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Do different measures of early life socioeconomic circumstances predict adult mortality? Evidence from the British Whitehall II and French GAZEL studies

Silvia Stringhini [1 *] , Aline Dugravot [1] , Mika Kivimaki [2] , Martin J. Shipley [2] , Marie Zins [1] , Marcel Goldberg [1] , Jane E. Ferrie [2] , Archana Singh-Manoux [1 2 3]

[1] *CESP, Centre de recherche en épidémiologie et santé des populations INSERM : U1018 , Université Paris XI - Paris Sud , Université de Versailles Saint-Quentin-en-Yvelines , INED , FR*

[2] *Department of Epidemiology and Public Health University College of London (UCL) , 1-19 Torrington Place London WC1E 6BT,GB*

[3] *Centre de Gérontologie Assistance publique - Hôpitaux de Paris (AP-HP) , Hôpital Sainte Périne , FR*

* Correspondence should be adressed to: Silvia Stringhini <silvia.stringhini@inserm.fr >

Abstract

Background

Father's occupational position, education and height have all been used to examine the effects of adverse early life socioeconomic circumstances on health, but it remains unknown whether they predict mortality equally well.

Methods

We used pooled data on 18393 men and 7060 women from the Whitehall-II and GAZEL cohorts to examine associations between early life socioeconomic circumstances and all-cause and cause-specific mortality.

Results

During the 20-year follow-up period, 1487 participants died. Education had a monotonic association with all mortality outcomes, the age, sex and cohort adjusted Hazard Ratio (HR) for the lowest versus the highest educational group was 1.45 (95% Confidence Interval (CI): 1.24,1.69) for all-cause mortality. There was evidence of a U-shaped association between height and all-cause, cancer and cardiovascular mortality, robust to adjustment for the other indicators (HR=1.41; 95% CI: 1.03,1.93 for those shorter-than-average and HR=1.36; 95% CI: 0.98,1.88 for those taller-than-average for cardiovascular (CVD) mortality). Greater all-cause and cancer mortality was observed in participants whose father's occupational position was manual rather than non-manual (HR=1.11; 95% CI: 1.00,1.23 for all-cause mortality), but the risks were attenuated after adjusting for education and height.

Conclusions

The association between early life socioeconomic circumstances and mortality depends on the socioeconomic indicator used and the cause of death examined. Height is not a straightforward measure of early life socioeconomic circumstances as taller people do not have a health advantage for all mortality outcomes.

Author Keywords Body height ; early life ; cohort studies ; education ; mortality ; occupational position

MESH Keywords Adult ; Aged ; Cardiovascular Diseases ; mortality ; Cause of Death ; Cohort Studies ; Female ; Follow-Up Studies ; France ; epidemiology ; Great Britain ; epidemiology ; Humans ; Male ; Middle Aged ; Neoplasms ; mortality ; Occupations ; Proportional Hazards Models ; Risk ; Risk Factors ; Social Class

Social inequalities in health have been reported and documented for several decades [1 ,2], both in high- and low-income countries[3]. A key finding is the existence of a social gradient, in that there is a finely graded association between indicators of socio-economic position (SEP) and health [4 –7]. Another finding is that socioeconomic circumstances across the lifecourse are associated with adult health outcomes[8]. At least three conceptual models have been identified within the lifecourse framework to explain the association between health and socioeconomic circumstances over the lifecourse[9]. These are the critical or sensitive periods model, the accumulation model, and the pathways model. The critical or sensitive periods model views specific biological (e.g. low birthweight) or developmental factors at critical or sensitive periods of development to have a lifelong influence on health; the term sensitive period is used when the effects of adverse exposures are more amenable to modification. The accumulation model proposes that disadvantage at different points in the lifecourse has a cumulative dose–response association with health. The pathway model views early environment to be important, but only because it shapes and influences the socioeconomic trajectories of individuals. The three lifecourse models are not competing hypotheses, as it has been shown that they are interrelated in such a way that it is impossible to disentangle them empirically [10 ,11]. In this paper, we focus on the effects of early life socioeconomic circumstances on health, without trying to separate the effect of early life SEP from the effect of adult or lifecourse SEP.

Adverse childhood socioeconomic circumstances have been found, even in recent studies involving young cohorts, to be related to higher mortality for stomach, liver and lung cancer and for coronary heart disease (CHD), stroke and chronic obstructive pulmonary disease [12 –14]. Some studies[12] have found childhood socioeconomic circumstances to be weak predictors of adult mortality, especially cancer mortality[15], particularly in analysis adjusted for adult SEP [12].

