Commentary: Socioeconomic status and diabetes outcomes; what might we expect and why don’t we find it?

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The existence of a strong social gradient in health is well documented. Life expectancy is substantially more unfavourable in lower socio-economic groups, and this particularly applies to cardiovascular disease, the main cause of death in most populations in the Western world. The full explanation for this gradient remains disputed, with candidates ranging from lifestyle behaviours, such as smoking, unhealthy diets and lack of exercise, to the wider social implications associated with income inequalities, and to the adverse effects of stressors in the workplace, including job insecurity. People with diabetes cannot be immune from the social patterning of health and illness. There is little reason why socio-economic gradients in smoking and other health behaviours should not persist in people with diabetes, and indeed every reason to suggest that as a consequence of such long-term illness, exclusion from the workforce, resulting in financial hardship, may affect diabetic individuals of lower socio-economic status more adversely than those who are better off.

In addition, the role of high quality health care in preventing or reducing progression of diabetes complications has been highlighted over the last decade. This itself may be subject to a social gradient. The Diabetes Control and Complications Trial in type 1 diabetes, and UK Prospective Diabetes Study in type 2 diabetes, have clearly demonstrated the beneficial effects of tight glycaemic control in the avoidance of complications. More markedly, improved blood pressure control, and the use of ACE inhibitors, also reduces the onset and progression of vascular complications. Cardiovascular disease is the main cause of morbidity and mortality in both type 1 and type 2 diabetes, with rates being 4–8 fold and 2–4 fold respectively greater than the general population. In addition to the beneficial effects of anti-hypertensive therapy, clear positive evidence is emerging for lipid-lowering therapy as a primary prevention strategy. Further, regular review of complication status by the health care system, to detect and treat early signs of disease, is a recommended strategy in many health care systems. The existence of an inverse care law however, where those in greatest need of health care are the least likely to receive it, should also apply to individuals with diabetes. Thus the willingness and ability to provide comprehensive complication reviews for people with diabetes, and knowledge of newer trials supporting the benefits of intensive management, is likely to be poorer for care providers in deprived areas. Further, patient understanding of the importance of adhering to what can be a complex preventive strategy, willingness, motivation and the domestic and workplace-related circumstances which allow them to do so, may also be adversely affected by low socio-economic status.

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There is therefore every reason to believe that people with diabetes will experience a socio-economic gradient in health that is at least as great as that observed in the general population. Additionally, inequalities in the determinants of diabetes outcomes, within the narrow terms of health care provision, combined with the general health disadvantages experienced by those of low socio-economic status, might even lead us to expect that health gradients could be steeper than those observed in the general population.

However, a report from Turin in this issue of the International Journal of Epidemiology indicates that this is not the case. Italy is no exception to the rule of social inequalities in both general health and access to health care services. However, in this data linkage study of patients on a population-based diabetes register, using education as the measure of socio-economic status, with the Turin general population as the comparator, socio-economic gradients for all-cause mortality in type 2 diabetes were weak in men and non-existent in women. A stronger social gradient was observed in the general population, and more strikingly, in those with type 1 diabetes.

In accounting for these counter-intuitive findings from Turin, possible biases such as the degree of completeness of the diabetes patient register by educational status should be considered. People with higher incomes and relatively mild type 2 diabetes may not value the benefits of registration, in terms of the availability of free medication and laboratory tests, as much as those who are less well off, the latter regardless of the severity of diabetes. This may result in an overestimate of mortality risk in wealthier individuals with diabetes. The authors contend that this bias is unlikely to be strong, and suggest instead that the network of diabetes clinics in Turin may help to alleviate the social gradient in care received by people with diabetes, although there are currently no data to support this assertion. In addition, if this was the sole explanation for the lack of a relationship between mortality and educational status in type 2 diabetes, it is inconsistent with the presence of a very strong educational gradient in type 1 diabetes, which if anything is steeper than that observed in the general population. A more plausible explanation for the observations made in this particular study may be due to the mortality contribution of migrant Southern Italians to this population. In Italy, the classical inverse relationship between socio-economic status and cardiovascular mortality may be weakened by the experience of the Southern Italians. These individuals are generally of lower social status than the more affluent Northern Italians, but despite that, mortality rates from cardiovascular disease in Southern Italy are relatively low. Southern Italians are more likely to be obese than their Northern counterparts, and thus a greater proportion of individuals with lower educational status in those with type 2 diabetes may be Southern Italians compared with the general population, due to the strong association between type 2 diabetes and obesity, sufficient to obliterate the social differential in mortality in diabetes, but not in the general population, or in type 1 diabetes.

