

Importance of the psychosocial environment in epidemiologic studies

by Michael Marmot, PhD¹

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It has been common for the starting point of occupational health studies to be the disease risks associated with particular occupations. The research effort then focuses on features of the work environment that might be exposures for the particular disease. The starting point of this paper has been different; it is the inverse social gradient in morbidity and mortality observed in all industrialized (and nonindustrialized) countries. In Great Britain, it has been usual for the socioeconomic classification to be based on occupation. This usage raises the question of how much of the social gradient in disease is related to the circumstances under which people work, and how much to living circumstances, acting through the life course. This paper illustrates how attention to psychosocial factors in the workplace and outside have the potential to reduce the burden of ill health for working people and to diminish the social gradient in morbidity and mortality.

Key terms control, early life, morbidity, mortality, relative deprivation, social inequalities, work environment.

Social inequalities in health are of profound importance in all countries. In industrialized countries, occupation is commonly used as a measure of socioeconomic position. This usage raises the question of the extent to which occupation itself is a contributor to inequalities in health. I wish to place this question in the broader context of approaches to the explanation of inequalities in health.

Poverty or inequality?

There are undoubted pockets of poverty in rich countries that are associated with worse health. In the United States, for example, a comparison of life expectancy by county showed that the longest life expectancy for men was in Utah, 77.5 years, and the shortest was 62.2 years for men in the District of Columbia. There is an undoubted effect of poverty represented. But inequality is also important. Figure 1 illustrates with data from the 25-year follow-up of British civil servants in the original Whitehall study and shows the social gradient in all-cause

mortality (1). These men were all in stable employment, in white-collar occupations, in and around London, and none was in poverty in any absolute sense of that word. Yet there is a gradient in mortality. Each grade in the civil service has higher mortality rates than the grade above it in the hierarchy. This figure shows the data for all-cause mortality, but there are similar gradients for all the major causes of death (2).

This social gradient in mortality is similar to that observed for morbidity. Our 2nd study of civil servants, the Whitehall II study, showed gradients in self-reported health, in diagnoses of a variety of diseases, and in sickness absence rates (3, 4). The evidence from Whitehall suggests that inequality is important: place in the hierarchy appears to predict risk of death and disease.

This conclusion is similar to Wilkinson's (5). He observed that, for the rich countries, above a gross national product of around USD 5000 per capita, there is little relation between the average gross national product and life expectancy. There is a strong relation with income inequality. This relation between income inequality and mortality has also been shown for states of the United States (6, 7).

¹ International Centre for Health and Society, Department of Epidemiology and Public Health, University College London, London, United Kingdom.

Correspondence to: Professor Michael Marmot, International Centre for Health and Society, Department of Epidemiology and Public Health, University College London, 1–19 Torrington Place, London WC1E 6BT, United Kingdom. [E-mail: ichs@Public-health.ucl.ac.uk]

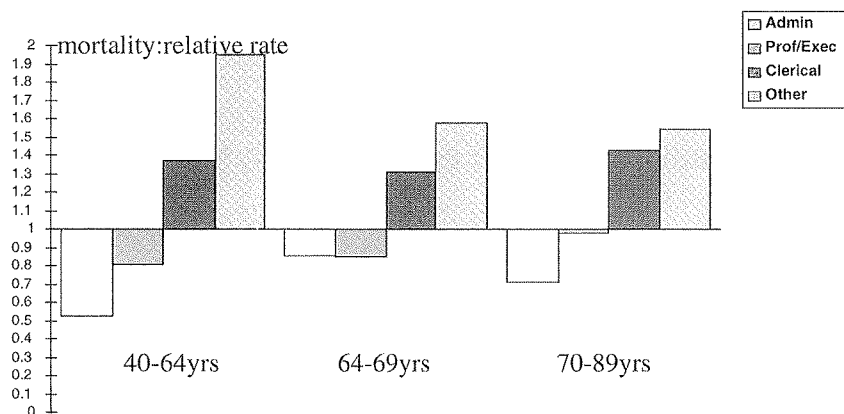


Figure 1. All-cause mortality by grade of employment of Whitehall men in a 25-year follow-up (1). (Admin = administration, Prof/Exec = professional or executive, yrs = years)

Psychosocial or material causes of inequalities

In Great Britain, there has been lively debate as to how many of the causes of inequalities in health are material or psychosocial. There is a good case to be made that material deprivation in one way or another accounts for the link between poverty and ill health. Even then, material deprivation may have an important psychosocial component. The ways of doing without in Great Britain, at least, have changed (Alan Marsh, personal communication). Whereas in the past, material deprivation meant inadequate housing, undernutrition, inadequate clothing, risky workplaces, now the definition of what it means to

be on the "bread line" has broadened. It also means inability to entertain children's friends, buy children new clothes, go on holiday, pursue a hobby or leisure-time activity. In other words, material deprivation in a modern context may mean inability to participate fully in society and to control one's life.