Much research on the impact of early life socioeconomic circumstances uses retrospective measures or adult recall of socioeconomic circumstances earlier in the lifecourse in order to examine their impact on adult health. The particular measure of early life SEP used depends most often on what is available in a study. Measures of parental education and occupation have been used most often[12 ,16 –21], but studies have also used diverse markers such as housing conditions [22], childhood diet[18 ,23], education [15 ,24 –30] or anthropometric measures like adult height or leg length [15 ,16 ,27 ,31 –35]. In this paper, we view early measures of socioeconomic position to reflect the period of life before the beginning of adult professional life. We use three measures of early life circumstances, father's occupational position, education, which being set early in life is considered to be an indicator of socioeconomic circumstances in early life [36], and height, which reflects cumulative effects of health conditions and disease load experienced during childhood and thus provides a proxy measure of childhood socioeconomic and environmental conditions[16].

This study has two objectives. First, to analyze three indicators of early life socioeconomic circumstances; father's occupational position, education and height, as predictors of mortality using pooled data from two occupational cohorts, the British Whitehall II study and the French GAZEL study. Second, to examine the associations of these measures of early life socioeconomic circumstances with specific causes of mortality.

MATERIAL AND METHODS

Study Population

The Whitehall II study was established in 1985 as a longitudinal study to examine the socioeconomic gradient in health and disease among 10,308 civil servants (6,895 men and 3,413 women)[37]. All civil servants aged 35–55 years in 20 London based departments were invited to participate by letter, 73% agreed. Baseline examination (Phase 1) took place during 1985–1988, and involved a clinical examination and a self-administered questionnaire containing sections on demographic characteristics, health, lifestyle factors, work characteristics, social support and life events. Participants were followed-up for mortality until 2008. The University College London Ethics Committee approved the study.

The GAZEL study was established in 1989, on employees of France's national gas and electricity company: Electricité de France-Gaz de France (EDF-GDF). Further details of this study can be found elsewhere [38]. At baseline, 20,625 (15,011 men and 5,614 women), aged 35–50, gave consent to participate in this study. The study design consists of an annual questionnaire used to collect data on health, lifestyle, individual, familial, social and occupational factors and life events. Participants were followed-up for mortality until 2008. The GAZEL study received approval from the national commission overseeing ethical data collection in France (Commission Nationale Informatique et Liberté).

Data from these two studies were pooled. Both cohorts were set up in the late eighties and the mortality follow-up covers broadly the same period. Male participants in both cohorts are of a similar age but the women in GAZEL are on average 3.8 years younger. Participants in both cohorts have stable jobs; the GAZEL study is composed of both blue and white collar workers and Whitehall II only of white collar workers.

Measures

Father's occupational position was assessed at the baseline survey in both studies. In Whitehall II it was assessed with the question " What is/was your father's main job, what kind of work does/did he do in it", coded basing on the Registrar General's Occupational position classification and then categorized as non-manual (I–II–III NM) and manual (III M-IV–V). In the GAZEL study it was assessed with the question "Which is /was your father's occupation", coded basing on the classification provided by the French National Institute of Statistics and Economic Studies (INSEE, http://www.insee.fr/fr/methodes/default.asp?page=nomenclatures/pcs2003/liste_n1.htm) and then categorized as non-manual or manual.

Education was assessed as the highest qualification attained while in full-time education and grouped in 3 categories: university degree, higher secondary school, lower than higher secondary school. The Whitehall II measure of education was drawn from Phase 5(1997–1999) as this measure was more detailed than the baseline measure. For non-responders at Phase 5 we used the baseline measure of education. In GAZEL, education was assessed at baseline.

Height was measured, in Whitehall II, to the nearest millimeter at the baseline medical screening using a stadiometer with the participant standing completely erect with the head in the Frankfort plane. In the GAZEL study, height was self reported to the nearest

centimeter in the baseline questionnaire. For the analysis, height was divided into 3 categories, separately in men and women and in the two cohorts, with the mid category composed of those of mean height ± 2cm and the other two categories representing those taller and shorter than those in the mean± 2cm category.

Mortality

Whitehall II

10,297 (99.9 %) respondents were traced for mortality through the national mortality register kept by the National Health Services Central Registry, by using the National Health Service identification number assigned to each British citizen. Mortality follow-up, including the causes of death, was available until 31st January, 2008; a mean of 20.3 years.

