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The measurement of social class in health studies: old measures and new formulations

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The measurement of socioeconomic status (SES) is a serious matter that requires us to think more precisely about both conceptual issues and issues more traditionally thought of as measurement issues. Progress in this area rests on our ability to identify those aspects of SES that are most closely related to health, human development, and life expectancy. In this chapter we review measures of SES based on characteristics of the individual as well as on characteristics of the environment or more ecologically based measures. Each of these types of SES measures has strengths and weaknesses and in all likelihood taps somewhat different aspects of class. In measuring SES across diverse populations, it is also crucial to be sensitive to the ways in which measurement varies across different cultural, ethnic and demographic groups.

It is likely that as we conduct more refined research in this area we will understand more fully why SES is so profoundly related to health status. However, so as to understand this relationship, we will need to expand efforts to identify not only those psychosocial or biological processes that occur 'downstream' as a result of SES but also the nature of the social experience itself and those 'upstream' forces that place so many individuals at risk.

Over the past decade there has been considerable interest in social class inequalities in health and length of life in industrialized societies. An extensive literature now covers empirical manifestations of such inequalities, trends in these over time, explanations for them, and methods of measuring socioeconomic status (SES), health, premature death, and the magnitude of inequalities (Macintyre, 1996). The aim of this chapter is to review some common and some uncommon ways of measuring SES or social class. By doing this, we hope to arrive at a deeper and more penetrating understanding of what it is about one's social class position that is so closely related to health, development and life expectancy.

Our objective in this review is to lead epidemiologists towards a richer understanding of the measurement of social class and the underlying reasons for it having been so consistently observed over the last century and a half to be related to health status. Our aim is not to document social class differentials in health status (for reviews on this topic, see Macintyre, in press; Marmot *et al.*, 1987; Bunker *et al.*, 1989; Davey Smith *et al.*, 1994; Adler *et al.*, 1994); nor is our aim to discuss the theoretical and conceptual underpinnings of the meaning of social class developed in the social sciences (for more information on this topic, see the chapter by Susser in this book). Rather, we hope that by taking a social epidemiological perspective that incorporates an understanding of the social dimensions and implications of social class (focusing 'upstream') as well as a biological understanding of ways in which social position influences the onset and progression of disease (focusing 'downstream'), we may help to clarify the processes that generate and maintain socioeconomic differentials in health.

Studies of social class and health show poorer health and shorter life expectancy the lower one's position in the social class scale, in all industrialized countries studied so far. However, the magnitude of the differences varies by the measures of SES used, the measures of the health outcome used, the social group being studied, and the particular setting. There is a tendency in the literature on inequalities to assume that the 'best' measure of SES is the measure that produces the steepest SES gradients for the particular group in question. This

can involve a circularity in the argument about the relationship between SES and health – a circularity that can interfere with precise thinking about, and study of, the processes producing social gradients in health. The usefulness of a measure depends on the analytical purpose at hand. The question 'what measures of social differentiation produce the greatest observed differentiation in health?' is not the same as the question 'what is the relationship between a specific measure of social differentiation, developed to capture a particular dimension of social experience, and health?', but the two are often confused (for example in debates about whether it is 'better' to classify women by their own or their husbands' occupations). In this chapter we describe properties of various methods of measuring social class without assuming that the 'gold standard' against which they should be measured is the strength of their association with health.

Which measurements are used in particular countries is dependent on the type of socioeconomic information commonly available in those countries. This in turn relates to deep-rooted political and cultural understandings about the nature of social stratification, and the axes of differentiation that are assumed to be significant and that it is politically feasible to collect, in those countries. In the United States of America (USA), race/ethnicity is routinely recorded in vital statistics, cancer registries, and social surveys, whereas occupation tends not to be so collected (Krieger, 1992). In Great Britain, by contrast, race/ethnicity is rarely recorded in these sorts of datasets (the 1991 census was the first ever to try to elicit this information), whereas occupation is a key social signifier and is routinely collected in all official datasets and surveys; data on income are also less frequently collected. In Great Britain such a high proportion of the population has only the lowest educational qualifications [for example, in a six-country comparison of years of education in relation to mortality conducted by Valkonen, 81% of the men and 86% of the women from England and Wales had left school at the statutory minimum school leaving age (Valkonen, 1989)] that years of education is rarely used as a useful measure of SES because of its lack of variance. In some European countries, such as the Netherlands, health-related data at an individual level were not generally available until recently and ecological data had to be used as a proxy [a standardized procedure for measuring SES on the basis of education, occupational class or income has now been developed and will be incorporated into routine data including hospital admission data (Mackenbach, 1994)]. By contrast, the Nordic countries have for some time been able to obtain a number of SES measures (education, occupation and income) from official records and link these with mortality and other health-related measures. As much social epidemiological research on cancer uses large-scale datasets, often derived from record linkage of official social and medical statistics, investigators must often rely on the types of socioeconomic data routinely available in their countries rather than on those measures that they might regard as the most conceptually appropriate.

