%. Among Japanese men social class differences in smoking were not observed. At follow-up, age-adjusted differences in smoking among British men were 73% larger (RII 3.60, 95% CI 2.48, 5.22) and among Finnish men 49% larger (RII 4.09, 95% CI 2.49, 6.72). Adjusting for covariates attenuated the follow-up differences by 14-17%. Among Japanese men differences at follow-up were not found.

Age-adjusted relative class differences in smoking among British (RII 2.32, 95% CI 1.24, 4.32) and Finnish women (RII 2.98, 95% CI 2.38, 3.74) were at a similar level with men. Adjusting for covariates attenuated the differences by 2-10%. Among Japanese women differences were not observed. At follow-up, age-adjusted differences among British women were 8% larger and among Finnish women 58% larger (RII 4.13, 95% CI 3.16-5.41). Adjusting for covariates attenuated the follow-up differences by 8-10%. Among Japanese women differences were neither found at follow-up.

Although the RII values were larger at follow-up among British and Finnish men and women, suggesting widening relative class differences, interaction tests did not confirm statistically significant changes over time (no data shown).

Absolute differences in smoking

Age-adjusted absolute social class differences in smoking at baseline measured by the SII were smaller among British men (SII 0.14, 95% CI 0.09-0.20) than Finnish men (SII 0.27, 95% CI 0.15-0.40) (Table 3). Thus for Finnish men at the bottom of the class hierarchy the prevalence of smoking was 27 percentage points higher than at the top and for British men the figure was 14 percentage points. Adjusting for covariates had negligible effects. Among Japanese men absolute differences in smoking were not found. At follow-up, age-adjusted absolute class differences in smoking remained similar among British men, but marginally narrowed among Finnish men. Further adjustments had minor effects. Among Japanese men no differences were found at follow-up.

Age-adjusted absolute class differences in smoking at baseline also tended to be smaller among British women (SII 0.11, 95% CI 0.04-0.18) than Finnish women (SII 0.18, 95% CI 0.14-0.22). Adjusting for covariates had negligible effects. Among Japanese women differences were not found at baseline. At follow-up, the differences among British and Finnish women remained similar. Among Japanese women no differences were found at follow-up.

Discussion

This study examined changes over time in the magnitude of relative and absolute socioeconomic differences in smoking among middle-aged men and women from Britain, Finland and Japan. For this purpose we used comparable employee cohorts followed up for 4-7 years between 1997 and 2007.

Main results

We found, first, that both relative and absolute social class differences in smoking persisted in Britain and Finland, with a tendency for larger absolute differences among men than women. Second, relative differences tended to widen over the follow-up among British and Finnish men and women. Third, sociodemographic and health-related covariates had only modest effects on the observed relative and absolute socioeconomic differences. Fourth, no social class differences could be confirmed among Japanese men or women.

Interpretation

The smoking epidemic model predicts that socioeconomic differences would emerge and widen after the prevalence of smoking has reached its maximum, with upper classes being increasingly less likely to take up and more likely to quit smoking.[6-7,9] According to the prediction of the epidemic model in relation to declining prevalence trends, large absolute and relative socioeconomic differences were seen both at baseline and follow-up.

Following further the epidemic model we expected relative socioeconomic differences in smoking to widen over the follow-up in Britain and Finland, and indeed socioeconomic differences in smoking tended to be larger at follow-up than baseline among Finnish and British men and women.

Although these widening tendencies could not be statistically confirmed in interaction analyses, they are in accordance with previous trend studies suggesting a widening of socioeconomic differences in smoking.[41-43] These developments most likely reflect transitions towards the later stages of the smoking epidemic, and are driven by declining trends of smoking, in particular among the upper classes in Britain and Finland. It has been hypothesised that the decline may lead to "hardening" of smoking behaviours, with hardcore smokers being more likely to continue and others to quit. Hardcore smokers come disproportionately from lower social classes and are often non-employed.[44] Our study is not ideal for examining broader social structural effects on smoking in general or trends towards hardcore smoking in particular since our participants were public sector employees who form a select subset even among employed people.