GAZEL

All participants were traced for mortality and information on vital status was obtained from EDF-GDF itself as it pays out retirement benefits. Data were available until 28th February 2008, a mean of 18.7 years, for all-cause mortality. In France, information on the underlying causes of death, recorded by France's national death registry (INSERM-CépiDC), is available two years later than the data on all-cause mortality. Therefore, data on specific causes of death were available until 29th December, 2005.

For both cohorts, we analyzed all-cause mortality, cancer mortality, Cardiovascular Disease (CVD) mortality, CHD mortality and other mortality (non cancer and non CVD). The International Classification of Disease (ICD) codes used to define Cancer were 140.0–209.9 (ICD 9) and C00-C97 (ICD 10), to define CVD were 390.0–458.9 (ICD 9) and I00-I99 (ICD 10), and to define CHD were 410.0–414.9 (ICD 9) and I20-I25 (ICD 10).

Statistical Analysis

We pooled data from the two cohorts to obtain sufficient statistical power for the analysis. As a preliminary step we undertook initial analyses on the two cohorts separately and then, using the pooled data, we tested the interaction terms between measures of early life socioeconomic circumstances and cohort for each mortality outcome. These analyses showed no evidence of any difference in the association between socioeconomic circumstances and mortality between the two cohorts, allowing us to estimate the effects of early life socioeconomic circumstances using pooled data from the two cohorts. We tested the interaction terms between the measures of early life socioeconomic circumstances and sex for each mortality outcome. No significant interactions were found, so data for men and women were analyzed together. We examined the extent to which the three measures of socioeconomic circumstances were associated with each other using Pearson's chi-squared test. We examined the age standardized mortality rates per 1,000 person-years for each indicator - father's occupational position, education and height categories - for all cause and cause-specific mortality.

Cox regression was used to estimate Hazard Ratios (HR) and their 95 percent confidence intervals (CI) for the associations between measures of early life socioeconomic circumstances and mortality. Participants were censored at the date of death or at the end of follow-up, whichever occurred first. For cause-specific analysis, GAZEL participants were censored at the date of death or at 29th December 2005. Each measure, father's occupational position, education and height, was first analyzed separately with adjustment for age, sex and cohort. Subsequently, in order to assess whether the SEP markers were associated with mortality independently of each other all measures of early life socioeconomic circumstances were entered simultaneously into the Cox model in addition to age, sex and cohort. Tests for linear trend across categories of early life socioeconomic circumstances were performed by entering them as continuous variables. The proportional hazard assumptions associated with Cox regression were tested by use of Schoenfeld residuals and found not to be violated at P =0.05.

All analyses were performed using statistical software STATA 10, StataCorp LP, Texas, USA.

RESULTS

Participants with missing data on father's occupational position (1,914), education (1,626) and height (3,109), or not followed-up for mortality (12), categories not mutually exclusive, were excluded from the analysis. In total, 18,393 men (84.0% of men at baseline) and 7,060 women (78.2% of women at baseline) were included in the analysis presented here. Those excluded tended to be shorter (169.5 cm vs. 171.2 cm, P <0.001), more likely to have a father with a manual occupation (57% vs. 54%, P =0.006), and less educated (31% vs. 29% with no higher secondary education, P <0.001). The excluded men were not different in age to those included (44.0 vs. 44.0 years, P = 0.89), but excluded women were older than included women (43.0 vs. 42.7 years, P <0.01). For three individuals the specific cause of death was unknown and they have been excluded from the cause-specific analysis.

Table 1 shows the sample characteristics. As expected, the cohorts have marked differences in father's occupational position and education with Whitehall II being the more advantaged cohort. For father's occupational position, the majority of the Whitehall II participants (60.9% of men and 50.6 % of women) reported non-manual occupations whereas the majority of the GAZEL participants

(61.9% of men and 55.7% of women) reported their father to have a manual occupation. All three markers of early life socioeconomic circumstances were closely related. In both studies, participants whose father had a non-manual occupation or participants with a higher education tended to be taller (P <0.001, results not shown). Similarly, participants with a higher education were more likely to report father 's occupation as non-manual (P <0.001, results not shown).