This chapter is divided into two major sections. In the first section, we review traditional measures of SES, which are based on characteristics of the individual. We then discuss three major issues related to ascertainment of SES based on these indicators: the precision with which they are measured; their appropriateness for women, minorities and older people; and the need to articulate a clearer set of hypotheses about the characteristics of SES that are related to health. In the second section, we discuss assessments of SES that are based not on individual characteristics but on characteristics at a household or community level. The advantages and disadvantages of such measures are identified.

Traditional measures of SES: assessment at the level of the individual

While social class and SES have somewhat different meanings in the sociological literature, based largely on theories developed by Marx and Weber, we have elected to use them interchangeably here (Lipset, 1968).

Social class as described by Weber (1946) had three domains: (1) class, by which he meant ownership and economic resources; (2) status, by which he meant prestige, community ranking or honour; and (3) political power. This tripartite definition has led many social scientists to identify multiple indicators of social class that may be used individually or cumulatively to represent these different dimensions. In an excellent and detailed review of this material and its relevance for those working in the field of public health, Liberatos *et al.* (1988) discuss the three common indicators of SES – wealth

Table 1. Summary of social class measures by three characteristics

Measures	Categories/scores	Advantages	Disadvantages
Occupation			
Edwards (Haug, 1977)	12 categories; data comparable for 1940–1980 census; 13 categories for 1980	Used by Census Bureau Provides comparability over time since 1940 Widely used since 1940	Each occupational category contains wide variations in income and education
Nam–Powers OSS (Nam & Terrie, 1986)	Scores range 0–100; available for 1960, 1970 and 1980 census	Each score interpretable as a cumulative percentile Data available for male, female, Black and total labour forces	Not sufficiently used to provide empirical evidence of its performance
Siegel (Siegel, 1971)	Scores range 0–100; available for 1960 census only	One of few scales utilizing prestige scores	Based on prestige data collected 20 years ago. Not updated to 1980. Available for male labour force only
Treiman (Treiman, 1977)	Scores range 0–100; can be grouped into eight occupational levels	Only occupational scale that applies internationally Applies to both industrialized and developing countries	Based on prestige data collected 20 years ago. Not updated to 1980. Available for male labour force only
Income	Categories vary depending on population	May measure unique aspects of social class	Varies within occupations and is inconsistent with education Sensitive to changes in life circumstances. Increases with age up to age 65. Not comparable across different years of family sizes unless adjusted. Sensitive topic in USA – 9% refusal rate
Education	Usual category range 2–5; sometimes used as a quantitative variable	Stable over life course Good predictor of mortality from all causes	Fixed early in adult life. Decreasing variability over time. Status does not rise monotonically with years
Composites			
Duncan SEI; (Duncan, 1961; Stevens & Featherman, 1981)	Scores range 0–99; available for 1950, 1970 and 1980 census	Most frequently used in social science research	Positively skewed distribution Original scale based on 1950 male labour force; updates use studies from 1960s to supplement
Hollingshead (Hollingshead, 1975)	Original scores range 11–77 subdivided into 5 classes; available for 1950 census Revision scores range 8–66 subdivided into 5 classes; available for 1970 census	Widely used during 1960s and early 1970s	**Original** Based on 1950 census. Validated in one small Connecticut city No update for 1980 **Revision** Scores for each working spouse are averaged. Census categories used in revision have been modified, requiring additional questions of respondents

Table 1. (Contd) Summary of social class measures by three characteristics

Measures	Categories/scores	Advantages	Disadvantages
Nam–Powers SES (Nam & Terrie, 1986; Nam & Powers, 1983)	Scores range 0–100; available for 1960, 1970 and 1980 census	Each score interpretable as a cumulative percentile Data available for male, female, Black and total labour forces. Scores are normally distributed	Not sufficiently used to provide empirical evidence of its performance. Potentially redundant if used in combination with individual's education and income
Warner ISC (Miller, 1983)	Scores range 12–84		Difficult to rate dwelling area and house type. Limited applicability since validated on small communities in 1940s
Indices combining income and education	*Ad hoc* measures	Can be specifically tailored to study population	No systematic validation. Each scale specific to a given study making cross-study comparisons difficult

Modified from Liberatos *et al.*, 1988.