Our hypothesis that Japanese men and women would also show emerging socioeconomic differences in smoking over the follow-up was not supported. This may reflect a delayed evolution from the early stages of the smoking epidemic towards the later ones. In our Japanese cohort the prevalence of smoking remained very high in all male social classes and very low in female classes. Some previous Japanese studies have also reported negligible socioeconomic differences in smoking while differences have also been reported.[45-47] However, our findings may also reflect cultural differences as Japan does not seem to have followed the stages of the smoking epidemic model. Thus, among Japanese men attitudes towards smoking may have remained permissive across social classes, and anti-smoking measures may have reached Japanese men less than their Western counterparts. Consequently, smoking prevalence in Japanese men still is high although it reached its maximum already in the late 1970s,[48] and socioeconomic differences remain small, inconsistent or non-existent. In Japanese women the prevalence has remained very low and may not reach the numbers observed in western countries in the foreseeable future.

We examined socioeconomic differences across three white-collar classes only, since the Whitehall II cohort does not include blue-collar employees. Even among the white-collar classes in Britain and Finland the socioeconomic differences in smoking were large. Nevertheless, the prevalence of smoking is typically highest among those lowest in the socioeconomic hierarchy.[3,14,43] We were able to include manual workers in our sensitivity analyses for the Finnish and Japanese cohort. In these analyses the relative and absolute class differences were somewhat larger for Finnish women and somewhat smaller for Finnish men. Among Japanese men, after including manuals, weak class differences in smoking were observed at baseline and follow-up. These differences among Japanese men may be visible in particular between white-collar and blue-collar classes, and less so within white-collar classes examined in our study. In order to obtain a comprehensive picture of the socioeconomic differences in smoking future studies should examine the full social class, as well as education and income, hierarchy.

Our study analysed changes over time in socioeconomic differences in smoking. We controlled for a number of key sociodemographic and health-related covariates. However, these had only modest effects on the relative differences and negligible effects on the absolute differences. Thus the observed differences could not be explained by the covariates included. We acknowledge that health-related covariates may involve reverse causality and cause overadjustment, and that residual confounding cannot be ruled out and needs to be considered in future studies.

We examined both relative and absolute socioeconomic differences in smoking to obtain a wider picture of the differences. It was expected that relative differences would be more likely to widen than absolute differences as the former depend more on the decline in the prevalence of smoking which tends to be higher in the lower than in the upper classes. As expected the relative socioeconomic differences in smoking tended to widen in Britain and Finland over the follow-up,

whereas absolute differences remained stable. The Relative Index of Inequality and the Slope Index of Inequality were advantageous indices for comparing the magnitude of socioeconomic differences over time and place as they take into account the proportions of participants in each class in each cohort.[34] These measures have also been used in previous studies.[9,36,49] Examining absolute differences helps also set priorities for anti-smoking measures. Our study reconfirms that it is recommendable to examine both relative and absolute socioeconomic differences in future studies.

The stable absolute socioeconomic differences in smoking in Britain and Finland were largest among Finnish men, with a prevalence of 27 percentage points higher at the bottom of the class hierarchy than at the top. This development is in accordance with the smoking epidemic model which predicts that smoking spreads from higher to lower classes as the epidemic proceeds. Social structural changes may further contribute to the epidemic and the differences in smoking, but in our study the four to seven year follow-up was a relatively short period for major changes in the class structures. Paralleling the epidemic, anti-smoking policies have been gradually implemented in many European countries including Britain and Finland. These policies have likely contributed to the decline of smoking prevalence and may have prevented even larger socioeconomic differences than those observed.[50] Japan provides a divergent case as anti-smoking policies have been weaker or non-existent, with prevalence levels among men as high as 55% in 1998 declining to 33% in 2012.[51] Our observations on British and Finnish men and women reconfirm the need for further measures that target smoking in general as well as the large and persistent socioeconomic differences. It is well-known that smoking is a key contributor to socioeconomic differences in morbidity and mortality in western countries,[49,52-53] and the persisting socioeconomic differences in smoking suggest that smoking likely contributes to these differences also in the future. This is one more incentive for anti-smoking measures in general and across all social classes.

Further studies are needed to corroborate our findings with longer follow-up, full socioeconomic hierarchies as well as additional cohorts and representative populations from a broader spectrum of national contexts.

Methodological considerations

There are strengths and limitations in our study. The participants came from the public sector and the findings may not be generalizable to other employee sectors or general populations.