A total of 389 men and 185 women in Whitehall II and 772 men and 141 women in GAZEL died during the follow-up. The mortality rate for men was the same in both cohorts (3.3 per 1,000 person-years) but higher in Whitehall II than in GAZEL for women (3.5 vs. 1.7 per 1,000 person-years). Information on the underlying cause of death was available for 571 of the 574 deaths in Whitehall II participants and 716 out of 913 in GAZEL.

Table 2 shows the mortality distribution across the measures of early life socioeconomic circumstances for all-cause mortality. As mortality was lower in the average-height category (mean±2cm) it was taken to be the reference category for height; for other indicators, non-manual father's occupational position and university degree were the reference categories. In the analysis adjusted for age, sex and cohort, participants whose father had a manual occupation had a slightly higher risk of death (HR = 1.11; 95% CI: 1.00, 1.23) compared to those whose father's had a non-manual occupation. The risk was attenuated after adjusting for education and height. The association between education and mortality was robust and only slightly attenuated after adjustment for height and father's occupation. The test for trend suggested a linear association between education and mortality (P ≤0.001). The Cox regression suggested some evidence of higher mortality in the shorter-than-average (HR = 1.17; 95% CI: 1.02, 1.34) and taller-than-average individuals (HR = 1.16; 95% CI: 1.01, 1.34). These associations remained unchanged after adjustment for the other measures of early life socioeconomic circumstances.

Table 3 shows analyses using cancer mortality as the outcome. The associations were largely similar to those for all-cause mortality. Participants whose father had a manual occupation had a 19% (95% CI: 1.01, 1.39) higher risk of dying from cancer. Compared to participants with a university qualification, those with less than higher secondary education had 60% (95% CI: 1.26, 2.04) higher risk of death. The U-shaped association between height and mortality was also evident (HR = 1.24; 95% CI: 1.01, 1.53 for the shorter-than-average and HR = 1.30; 95% CI: 1.05, 1.61 for the taller-than-average). The associations between height and cancer mortality were not reduced after adjusting for the other measures of early life socioeconomic circumstances.

Table 4 presents the association between early life socioeconomic circumstances and CVD mortality, with CHD as a separate sub-category. The lowest education group had greater risk of CVD mortality in the fully adjusted model (HR = 1.41; 95% CI: 1.01, 1.97) and there was some evidence of a dose-response effect (P =0.06). Shorter-than-average individuals had a greater risk of CVD mortality (HR = 1.41; 95% CI: 1.03, 1.93) and there was also an indication of excess risk of CHD mortality (HR = 1.40; 95% CI: 0.94, 2.09). Similarly, there was some evidence of excess CVD (HR = 1.36; 95% CI: 0.98, 1.88) but not CHD (HR = 0.97; 95% CI: 0.62, 1.51) mortality among the taller-than-average individuals. Finally, Table 5 presents the results for other causes of death, or non cancer and non CVD mortality. Although none of the results were significant at the P <0.05 level, the pattern of results was similar to that for all-cause mortality, except for height which tended to be inversely associated with mortality.

DISCUSSION

This study, using pooled data from two populations followed-up for approximately 20 years, shows that three markers of early life socioeconomic circumstances, father's occupational position, education and height, are differently related to mortality and may therefore capture different aspects of early life conditions. The three measures were correlated with each other but their predictive ability was different, with education being the only indicator consistently associated with mortality. Participants whose father had a manual occupation had a slightly higher risk of all-cause and cancer mortality. There was evidence of a U-shaped association between height and all-cause mortality, cancer mortality and CVD mortality.

Father's occupational position

Participants whose father had a manual compared to a non-manual occupation were in general at higher risk of mortality. This excess risk was greatly attenuated when adjusted for the effects of education and height. Further analyses (not shown) revealed the attenuation to come primarily from adjustment for education, as has been reported previously[19]. Sensitivity analyses with finer categorization of father' s occupation did not show any evidence of a dose-response association with mortality.

Education

Education had the most consistent association with mortality, with evidence of excess mortality in the lower education groups for all mortality outcomes examined. In general terms, there was a dose-response association between education and mortality. This association was not reduced after adjustment for father's occupational position and height and this can be explained in different ways. First, education strongly relates to adult socioeconomic position and thus material conditions in adulthood[39]. Second, education is thought to have a direct effect on health through health behaviors[40]. Finally, education is easier to measure accurately and to assign to individuals than

several other SEP indicators[39], and misclassification is less likely to occur. The role of education in predicting mortality was especially marked for cancer mortality.

