Socio economic position, the risk of pre and type 2 diabetes, and implications for prevention

Socioeconomic position

Resources, material and others, within virtually all human societies are unequally distributed. The ability of an individual to access resources is strongly related to their position within the social hierarchy of that society. Following the theoretical framework of Weber, the position within the social hierarchy (socioeconomic position) can be seen as being determined by three factors. These factors are class (related to the ownership and control of material resources), status (related to the ability to access cultural, social and knowledge resources) and power within the political context[1]. Commonly used indicators of socioeconomic position include occupation, income and education[1]. Indicators of socioeconomic position are commonly used at an individual, household and neighbourhood level, with the reasons for choosing one level rather than another often being pragmatic, reflecting the availability of data, rather than being driven by theory.

Health Equity and the Commission on the Social Determinants of Health

Health equity can be defined as the absence of unfair and avoidable or remediable differences in health amongst social groups[1]. The World Health Organisation Commission on Social Determinants of Health (CSDH)[2] examined the basis of health inequity, between and within countries. Its conceptual framework for this work related the broad socio-political context within countries to their social hierarchies, with socioeconomic position being related to differential exposure to living and working environments which in turn lead to differential vulnerability to adverse health outcomes[3]. For example, in the case of type 2 diabetes and pre diabetes "differential vulnerability" would include differences in obesity and behaviours such as diet and physical activity between groups. The framework of the CSDH encourages further analysis on the underlying determinants of such differential vulnerabilities, thus moving beyond simple behavioural explanations.

Distribution of risk factors for type 2 diabetes and pre diabetes by indicators of SEP

There is strong evidence for the socioeconomic patterning of the major known risk factors for type 2 diabetes in the UK i.e. for differential vulnerability. For example, obesity, central obesity, self reported physical activity, smoking, and self reported consumption of fresh fruit and vegetables are all lower in adults in the poorest compared to better off households[4]. Gradients in some of these risk factors by household income are also highly apparent in children (under 16years), particularly overweight and obesity in girls, lower consumption of fresh fruit and vegetables and exposure to tobacco smoke[5].

Distribution of diabetes and glucose by indicators of SEP

Known or doctor diagnosed diabetes

Most of the relevant data available concerns the distribution of known or doctor diagnosed diabetes by SEP. In the Scottish diabetes survey[6] there is a steep gradient

in the prevalence of type 2 diabetes across quintiles of deprivation (based on the Index of Multiple Deprivation), with those in the lowest quintile having a 77% increased odds of having type 2 diabetes compared to those in the highest. These differences across deprivation quintiles may be more marked in middle aged men and women, with less difference by measures of SEP in older age groups[7]. A plausible interpretation of this is that the greater vulnerabilities to type 2 diabetes associated with more deprived areas leads to higher incidence in younger age groups. This in turn would contribute to increased risk cardiovascular disease and premature mortality[8].

As would be expected, there is a steep gradient in the incidence of doctor diagnosed diabetes by SEP. In data from over 350 general practices the age standardised incidence of type 2 diabetes in women in the poorest quintile was over twice as high as that in the best off, and in men roughly 1.5 times as high[9]. In this study, the aim of which was to derive a risk score for the prediction of type 2 diabetes, SEP, based on Townsend Score, remained a significant predictor of diabetes even with ethnicity, obesity, treatment of hypertension, smoking and diagnosed cardiovascular disease also in the model.

A cohort study of African American women also found that measures of SEP remained predictors of incident type 2 diabetes even when allowing for risk factors, such as obesity, associated with SEP[10]. This study was able to examine person, household and area based indicators of SEP, and found that both years of education and neighbourhood deprivation score were independently associated with a 20 to 25% increased risk of incident diagnosed type 2 diabetes.

Studies in which glucose/glycaemia was measured
There are far fewer studies that describe the relationship between SEP and measured glucose. The British 1958 birth cohort measured glycated haemoglobin in its participants at age 45 years, and described a higher prevalence of values at 5.5% and above in those in occupational social class 3 manual and 4&5 compared to the others[11]. Further analysis to determine to what extent this difference is accounted for by differences in obesity and other risk factors would be of interest.

The Whitehall II study used a combination of doctor diagnosis and repeat oral glucose tolerance tests to identify new cases of type 2 diabetes at follow up[12]. In men, the incidence of type 2 diabetes was over twice as high in the lowest compared to the highest employment grade. This difference was attenuated but not eliminated when controlling for obesity and health behaviours, such as report physical activity.

In summary
Although most of the available evidence concerns the prevalence and incidence of doctor diagnosed type 2 diabetes by indicators of SEP, it is consistent in showing a clear gradient, with those in lower SEP groups having a higher prevalence and incidence. There is some suggestion that there may be independent relationships with both person based and area based indicators of SEP. The analyses available suggest that the well known adult risk factors do not fully account for the gradient. Factors across the life course, including those in early life and childhood, may well contribute to SEP differences in type 2 diabetes in adults. In addition, better understanding and measures of vulnerabilities in adulthood, such as aspects of diet, physical activity, and

psychosocial factors may also provide a fuller explanation of what underlies differences by SEP.