Our cohorts share many similarities. However, the Finnish and the Japanese cohort consisted of a baseline survey and follow-up, whereas for the Whitehall II study we used phase 5 as our baseline and phase 7 as our follow-up to avoid major age and period differences among the cohorts. Thus attrition is a potential problem and previous studies on the Whitehall cohort suggest that those lost to follow-up are more likely to be smokers and from lower social class groups compared to those who remain in the study.[54-55]

The response rates to our surveys were satisfactory. According to non-response analyses of the British and the Finnish data, the baseline and follow-up data were largely representative of the target populations.[22,56] Further, item non-response was mostly below 10% in the British and Finnish data (see Appendix Table A1). In the Japanese data item non-response was somewhat higher, reflecting in part the structure of the Japanese baseline data which were collated from four separate questionnaires with some mismatch and consequent loss of participants.

Multiple imputation was used to control for non-response bias.[39] Our sensitivity analyses tended to show lower RII values in the complete case than imputed analyses. Thus for British and Finnish

men, the values were 7-39% lower and for British women 61-70% lower, but for Finnish women slightly higher. For the SII, the complete case analyses showed both somewhat lower and somewhat higher values, with British women at follow-up showing a 60% lower value. While in some cases the complete case estimates were substantially lower than the imputed ones, the class differences in smoking nevertheless remained. Among Japanese participants, the complete case analyses, like the imputed ones, showed no relative or absolute class differences in smoking. Following Rubin's[40] rules we also explored the influence of missing data by examining the relative increase in variance due to non-response. For RII and SII this increase was otherwise 1%-6%, but for Japanese women 14%-27%, likely due to the lack of female managers. We acknowledge that non-response remains a potential source of bias.

Our occupational social class classifications were broadly similar but not fully identical. Three occupation-based and hierarchical white-collar classes were included. However, the Finnish and the Japanese data allowed sensitivity analyses which included also the manual class. Some participants may have changed their social class over the follow-up and that might cause some bias. Further sensitivity analyses among the employed showed that 79% in the British cohort, 85% in the Finnish cohort and 87% in the Japanese cohort remained in the same class, an indication that this source of bias is limited.

Our outcome was current smoking, a measure often used in similar studies.[9,29] A quantitative measure of smoking, such as pack-years would be beneficial but was unavailable.

Finally, the comparability of our cohorts from three affluent societies, a follow-up design as well as identical measures were advantage of this study of the development of socioeconomic differences in smoking. Nevertheless, caution is needed in the interpretation of similarities and differences in complex phenomena emerging from divergent temporal, cultural and social structural backgrounds, in our case Britain and Finland from Western Europe and Japan from the Far East with both modern and traditional influences.[57-58]

Conclusion

Our study showed large and persistent relative and absolute socioeconomic differences in smoking among middle-aged men and women from Britain and Finland. Widening relative socioeconomic differences was suggested over a relatively short follow-up. The observed socioeconomic differences in smoking will contribute to subsequent inequalities in lung and other smoking-related diseases and mortality.[13,52-54] Population approaches to smoking reduction should be augmented by policies to improve success across all social classes in Britain, Finland and Japan and to narrow socioeconomic differences in smoking in Britain and Finland.

Ethics

Ethical approvals have been received from the University College London ethics committee (Whitehall II study), the Department of Public Health, University of Helsinki and the City of Helsinki health authorities (Helsinki Health Study), while a committee of civil servants checked the contents and ethical aspects of the Japanese Civil Servant Study.

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Competing interests

There are no competing interests.

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Table 1. Distribution of occupational social class and prevalence of smoking among a) men and b) women from Britain, Finland and Japan at baseline and at follow-up (%).

			Prevalence of smoking	
			Baseline	Follow-up
		N	%	%
a) Men				
Britain	Managers	1622	13	9
	Professionals	1428	18	15
	Clerical employees	163	28	29
	All[1]	3213	16	13
Finland	Managers	608	20	15
	Professionals	255	21	17
	Clerical employees	138	42	38
	All	1024	24	19
Japan	Managers	83	32	27
	Professionals	694	43	37
	Clerical employees	456	43	36
	All	1369	43	36
b) Women				
Britain	Managers	278	9	6
	Professionals	498	13	12
	Clerical employees	361	17	13
	All	1137	13	11
Finland	Managers	1605	13	9
	Professionals	1131	17	12
	Clerical employees	2473	25	21
	All	5304	20	16
Japan	Managers	0	-	-
	Professionals	407	6	5
	Clerical employees	147	2	3
	All	624	5	5

[1]'All' row contains also missing data.