Height

Our data suggest a U-shaped association between height and mortality. Adult height is often used as a proxy measure of early life socioeconomic circumstances with the assumption that short stature results from poor circumstances in utero or during early life [12 ,41]. This hypothesis has been supported by results showing an inverse association between adult height and all-cause mortality, cardiovascular mortality and other causes of death related to early life conditions [31 ,32 ,42 ,43]. This has led to the assumption of a linear association between height and health. Our data show this to be the case for CHD mortality, as in other studies [44]. In a sub-sample of the Whitehall II study (N=4,546) we had data on components of height. Analyses using these data showed leg length to have a linear association with CHD mortality, one standard deviation decrease in leg length was associated with 25% excess risk of CHD mortality (95% CI = −23% to 103%).

Our results on CVD mortality do not suggest a linear association with height. Although short people were at higher risk for CVD mortality, as has been shown previously [32 ,44], tall people were also found to be at higher risk compared to people of average stature. The U-shaped association could be explained by the inclusion of a range of causes of death considered under CVD mortality. For instance, previous research suggests greater risk of aortic aneurysm among the tall individuals [45]. On the other hand, studies on stroke incidence [46] and stroke mortality [31] suggest greater risk among the shorter individuals.

Our study supports existing literature on the higher risk of cancer mortality among the taller individuals. This finding has been shown consistently for breast cancer, colorectal cancer, prostate cancer and cancers not related to smoking [47]. Several plausible mechanisms have been suggested for the association between height and cancer. For example, taller people have larger organs and therefore their chances of dividing stem cells undergoing transformation to malignancy might be raised; some genetic factors linked with height may also be tied to tumor risk; and height might reflect early life dietary or metabolic factors that affect cancer risk [47].

We also found a higher risk for cancer mortality among those shorter than the average. There is some evidence of greater risk among the shorter individuals for certain cancers, as gastrointestinal cancers [48] or cervical cancer [32], but results remain inconsistent. In the Whitehall II sub-sample for which components of height were examined, trunk length seemed to be better related to cancer mortality than leg length, for instance a standard deviation increase in trunk length was associated with 20% greater mortality (95% CI: −3% to 47%). The U-shaped relationship between height and mortality could also be explained by the fact that some cancers, such as smoking related or esophagus and stomach cancers, have been related to low SEP and others, such as breast and colon cancer and skin melanoma to high SEP [49].

As suggested in previous research [12 ,31 ,32 ,41 –43 ,47 ,50 ,51], the association between short stature and mortality seems to be driven by living conditions in early life while the association between greater stature and mortality is probably explained by other non-social mechanisms. Therefore, height can be a misleading indicator of early life socioeconomic circumstances when used in relation to mortality. Mechanisms behind the relation of height with mortality still need to be understood, and further research on this topic is needed.

Strengths and limitations

The major strength of this study is that it uses data from two different populations, allowing sufficient power to examine the differential predictive ability of the three markers of early life socioeconomic circumstances for premature adult mortality. However, there are several potential limitations to this study that should be considered in interpreting results. Pooling data from two cohorts increased power in the analysis, but the measures used in this study are not identical in the two populations. In an effort to harmonize the measures we have used broad categories for the indicators of early life socioeconomic circumstances. Given the size of the original cohorts, the GAZEL participants represented a much higher proportion (66%) of the study population. Results may therefore have been influenced more by the French GAZEL population even though the interaction term did not suggest any difference between the cohorts. Pooling all cancers is not an ideal strategy as social inequalities differ by cancer site. However, in the present study we did not have sufficient power to examine different cancers separately.

A major drawback of the majority of the studies in this domain, including ours, is that information on early life circumstances is collected through adult's recall. Moreover, in our study the question on father's occupation did not relate specifically to the participant's childhood. Two studies [52 ,53] have recently shown that adult's recall of father's occupational position during early life might be overestimated. Misclassification of father's occupation may lead to underestimation of its true effect on adult health [54]. In fact, other studies [19 ,55] where information on father's occupation was obtained from registers during early life showed a greater predictive ability of this measure for mortality. Other measurement limitations include the use of a self reported measure of height in the GAZEL study. A

study[56] conducted in 1999 on the validity of self reported height in the GAZEL study found that height was overestimated by approximately 0.40 cm. We created the height categories using measures to the nearest centimeter and it is unlikely that an overestimation of this magnitude could cause a significant bias in the estimations.