Thus there is a link with the concept of relative deprivation that may underlie the social gradient. The mechanisms linking social position to health, across the whole social gradient, are likely to involve psychosocial factors. Among the psychosocial factors with the strongest evidence to support their role in generating inequalities in health are social supports or social integration, the

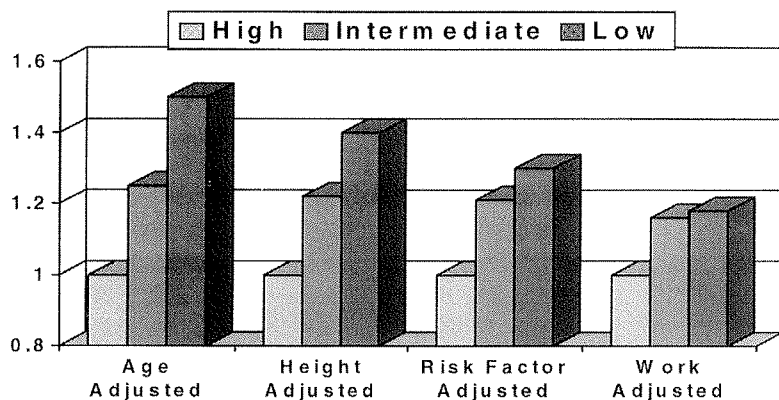


Figure 2. Odds ratios for new cases of coronary heart disease in the Whitehall II study by employment grade (high = administration, intermediate = professional or executive, low = clerical or other) among the men (17).

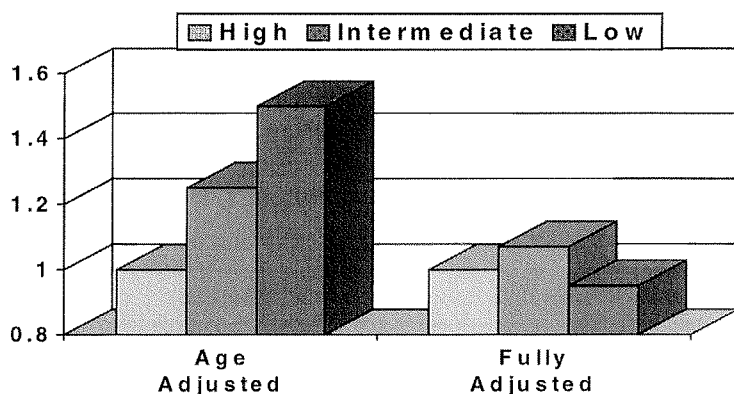


Figure 3. Odds ratios for new cases of coronary heart disease in the Whitehall II study by employment grade (high = administration, intermediate = professional or executive, low = clerical or other) adjusted for age and then fully adjusted for the combined effects of height, coronary risk factors and low control at work among the men (17).

psychosocial work environment, control or mastery, and hostility. The influence of early life will be touched on later.

Social supports or integration

Lisa Berkman (8) has reviewed the evidence for the strong and consistent protective effect of participation in social networks and of social supports. Evidence from the Whitehall II study shows that the lower the position in the hierarchy, the less participation in social networks outside the family and the more negative the degree of social support (9).

Data from Central and Eastern European countries showed that the adverse trend in mortality affected particularly men who were single, widowed, or divorced (10, 11). The adverse effect was not seen for women. One possible explanation for this finding is that marriage provided the main source of support for men in societies in which other forms of social participation were weak (12). Women, on the other hand, were more likely to participate in informal social networks, at least in part, because barter and other forms of informal exchange were mechanisms that allowed families to function.

Psychosocial work environment

The 2 dominant models in the field of the psychosocial work environment are the demand-control model (13) and that of effort-reward imbalance. (14)

In the Whitehall II study, along with a number of other studies (15), the demand dimension did not predict coronary heart disease. Low control in the workplace was an important predictor of incidence rates of coronary heart disease (CHD) (16). Figure 2, from the Whitehall II study, shows the social gradient in the occurrence of incident CHD events (17) and the contribution of 3 sets of factors, taken one at a time in explaining this social gradient. Short height, as a measure of early life effects, is a predictor of CHD incidence and makes a small contribution to explaining the social gradient. As in Whitehall I, the standard coronary risk factors, serum cholesterol, blood pressure, smoking, body mass index, and physical activity, accounted for between 1/4 and 1/3 of the social gradient. More than 1/2 the gradient appeared to be accounted for by low control in the workplace. Figure 3 shows that, in a multivariate analysis, the combination of height, coronary risk factors, and low control in the workplace appear to provide a complete explanation for the social gradient in the occurrence of CHD.

Using the same methods, but in a very different population in the Czech Republic, we had remarkably similar findings. A combination of coronary risk factors and low control in the workplace provided an explanation for the association between low education and the risk of myocardial infarction (18).

In discussing these findings, we noted that there are, of course, social gradients in the occurrence of CHD among people who are not working. This fact does not negate the importance of low control. It does not derive only from the workplace. Low control may be a feature of the social conditions under which people live, as well as work.