However, perhaps the major challenge is not to better understand how different vulnerabilities (e.g. behaviours and biological factors, such as obesity) contribute to differences in risk by SEP of type 2 diabetes, but what exposures (environments) underlie those vulnerabilities. Obvious examples include relationships between physical, economic and cultural environments and levels of physical activity and types of diet.

A note on the level of interventions to reduce differences by SEP

It is well recognised that interventions to improve health may have the effect of increasing health inequalities – so called intervention generated inequalities[13]. There is some evidence that population wide approaches, as opposed to those targeting high risk groups, are more likely to reduce inequality[14]. It is argued that this is particularly the case for interventions that target exposures (environments) rather than vulnerabilities (e.g. behaviours)[15]. For example, increasing the price of cigarettes is likely to reduce inequalities while the provision of smoking cessation services may increase them (with better uptake and use by the better off). This principle of favouring population level interventions over high risk approaches is leant weight by the demonstration that a uniform reduction in cardiovascular disease risk factors levels across the population would substantially reduce the difference in mortality between SEP groups[16]. Indeed it is likely that in the vast majority of situations where the risk of disease is patterned by SEP, reducing the risk across the whole population will lead to a reduction in inequalities. Modelling to assess the likely impact of different types of interventions on inequalities is needed, followed by a full evaluation of the actual impact of the chosen interventions.

Nigel Unwin
Institute of Health and Society
Newcastle University
n.c.unwin@ncl.ac.uk

References

1. Commission on Social Determinants of Health, *A Conceptual Framework for Action on the Social Determinants of Health*. 2007, World Health Organisation: Geneva.
2. World Health Organisation, *Closing the gap in a generation: Health equity through action on the social determinants of health*. 2008, World Health Organisation: Geneva.
3. Commission on Social Determinants of Health, *PPHC-KN PROGRAMME NODES PHASE 1: ANALYSIS OF CONDITIONS*. 2007, World Health Organisation: Geneva.
4. The Information Centre, *The Health Survey for England 2006: Volume 1 Cardiovascular disease and risk factors in adults*. 2008, National Statistics: London.
5. The Information Centre, *The Health Survey for England 2007: Volume 1 Healthy lifestyles:knowledge, attitudes and behaviour*. 2008, National Statistics: London.
6. Scottish Diabetes Survey Monitoring Group, *Scottish Diabetes Survey 2008*. 2008, NHS Scotland: Edinburgh.
7. Connolly, V., et al., *Diabetes prevalence and socioeconomic status: a population based study showing increased prevalence of type 2 diabetes mellitus in deprived areas.* Journal of Epidemiology & Community Health, 2000. **54**: p. 173-177.
8. Roper, N.A., et al., *Excess mortality in a population with diabetes and the impact of material deprivation: longitudinal, population based study.* BMJ, 2001. **322**: p. 1389-1393.
9. Hippisley-Cox, J., et al., *Predicting risk of type 2 diabetes in England and Wales: prospective derivation and validation of QDScore.* BMJ, 2009. **338**(mar17_2): p. b880-.
10. Krishnan, S., et al., *Socioeconomic Status and Incidence of Type 2 Diabetes: Results From the Black Women's Health Study.* Am. J. Epidemiol., 2010. **171**(5): p. 564-570.
11. Thomas, C., E. Hypponen, and C. Power, *Diabetes risk in British adults in mid life: a national prevalence study of glycated haemoglobin.* Diabetic Medicine, 2007. **24**(3): p. 317-21.
12. Kumari, M., J. Head, and M. Marmot, *Prospective study of social and other risk factors for incidence of type 2 diabetes in the Whitehall II study.* Archives of Internal Medicine, 2004. **164**(17): p. 1873-80.
13. White, M., J. Adams, and P. Heywood, *How and why do interventions that increase health overall widen inequalities within populations? ,* in *Health, inequality and society,* B. S, Editor. 2009: Bristol: Policy Press.
14. Capewell, S., *NICE PDG on CVD Prevention in Populations: Cardiovascular disease prevention in populations and effects on health inequalities*. 2009, National Institute for Health and Clinical Excellence: London.
15. McLaren, L., L. McIntyre, and S. Kirkpatrick, *Rose's population strategy of prevention need not increase social inequalities in health.* Int. J. Epidemiol., 2009: p. dyp315.
16. Kivimaki, M., et al., *Best-practice interventions to reduce socioeconomic inequalities of coronary heart disease mortality in UK: a prospective occupational cohort study.* Lancet, 2008. **372**(9650): p. 1648-54.