Analyses reported here were based on only 82% of participants. As participants not included had a lower socioeconomic profile, their exclusion may have led to some underestimation of the observed effects. Finally, it has to be considered that both occupational cohorts examined here differ from the majority of other studies as they are based on individuals with stable jobs. This implies that the part of the population who suffered adverse socioeconomic circumstances in early life and eventually ended up with temporary jobs or unemployed is not represented in this study.

Conclusions

Father's occupational position, education and height have all been used as indicators of early life socioeconomic circumstances. Our results suggest that their association with mortality 1) does not have the same shape, 2) depends on the cause of mortality being examined, and 3) underlying mechanisms linking them to health may not be the same.

WHAT THIS PAPER ADDS

What is already known on this subject?

Adverse childhood socioeconomic circumstances have been found, even in recent studies involving young cohorts, to be related to higher mortality from all-causes, stomach, liver and lung cancers and for coronary heart disease (CHD), stroke and chronic obstructive pulmonary disease.

What does this study add?

Our results show that the associations between the indicators of early life socioeconomic circumstances and mortality 1) do not have the same shape and 2) depend on the cause of mortality being examined.

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COMPETING INTERESTS None

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Table 1

Characteristics of Participants of the Whitehall II Study and the GAZEL Study

	COHORT WHITEHALL II			
	MEN (n=5,806)		**WOMEN (n=2,603)**	
Father's position N (%)				
Non Manual	3,539	(60.9)	1,317	(50.6)
Manual	2,267	(39.1)	1,286	(49.4)
Education N (%)				
University	1,876	(32.3)	456	(17.5)
Higher Secondary	1,556	(26.8)	582	(22.4)
Lower than Secondary	2,374	(40.9)	1,565	(60.1)
Height Mean (SD)				
Shorter than mean − 2cm	169.6	(3.7)	155.7	(3.5)
Mean ± 2cm	176.2	(1.2)	162.2	(1.1)
Taller than mean + 2cm	183.0	(3.8)	168.8	(3.8)
Age Mean (SD)	44.0	(6.0)	45.3	(6.1)
Mortality N (Rate*)	389	(3.3)	185	(3.5)
	COHORT GAZEL			
	MEN (n=12,587)		WOMEN (n=4,457)	
Father's position N (%)				
Non Manual	4,797	(38.1)	1,972	(44.3)
Manual	7,790	(61.9)	2,485	(55.7)
Education N (%)				
University	2,739	(21.8)	595	(13.4)
Higher Secondary	7,448	(59.1)	2,647	(59.4)
Lower than Secondary	2,400	(19.1)	1,215	(27.2)
Height Mean (SD)				
Shorter than mean − 2cm	168.5	(3.3)	156.9	(3.3)
Mean ± 2cm	174.6	(1.1)	162.5	(1.0)
Taller than mean + 2cm	180.9	(3.3)	168.2	(2.8)
Age Mean (SD)	44.1	(2.9)	41.3	(4.2)
Mortality N (Rate*)	772	(3.3)	141	(1.7)

SD= Standard Deviation

* Rate per 1,000 person-years

Table 2

Early life Socioeconomic Predictors of All-cause Mortality, the Whitehall II and GAZEL Studies (N=25,453)

			Adjusted for age, sex and cohort		Fully Adjusted**	
Early life socioeconomic measures	**Deaths**		**HR (CI 95%)**		**HR (CI 95%)**	
	N	**Rate***				
Father's occupational position						
Non Manual	641	(2.86)	1.00	-	1.00	-
Manual	843	(2.96)	1.11	1.00, 1.23	1.05	0.95, 1.17
Education						
University	251	(2.29)	1.00	-	1.00	-
Higher Secondary	700	(3.02)	1.38	1.19, 1.59	1.36	1.17, 1.58
Lower than Secondary	536	(3.66)	1.45	1.24, 1.69	1.42	1.22, 1.66
Height (cm)						
Shorter than mean − 2cm	656	(3.24)	1.17	1.02, 1.34	1.16	1.01, 1.33
Mean ± 2cm	319	(2.73)	1.00	-	1.00	-
Taller than mean + 2cm	512	(3.04)	1.16	1.01, 1.34	1.17	1.02, 1.34

* Age adjusted rate per 1,000 person-years

** Adjusted for age, sex, cohort and mutually adjusted.

Table 3

Early life Socioeconomic Predictors of Cancer Mortality, the Whitehall II and GAZEL Studies (N=25,450)