However, the lack of a diabetes-related social gradient in mortality has been observed in other countries, suggesting that an explanation specific to the Italian population cannot provide the full answer. A population-based study in Finland, again using a record linkage approach similar to that employed in the Turin study, initially demonstrated a complete absence of a social gradient in mortality in people with diabetes, in contrast to the marked gradient observed in the general population. Subsequently though, a gradient emerged in diabetes in the early 1990s. Explanations again invoked high quality care provision, but it must be remembered that high quality health care would have to be focused almost exclusively on the more deprived groups, to overcome the strong opposing social gradient of factors not intimately connected to health care, such as lifestyle behaviours, as observed in the general population, although of course the relative influences of health care per se versus health-related behaviours on mortality outcomes in diabetes is unknown.

The balance between genetic and environmental factors in the aetiology of diabetes by social class may provide a further explanation for these counter-intuitive findings. While the strongest environmental risk factor for diabetes, obesity, is inversely related to socio-economic status in Western countries, genetic factors are less likely to be socially patterned. In the higher social groups therefore, a greater proportion of diabetes may be solely genetic in origin, and occur despite relative leanness. This strong genetic influence may be associated with a greater risk of mortality, in comparison with individuals where obesity is the sole or predominant risk factor. This hypothesis is supported by the observation that insulin use is greater in individuals with type 2 diabetes in the higher social groups, and may thus counter the underlying beneficial mortality experience observed in higher social groups in the general population.

In addition, gradients in process measures of care, such as glycemic control and blood pressure, two powerful predictors of vascular complications, are apparent only in some studies and not in others. In contrast, outcomes, in terms of microvascular complications, do show a gradient in the expected direction. It is likely that the emergence of microvascular complications acts as a spur to both patient and physician to improve control of risk factors, accounting for the lack of social gradient in the latter. Whether this alone translates to the loss of a gradient in mortality outcomes is unclear.

In the UK, population-based registers and cohort studies suggest a powerful socio-economic mortality gradient in those with largely type 2 diabetes. In addition, the Finnish group demonstrate the emergence of a social gradient in diabetes-related mortality a decade after their original findings of no gradient. But even these do not provide any evidence for a significant interaction between diabetes and socio-economic status on mortality. So our hypothesis, that the social gradient in mortality in diabetes should be as strong, if not stronger, than the general population is not wholly supported by current evidence.

It is therefore likely that the conflicting findings discussed here could be due to a number of competing influences. On the one hand, the underlying population gradients in health must be reflected in diabetes, as key risk factors and disease outcomes are identical. However, the relative contributions of the different aetiologies of diabetes, running counter to the expected social class gradient in terms of implications for mortality, and the role of improved attention to health care quality in the face of prevalent microvascular complications, which may serve to at least attenuate the relationship between socio-economic status and diabetes mortality, may also differ from population to population, and may thus result in very different relationships between deprivation and mortality in diabetes between populations, and within populations over time.
Understanding the relative contributions of diabetes aetiology, health care and non-health care determinants of disease outcomes would be of interest in unravelling the reasons for a consistent social gradient in the general population, and not so in diabetes, and provide evidence for the economic value of health care interventions in diabetes, which may, up to now, have been underestimated.

References