(or income), occupation and education – and the ways in which they are measured or combined to form composite indices. Wealth is clearly most directly related to Weber's idea of class based on ownership and access to economic resources. Occupational rankings based on prestige tap Weber's domain of status (Nam & Terrie, 1982), whereas those occupational rankings based on income may also tap his domain of class. Education, perhaps the most commonly used measure of class in North America, is an indicator of both class and status. As on an individual level completed education generally precedes employment and the ability to earn income, it may influence social position in a powerful way. Table 1 outlines the scales of SES based on occupation, income and education most commonly used in North America, along with their major advantages and disadvantages.

Work from outside North America also uses occupation, income and education, although as noted earlier the availability of individual-level data on these three dimensions, and their perceived relevance, varies from country to country. Investigators in the USA tend to use education and income (Kitagawa & Hauser, 1973; Pappas *et al.*, 1993); those in Great Britain, and in countries such as New Zealand with previous close links to Great Britain, tend to use occupational social class (Townsend *et al.*, 1992; Pearce *et al.*, 1993); and education has commonly been used in several European countries (Valkonen, 1989).

As noted in virtually all reviews on SES gradients and health, the consistency and strength of the associations between SES and morbidity and mortality, both within and across countries, attest to the validity of the indicators themselves and the degree to which these relatively crude indicators must be tapping some underlying construct of social stratification that powerfully influences health (Syme & Berkman, 1976; Williams, 1990). However, from a measurement perspective there are certain troublesome aspects of these brief scales, which pose problems worthy of consideration. The three issues outlined below are particularly relevant, and are discussed in more detail in the following sections.

- Differences in the slope of the SES gradient or in the magnitude of differences between different social categories are reported both between studies and between different groups within studies. A major question is whether these differences reflect imprecision in measurement of either SES or the health outcome of interest or reflect real variations in risk.
- Measures of SES were most often developed using middle-aged employed male populations.

The validity of such measures for women, older populations and ethnic minorities is unclear.

- Investigators rarely articulate precisely what it is about SES, or about the particular measure of it they are using, that they hypothesize to influence health status. For instance, most scientists currently argue that it is not poverty alone that conveys disease risk, as there is a steady gradient of risk all the way up the social scale. However, they often fail to articulate whether they are using education, income or occupation simply as an indicator of an underlying SES gradient (and if so, how that gradient influences health) or whether (and if so, how) they see education, income and occupation as directly influencing health.

Imprecision in measurement of SES

Social scientists whose major efforts are directed towards the measurement and study of social stratification often argue that crude indicators of SES such as income, occupation and educational level are inadequate measures of SES.

One concern relates to the use of income as a measure of wealth or economic status. Economists point out that income captures economic status only partially since income measures do not include assets such as inherited wealth, savings, benefits, or ownership particularly of homes or motor vehicles. More detailed information must be collected to identify these other sources of wealth. Excellent examples of how this information has been incorporated into studies with important health outcomes are the Health and Retirement Study funded by the National Institute of Aging to the University of Michigan and cross-cultural studies conducted by Rand.

Not only do traditional measures of income fail to capture wealth but they also often fail to measure income earned from the 'informal economy'. As Susser points out in the chapter in this book, many recent immigrants and minorities work in an informal economy for cash with no job security or benefits. Additionally, many people – rich and poor – exchange goods and services, and barter. Such informal transfers are poorly documented and rarely included in measures of income.

Finally, many investigators from both epidemiology and public health have remarked that measures of income must be adjusted to account for the number of people supported by the income. Clearly, an income of US$ 25 000 for a family of two or a single person is not equivalent to the same income supporting a family of six. When we add to these measurement issues the fact that of all the measures of SES, individuals are least likely to report their income, regarding it as a highly sensitive and private topic, we can see why income is the least used of SES indicators. This is unfortunate because no other measure of SES has the psychometric properties of being continuous and spread along such a broad range from low (the depths of poverty) to high (wealth). Furthermore, no other indicator so clearly taps the dimension of potential access to material goods and services as unambiguously as does economic resources assessed from income and wealth.