Control or mastery

There is a large amount of literature on the subject of control or mastery (19). It tends to view low control as a characteristic of individual persons. Indeed, our work from Central and Eastern Europe would confirm that people who report low control have worse health (20). It may be possible to characterize whole societies on the degree of control. Figure 4 plots the mean control for population subgroups against CHD disease rates for whole populations in an "ecological" analysis. It shows that the higher the mean level of control of a society, the lower the CHD rates.

Hostility

Redford Williams (21) has produced similar findings for hostility. He and others have shown that hostile people have a higher risk of CHD than those who are not hostile. If hostility is viewed as a stable trait of a person, there is no particular reason why it should be related to the environment. Williams did a Gallup survey of 10 American cities and showed that they differed in mean hostility levels. He showed further that there was a direct correlation between the mean hostility of a city and the mortality from CHD in the city (22).

Early life or current circumstances?

There is ample evidence that factors in the current environment of adults affects their disease rates. Change these and disease rates change. Evidence on giving up smok-

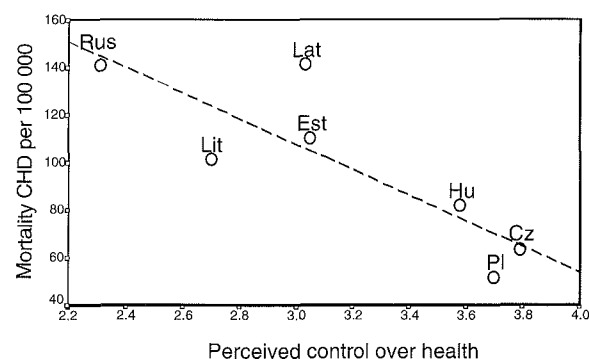


Figure 4. Standardized mortality from coronary heart disease between the ages of 0–64 years. (Rus = Russia, Lit = Lithuania, Lat = Latvia, Est = Estonia, Hu = Hungary, Cz = Czech Republic, Pl = Poland)

ing or lowering cholesterol or blood pressure show that coronary heart disease rates can change within 5 years. The changing social class distribution of disease does not show a birth cohort pattern and therefore suggests that it is likely to be the result of change in adult circumstances.

Barker's group (23) in the United Kingdom has provided strong evidence for the programming hypothesis. The in utero environment programs organ systems of the developing fetus that change the person's likelihood of developing chronic disease later in life. There is good evidence that early life experiences, beyond birth, affect mental illness later in life (24, 25). It seems likely that there will be effects on physical illness as well. This assumption has been confirmed by the British birth cohorts studies. There are substantial effects of early life that continue to influence disease risk later in life (26–28). Working with data from the 1958 birth cohort, Power et al (29) showed that it is the accumulation of advantage and disadvantage throughout the life course that accounts for inequalities in health in adulthood. This finding has led to an interest in the life course approach to chronic disease (30).

One particular feature of early life that has been the focus of much attention is education. Education, as a marker of socioeconomic status, has been shown in a large variety of studies to be related to morbidity and mortality. One feature of these results is that, to some extent, it deals with the health selection argument, in that educational status is determined long before the major killing diseases of middle and later life have started to become manifest. This statement does not necessarily mean that education per se is the determinant of socioeconomic differences in health the outcomes. There is a strong link between social deprivation and the outcome of education, measured as examination results (31). Education may therefore be a marker of the relative degree of deprivation. There is some evidence that equal expenditure on education will benefit more children from advantaged backgrounds (32) (ie, it could lead to greater inequality in the outcome of educational achievement). One conclusion from the link between social deprivation and educational outcome has been to recommend that attention be paid to children's ability to benefit from school, in particular preschool education.

Where you are or who you are?

Examples of marked geographic differences in the occurrence of disease were given in the preceding discussion. A question that has exercised researchers is whether these differences are due to the composition of the areas (ie, the characteristics of persons who live there) or

whether context, social characteristics of the area itself, exerts an influence on health over and above the characteristics of the persons who live there. Where the focus is pollution of the air or water, there would be no doubt that there are area effects. Can the social environment be thought of in the same way? For example, crime rates tend to be high in deprived areas. Can worse health in those areas be ascribed to this area effect, or is it because there are more deprived persons in these areas. The evidence adduced by Wilkinson (33), Kawachi et al (34), Haan et al (35), and Macintyre et al (36) suggest that there is indeed an area effect that applies to both the social and the physical environment.

The data already presented for hostility and low control suggest that these characteristics can be used not only to characterize individual persons but also whole populations (37).

Implications for policy

In Great Britain, we have had what is called the Independent Inquiry into Inequalities in Health (chaired by a former Chief Medical Officer, Sir Donald Acheson), of which I am a member, and the report is due out in the next few weeks. It contains 39 recommendations of varying degrees of specificity. [Since the conference this has now been published (38).]

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