Table 2. Magnitude of relative differences in smoking by occupational social class among a) men and b) women from Britain, Finland and Japan at baseline and at follow-up. Relative Index of Inequality (RII) and 95% confidence intervals (95% CI).

		Model 1	Model 2	Model 3
		RII 95% CI	RII 95% CI	RII 95% CI
a) Men				
Britain	Baseline	2.50 (1.80, 3.46)	2.33 (1.67, 3.25)	2.28 (1.64, 3.18)
	Follow-up	3.60 (2.48, 5.22)	3.28 (2.25, 4.79)	3.23 (2.22, 4.72)
Finland	Baseline	3.08 (1.99, 4.78)	2.71 (1.74, 4.23)	2.47 (1.58, 3.87)
	Follow-up	4.09 (2.49, 6.72)	3.67 (2.20, 6.10)	3.55 (2.11, 5.95)
Japan	Baseline	1.15 (0.89, 1.49)	1.15 (0.89, 1.49)	1.13 (0.87, 1.46)
	Follow-up	1.26 (0.93, 1.70)	1.27 (0.94, 1.71)	1.24 (0.92, 1.67)
b) Women				
Britain	Baseline	2.32 (1.24, 4.32)	2.32 (1.24, 4.33)	2.29 (1.22, 4.31)
	Follow-up	2.42 (1.19, 4.91)	2.42 (1.19, 4.91)	2.30 (1.12, 4.72)
Finland	Baseline	2.98 (2.38, 3.74)	2.84 (2.27, 3.56)	2.78 (2.22, 3.48)
	Follow-up	4.13 (3.16, 5.41)	3.96 (3.03, 5.18)	3.80 (2.90, 4.98)
Japan	Baseline	0.31 (0.02, 4.10)	0.31 (0.02, 4.04)	0.31 (0.02, 4.06)
	Follow-up	0.39 (0.05, 2.93)	0.38 (0.05, 2.91)	0.39 (0.05, 3.01)

Model 1 adjusted for age
Model 2 adjusted for age and marital status
Model 3 adjusted for age, marital status, BMI and self-rated health

Table 3. Magnitude of absolute differences in smoking by occupational social class among a) men and b) women from Britain, Finland and Japan at baseline and at follow-up. Slope Index of Inequality (SII) and 95% confidence intervals (95% CI).

		Model 1 SII 95% CI	Model 2 SII 95% CI	Model 3 SII 95% CI
a) Men				
Britain	Baseline	0.14 (0.09, 0.20)	0.13 (0.08, 0.19)	0.13 (0.07, 0.18)
	Follow-up	0.15 (0.10, 0.20)	0.14 (0.09, 0.19)	0.13 (0.08, 0.18)
Finland	Baseline	0.27 (0.15, 0.40)	0.24 (0.11, 0.37)	0.23 (0.10, 0.36)
	Follow-up	0.27 (0.15, 0.40)	0.25 (0.12, 0.37)	0.24 (0.11, 0.36)
Japan	Baseline	0.06 (-0.05, 0.17)	0.06 (-0.05, 0.17)	0.06 (-0.06, 0.17)
	Follow-up	0.08 (-0.03, 0.19)	0.08 (-0.03, 0.19)	0.07 (-0.03, 0.18)
b) Women				
Britain	Baseline	0.11 (0.04, 0.18)	0.11 (0.04, 0.18)	0.10 (0.03, 0.17)
	Follow-up	0.10 (0.03, 0.16)	0.10 (0.04, 0.16)	0.11 (0.04, 0.17)
Finland	Baseline	0.18 (0.14, 0.22)	0.18 (0.14, 0.22)	0.17 (0.13, 0.20)
	Follow-up	0.18 (0.15, 0.22)	0.18 (0.14, 0.21)	0.17 (0.13, 0.20)
Japan	Baseline	-0.05 (-0.16, 0.05)	-0.05 (-0.15, 0.05)	-0.05 (-0.16, 0.05)
	Follow-up	-0.04 (-0.13, 0.04)	-0.05 (-0.13, 0.03)	-0.05 (-0.14, 0.03)

Model 1 adjusted for age
Model 2 adjusted for age and marital status
Model 3 adjusted for age, marital status, BMI and self-rated health