Measures of occupational status or prestige are commonly used in epidemiological studies. There are several occupationally based classifications of social class in Great Britain, mainly based on the Registrar General's classification of occupations that was first used to examine social gradients in births, infant mortality and adult mortality around the time of the 1921 British census (Stevenson, 1928). This grouped occupations into six social classes (three non-manual and three manual) according to a combination of skill levels and general standing in the community. It was explicitly not based simply on the average income of the occupations. In a lecture to the Royal Statistical Society in 1928, Stevenson, the Registrar General who had developed the classification, described a method of examining infant mortality by family income that had recently been used in the USA, and commented (Stevenson, 1928):

> 'So far as this method can be applied it is of course ideal for estimation of the effects of wealth as such... But its drawback is that it may fail altogether as in index of culture, probably the more important influence. The power of culture to exert a favourable influence on mortality, even in the complete absence of wealth, is well illustrated by the clergy. The income test, if it could be applied, would certainly place them well down the list yet their mortality is remarkably low... The method suggested, therefore, as on the whole best meeting the various conditions which have to be considered is that of

inferring social position (largely but by no means exclusively a matter of wealth or poverty, culture also having to be taken into account) from occupation.'

When Stevenson first applied his classification to birth and death rates he was pleased to see that they produced steady gradients, and commented that this was 'at the same time an indication both of success in the social grading in the population and of the association of mortality with low status' (Stevenson, 1928). Thus from the start there has been some circularity about this classification of occupations when applied to birth or death rates – the validity of the classification being assessed by its correlation with these rates, and the strength of social influences on these outcomes being assessed by the linear gradients produced by this occupational social classification (for a critique, based on this issue, of the use of the classification, see Jones & Cameron, 1984).

Nevertheless, scales similar to the British one are widely used in other countries and have been used for a number of between-country comparisons of inequalities (Vagero & Lundberg, 1989; Leclerc *et al.*, 1990; Kunst & Mackenbach, 1994)

In the USA, occupational scales have usually been based on prestige or income (Siegel, 1971; Treiman, 1977; Duncan, 1961; Featherman *et al.*, 1975). Apart from the issue of the conceptual underpinning of these various scales, the greatest problem with them is that the job rankings have proved to be relatively unstable over time; that is, new requirements and economic needs have changed job standing in terms of both income and status over time. For instance, when scales were initially developed in the 1950s and 1960s, white-collar, office jobs were almost always ranked higher than blue-collar jobs. Over time, however, with the entry of women into the workforce and the growth of 'pink-collar' office jobs (secretarial, sales and so on), some blue-collar jobs have gained much higher earning power as well as more prestige and job characteristics associated with control, independence and skill than these white-collar jobs have. These recent status differentials are not always reflected in job rankings. Investigators must take care to use scales that reflect the characteristics of the population being studied. Some scales, including those developed by Edwards, Nam–Powers and Duncan, have been updated to the 1980 census and reflect some of these changes.

Prestige-ranked scales of occupation vary by country, making international comparisons difficult. For instance, in France intellectuals and artists rank high on prestige-based occupational scales. Thus, teachers at both the secondary and university level and visual artists are ranked high even though their income is not among the highest in the country. In the USA, such professionals are ranked lower. In some countries it is considered legitimate to have an unambiguous ranking from the top to the bottom of the occupational scale (as in the British system) but in others certain occupational groups (such as farmers, the self-employed, or the armed forces) stand outside the occupational ranking system and their placement in a scale is therefore problematic. Occupational scales that rank occupations uniformly across countries will obscure these differences yet scales based on national norms may make comparisons difficult to interpret (Fox, 1989; Kunst & Mackenbach, 1994).

Occupational classes are made up of heterogeneous occupations and there is considerable variation within each class in education, income, prestige and risks. Studies that examine more homogeneous occupational groups within specific industries or employment settings [for example, studies in Great Britain of the army, the National Health Service, and the civil service in London (Lynch & Oelman, 1981; Balarajan, 1989; Davey Smith *et al.*, 1990)], find much bigger differences between these groups in mortality than are found for the occupational classes in which they are normally classified [for example, standard mortality ratios for coronary heart disease among men in the British army were 33 for direct-entry officers and 205 for private soldiers, a sixfold difference that is greater than the difference between all social class I men and all social class V men (Lynch & Oelman, 1981)]. It has been argued on the basis of findings such as these that conventional occupational class measurements tend to underestimate the impact on mortality of socioeconomic position because of imprecision of measurement (Davey Smith & Egger, 1992).