			Adjusted for age, sex and cohort		Fully Adjusted**	
Early life socioeconomic measures	**Deaths**		**HR (CI 95%)**		**HR (CI 95%)**	
	N	**Rate***				
Father's occupational position						
Non Manual	276	(1.23)	1.00	-	1.00	-
Manual	378	(1.37)	1.19	1.01, 1.39	0.92	0.76, 1.11
Education						
University	98	(0.90)	1.00	-	1.00	-
Higher Secondary	310	(1.34)	1.59	1.26, 2.01	1.56	1.24, 1.98
Lower than Secondary	246	(1.68)	1.60	1.26, 2.04	1.55	1.22, 1.99
Height (cm)						
Shorter than mean − 2cm	284	(1.40)	1.24	1.01, 1.53	1.23	1.00, 1.51
Mean ± 2cm	131	(1.12)	1.00	-	1.00	-
Taller than mean + 2cm	239	(1.42)	1.30	1.05, 1.61	1.31	1.06, 1.62

* Age adjusted rate per 1,000 person-years

** Adjusted for age, sex, cohort and mutually adjusted.

Table 4

Early life Socioeconomic Predictors of CVD and CHD Mortality, the Whitehall II and GAZEL Studies (N=25,450)

			Adjusted for age, sex and cohort		Fully Adjusted**	
Early life socioeconomic measures	**Deaths**		**HR (CI 95%)**		**HR (CI 95%)**	
	N	**Rate***				
CVD Mortality						
Father's occupational position						
Non Manual	146	(0.65)	1.00	-	1.00	-
Manual	144	(0.50)	0.95	0.75, 1.20	0.90	0.71, 1.14
Education						
University	56	(0.51)	1.00	-	1.00	-
Higher Secondary	112	(0.47)	1.24	0.89, 1.72	1.26	0.91, 1.46
Lower than Secondary	122	(0.83)	1.37	0.99, 1.90	1.41	1.01, 1.97
Height (cm)						
Shorter than mean − 2cm	131	(0.65)	1.41	1.02, 1.93	1.41	1.03, 1.93
Mean ± 2cm	55	(0.47)	1.00	-	1.00	-
Taller than mean + 2cm	104	(0.62)	1.36	0.98, 1.88	1.36	0.98, 1.88
CHD Mortality						
Father's occupational position						
Non Manual	82	(0.36)	1.00	-	1.00	-
Manual	78	(0.28)	0.93	0.67, 1.27	0.87	0.63, 1.20
Education						
University	33	(0.30)	1.00	-	1.00	-
Higher Secondary	61	(0.26)	1.16	0.75, 1.79	1.19	0.76, 1.84
Lower than Secondary	66	(0.45)	1.32	0.86, 2.02	1.35	0.87, 2.09
Height (cm)						
Shorter than mean − 2cm	80	(0.39)	1.40	0.94, 2.09	1.40	0.94, 2.09
Mean ± 2cm	34	(0.29)	1.00	-	1.00	-
Taller than mean + 2cm	46	(0.27)	0.97	0.62, 1.51	0.97	0.62, 1.51

* Age adjusted rate per 1,000 person-years

** Adjusted for age, sex, cohort and mutually adjusted.

Table 5

Early life Socioeconomic Predictors of Non Cancer and Non CVD Mortality, the Whitehall II and GAZEL Studies (N=25,450)

			Adjusted for age, sex and cohort		Fully Adjusted**	
Early life socioeconomic measures	**Deaths**					
	N	**Rate***	**HR (CI 95%)**		**HR (CI 95%)**	
Father's occupational position						
Non Manual	146	(0.65)	1.00	-	1.00	-
Manual	197	(0.73)	1.13	0.91, 1.41	1.09	0.87, 1.36
Education						
University	69	(0.63)	1.00	-	1.00	-
Higher Secondary	148	(0.64)	1.04	0.78, 1.40	1.02	0.76, 1.37
Lower than Secondary	126	(0.86)	1.30	0.96, 1.76	1.26	0.92, 1.71
Height (cm)						
Shorter than mean − 2cm	158	(0.78)	1.14	0.87, 1.49	1.13	0.86, 1.48
Mean ± 2cm	79	(0.67)	1.00	-	1.00	-
Taller than mean + 2cm	106	(0.63)	0.97	0.73, 1.30	0.98	0.73, 1.31

* Age adjusted rate per 1,000 person-years

** Adjusted for age, sex, cohort and mutually adjusted.