One of the reasons that education is used most frequently as an indicator of social class is the ease and consistency with which it is measured. While distributions in educational level may vary by

region, country, age and gender, years of education remains one of the most reliable and valid indicators of SES. It may be used as a continuous measure or categorized at meaningful cut points, such as completion of high school or university. Furthermore, education is often used as an indicator because of all common measures it is least likely to be influenced by disease, as most people complete their education before they reach the age of 20 or 25 years. With the exception of a few psychiatric disorders, there are few diseases that threaten to disrupt the educational process in European and North American countries (Kitagawa & Hauser, 1973). [However, as pointed out by Goldberg and Morrison, achieved educational level is not a good measure of social drift following illness. They found that many schizophrenics had educational records commensurate with their social background but then held jobs that were of lower skill level than their background or education would predict. Many also remained living with their parents. For these reasons, using educational attainment and residence as measures of SES could underestimate the intergenerational downward social drift experienced by schizophrenics (Goldberg & Morrison, 1963)].

A technique used to circumvent absence of individual-level income, education or occupational data is to classify people according to household assets such as whether the home is owned or rented, and whether there is a car or garden. These have been shown both to be independently predictive of mortality and to add to the predictive power of other measures such as occupational social class and grade of employment in the civil service (Fox & Goldblatt, 1982; Davey Smith *et al.*, 1990). It has been argued that such household measures of assets create a more finely grained hierarchy of socioeconomic position and thus demonstrate that conventional measures understate the power of SES to influence life chances (Davey Smith & Egger, 1992). However, they represent some of the least characterized measures of SES and little research has been conducted into their social meaning and implications or the processes by which they influence health. Some have taken them as simply more refined measures of material well-being (Davey Smith & Egger, 1992). But the finding that top-rank civil servants in London who do not own cars have higher mortality than car-owning colleagues in the same grades raises as many questions as it answers. It is likely that top-rank civil servants can all afford cars, so why do some not have cars? Because they prefer to walk from their elegant town houses, because they have had their driver's licence revoked, or because they use taxis and a work-provided chauffeur? Car ownership may actually be directly health promoting (by enhancing social contacts, and providing convenient access to health services, recreation, and food shopping), but it is often regarded simply as a marker of wealth. Similar sorts of questions are raised about the social meaning of home ownership as opposed to home rental: is it directly health promoting in some way, a marker of wealth, or confounded with other variables (such as region of the country, or employment in the armed forces or other occupations that involves frequent moves)?

Generational and aging effects need to be taken into account in using individual- or household-level measures of SES. The social meaning of education, income and occupation will vary between different birth cohorts who grew up in, and now inhabit, very different social contexts. The significance of a college-level education will for example differ between someone now 75 years old and someone now 35 years old because a much higher proportion of the latter's age cohort will have attended college. What may be relevant for a 75 year old is not how their absolute income compares with that of her 35-year-old grandchild but how it compares with the income of their age peers. The occupational structure, and with it the occupational class structure, has changed greatly in all industrialized societies such that, in general, succeeding generations are likely to appear to have higher social class position. The social meaning and significance for health of other measures such as car or house ownership are also likely to differ both by generations and by age. It is thus important when examining SES relationships with health both to standardize for age and to think clearly about the applicability for different ages and cohorts of the measures and underlying construct of SES being used.

The use of indicators of SES among women, minorities and older populations

As we stated earlier, most measures of social class were developed and subsequently validated on men, primarily men in the labour force. Extrapolating to

other populations has proved to be quite problematic. Even after 30–40 years of research in this area in the USA (and 70 years in Great Britain), there are no completely successful resolutions as to how to classify housewives, retirees, or minorities who may hold the same job as White males but do not gain the same benefits. The robust and consistent relationships between SES and health or mortality found for men of working age (whether measured by education, income or occupation) are often not found for women, older people and ethnic minorities. For example, in cross-national comparisons the relationship between education and mortality is less consistent (and less likely to be linear) among women than among men (Valkonen, 1989; Koskinen & Martelein, 1994), and occupational class is much less predictive of mortality among Maori compared with non-Maori men in New Zealand (Pearce *et al.*, 1993) and among migrants from the Indian subcontinent in Great Britain compared with the general population (among Afro-Caribbeans in Great Britain, mortality is actually higher among higher occupational classes) (Marmot *et al.*, 1984).

Only a small part of the problem lies in imprecision in measurement. For instance, while it is worthwhile to rescale occupation to incorporate occupations held predominantly by women (for example, nursing and clerical work) and carefully consider where 'pink-collar' occupations fit in occupational rankings, such readjustments to the scales do not inform us about how to deal with two-occupation families or how to classify women who do not work in the labour force. These problems pose larger challenges and force us to confront more directly the conceptual underpinnings of measures of SES. More serious consideration should be given to classifying couples who share households by the highest occupational ranking between them or by developing new indicators of SES that are not gender specific.

In Great Britain steeper gradients in mortality have been observed when women have been classified by their husbands' occupations than by their own, and within any own occupational social class defined by the women's own occupations there are gradients by husbands' occupations. For example, among women whose own occupations place them in social class III non-manual, SMRs range from 72 among those whose husbands are in class I to 117 among those whose husbands are in class V. These differences are even greater for economically inactive women (SMRs by husbands' classes ranging from 55 to 130) (Fox & Goldblatt, 1982). Various attempts have been made to improve social classifications among women by adding in other social characteristics such as marital status, economic activity and indicators of household wealth, and it has been argued that 'accurately to reflect the relation between a woman's life circumstances and mortality it is necessary to utilize other measures than those based solely on occupation' (Moser *et al.*, 1988). As with evaluations of the arguments that specific occupations provide sharper differentiation in mortality than broad groupings (see above) and that household- or asset-based measures add to predictions of mortality, it is important to be clear about whether the aim is to produce the most accurate social predictors of mortality risk (which might contain a number of elements including marriage and specific occupational exposures) or whether the intention is to clarify the relationship between occupational class and risk. It is also important to note an asymmetry in discussions of women's and men's social classifications; researchers have rarely looked to see whether the educational levels, incomes or occupations of wives add to the prediction of men's mortality. We will pick up these issues again in the next section in which we move beyond individual-based indicators of SES.

The evidence relating social class to health among older men and women is conflicting. Common wisdom is that SES wanes in importance as a predictor of mortality and morbidity in the elderly. While some studies support this notion, many other studies continue to show that SES is a critical predictor of health outcomes throughout the life course (Berkman, 1988). Of particular interest are the recent findings on the relationship between low educational level and risk of Alzheimer's disease and other cognitive and functional declines (White *et al.*, 1994).

Is there a way to explain these differences in study findings? Differences among studies in the magnitude of SES effects in elderly populations may well be the result of the same set of methodological issues that besets investigators studying other subpopulations. Perhaps most relevant to the study of older men and women is the imprecision

with which SES is measured. Many investigators gather data on current occupation (or most recent occupation) or current income. In the majority of cases, current income or occupation is not an accurate reflection of lifetime or usual occupation or usual income. In order to obtain information in these areas, investigators must ask questions about accumulated wealth, savings and ownership as well as usual occupation. Of course, issues of ascertainment of SES among older women or minority elders are compounded by ascertainment of SES in these groups. Furthermore, many investigators fall back on education-based indicators of SES for older populations. While this has many advantages, the most important being that it is a stable measure of SES and unlikely to be influenced by health status in old age, there are some drawbacks to using education as a marker for SES in this age group. The most important disadvantage relates to the limited number of years of schooling many older people have had who are part of the birth cohorts born between 1910 and 1930. Many Americans during this time had few years of formal education yet were occupationally quite mobile. Thus, their educational level may not be a very precise indicator of their social class. This truncated distribution and weak correlation with other indicators of SES may not be so important in future studies as more recent birth cohorts, at least in the USA, have a broader range of educational experiences.

Similar to the case for the ascertainment of SES in women and minorities, closer attention to the precision with which we measure SES using standard tools and indicators may not be sufficient to capture the true variance in risk of adverse health outcomes related to social class in older populations (Berkman *et al.*, 1989). In order to understand SES gradients more fully in older populations, it would be helpful to have more information on social stratification on a community level – how more extended families and households contribute to the SES of older family members, how older people continue to be productive despite not being in the formal labour force, and how their status is determined based on a lifetime of experience and contribution to members of their families and communities. These areas require us to extend our thinking of social class, probing new areas and formulating new measures of SES based on more conceptually rich theories.

The assessment of SES in African-Americans and other minority ethnic groups poses a new set of issues. Racial differences in health outcomes, especially in the USA, are often attributed to underlying differences in SES rather than to genetic or inherent biological differences between races (Williams, 1990; Krieger *et al.*, 1993). However, many studies report that health status differences between racial groups remain after 'adjustment' for SES. Investigators rarely acknowledge that the 'adjustment' for SES may not have completely accounted for SES differences. For instance, there is now a growing literature indicating that within broad categories of income, education and occupation, African-Americans earn less, have less wealth, and often have a higher cost of living than Whites in the same categories (Nam & Powers, 1983; Krieger, 1993). Such differences relate to the imprecision with which we measure SES. However, increasing the precision with which we measure SES among different ethnic groups would probably account for only a portion of the health disparities between Blacks and Whites. Additional inequalities are likely to result from racism and discrimination *per se* so that even among Blacks and Whites with exactly the same occupational and educational level disparities in SES exist. The burden that discrimination places on selected ethnic minorities limits access not only to medical care, which may influence health outcomes, but also to a broad range of life chances and opportunities. Incorporating subtle measures of social class that capture the social stratification that occurs in our society on the basis of race remains a major challenge.

Cultural differences must also be taken into account. Pearce *et al.* (1988) have pointed out that social class classifications based on occupation may have little meaning in traditional Maori society: 'A manual labourer performing the most menial task not infrequently turns out to be a gifted orator, or a person with exceptional prestige widely regarded by his tribe as healthy' (Durie, 1985). The linkages between education, occupation and income commonly assumed or studied in a majority culture may also differ in minority cultures, especially in newly arrived migrant groups among whom earnings may be remitted to family members remaining in the country of origin, and who may occupy particular economic or residential niches of a lower standing than their educational qualifications would normally predict in their old or new country.

What is it about SES that is so closely related to health? Conceptual clarity about the macrosocial phenomenon

Stepwise or linear gradients in morbidity and mortality risk by SES have been observed in the vast majority of studies, although policy analysts, especially in the USA, have commonly focused on the effects of poverty, using a threshold model of risk that assumes that absolute disadvantage causes poor health but that above a certain threshold there is no further effect of SES on health. As Macintyre notes, in many ways the SES gradient is not at all surprising 'since most socioeconomic classifications fit a Weberian model of a relatively continuous distribution of life chances which are likely to produce a relatively continuous distribution of health attributes' (Macintyre, in press). The gradient in risk challenges us to define what it is about social stratification *per se*, not just poverty, that is associated with poor health (Adler *et al.*, 1994). In addressing this issue many investigators have skipped over more social–structural interpretations having directly to do with class and moved on to identify mechanisms or pathways by which SES could produce poor health. Such endeavours move us from struggling with defining the macrosocial processes that are fundamental to class and stratification to what may well be the result or response of individuals to such social phenomena.

If we are to understand better how social position confers health risks it is important to focus upstream, to processes of social stratification and their implications for everyday life, as well as downstream, to the psychosocial or biological mediators of risk. Whatever the focus it is important to be clear about the underlying models with which we are operating. It is only in relation to these that the validity, reliability and utility of measures of SES can be assessed.

It is clear from the history of research on social inequalities in health that different investigators often conceptualize the same measures as being operationalizations of different underlying constructs. For example, in northern Europe occupational social class has often been seen as an indicator of direct occupational exposures (both physical and psychosocial), and its association with mortality has led investigators to study health-promoting or -damaging properties of jobs. In Great Britain occupational class has been seen as an indicator of a general style of life including residential and consumption patterns and access to a whole set of social and material resources. This may explain why in Great Britain it made sense to classify women by their husbands' occupations, as these predicted general domestic circumstances, but this makes less sense in countries in which the main focus is occupational exposures (Arber & Lahelma, 1993). The mortality risks of husbands and wives have indeed been used for some time in the United Kingdom in an effort to disentangle direct occupational risks from those associated with general life circumstances (Office of Population Censuses and Surveys, 1978).

However measured, SES gradients can be seen as expressing wealth and income differences, exposures to health-damaging circumstances, access to control over health-promoting activities and resources, or psychosocial assets such as education and coping skills. However, it is often not explicit which of these (or many other) underlying models are being assumed. For example, household ownership of homes, gardens and cars has been shown to predict mortality risk in Great Britain (Davey Smith & Egger, 1992) but the interpretation of these relationships is rarely clearly spelled out (implicitly it often seems to be that these are seen as simply indicators of wealth, it being wealth that produces health, rather than as directly health-promoting resources that wealth can help one to buy).

If we are to improve measures of SES, we must offer explicit hypotheses about the aspects of social class that we think convey health risks. For instance, if we hypothesize that relative deprivation is a more useful concept than absolute deprivation to explain SES gradients, we might refine our measures specifically to capture elements of relative deprivation. If we hypothesize that material resources are more important than psychosocial resources, we might focus increased attention on measures of wealth and on the assets or experiences that wealth produces. If we believe psychosocial resources are more critical, we might examine educational measures more carefully since they are more highly correlated with cognitive strategies and behaviours. If we hypothesize that something about status or ranking *per se*, even in the absence of resources, is the critical dimension of SES, we might examine yet other dimensions of class emphasizing prestige or hierarchy. The most important point here is that if we

focus our scientific energies 'downstream' to identify consequences of SES we may miss valuable opportunities to understand the nature of the social positions we call social class.

Area- or household-based measures of SES

There are two main reasons for using household- or area-based measures of social class. The first is that individual-level data are unavailable; the second is that these more collective measures may add to or interact with individual measures and thus add explanatory power. For which of these reasons such measures are being used is not, however, always clear.

Given the prominence of occupational class analysis in Great Britain, and the way it is conceptualized as indicating broad styles of life, it is common to use household measures of class in order to get around the problem of missing individual data arising from current unemployment for whatever reason. 'Head of Household Social Class' can for example be applied to children, homemakers, and unemployed, retired or sick adults, and thus can be used for comparisons of class gradients across the life course (Ford *et al.*, 1994). Although used to compensate for the problem of non-employment, an underlying premise of such measures is that head of household measures actually express a real form and unit of social stratification that is related to health and life expectancy.

Area-based measures of socioeconomic position, usually based on census data, have been used in a number of countries as a proxy for individual or household social class. Individuals are characterized by the aggregate socioeconomic properties of the zipcode (USA), postcode (United Kingdom), census tract, or local government area in which they live. In Great Britain there are two widely used area-based indices of deprivation based on census data: the Carstairs–Morris index [based on the percentage of unemployed people, overcrowded households, households with no car, and people in social classes IV and V (Carstairs & Morris, 1991)] and the Townsend index [based on the percentage of people with no car, in overcrowded housing, in non-owner-occupied housing, and unemployed (Phillimore *et al.*, 1994)]. Both measures strongly predict mortality and other health measures. However, as with all ecological measures care has to be taken in interpreting these correlations. At the extremes of deprivation these indices classify fairly socially homogenous areas: Carstairs category 1 postcodes will be inhabited by people who are very well off, and category 7 postcodes by people who are very badly off. But categories in the middle will contain a mixture of better- and worse-off people and it will therefore be less valid to 'read off' personal circumstances from residence in such areas (McLoone & Boddy, 1994). It is not always clear whether investigators are using such measures simply as surrogates for individual SES ('this person lives in a high-income or middle-class area so we can infer that they have a high income or is middle class') or whether they are using them as genuinely ecological measures ('this person lives in a high-income or middle-class area so may have access to certain health-promoting local resources').

Classification of an individual's social class based on his or her personal characteristics is limited by the fact that people living together often share class position in ways not reflected by individual circumstances. Furthermore, recent evidence indicates that the socioeconomic environment or community in which one lives confers risk apart from an individual's standing in that community (Haan *et al.*, 1987). This reasoning has led investigators to develop new techniques to assess socioeconomic position based on area-based indicators. The hypothesis is that an individual's living environment, the resources to which they have access, and the stresses to which they are exposed, are based on more than their individual characteristics. For instance, middle-class individuals living in impoverished neighbourhoods may share more experiences with their neighbours than with their middle-class counterparts in less impoverished areas. Personal and local circumstance and access to resources may interact to amplify disadvantage and health risk. For example, healthy food may be more costly and less available in poorer neighbourhoods inhabited by people with lower disposable income (Sooman *et al.*, 1993) and 'healthy eating' has been shown to vary between neighbourhoods even after controlling for household social class, sex, income and age (Forsyth *et al.*, 1994). It is for this reason that many public housing policies are based on the theory that poorer families will do better in middle-class suburbs than they will do if provided with straightforward subsidies to improve their individual housing.

The argument that features of the local area might amplify personal advantage or disadvantage

in predicting health risk would suggest that measures should be developed that incorporate both personal and local characteristics. This has rarely been done, however, and so we are left with what may be a fake antithesis: should we be focusing on people or places? (Macintyre *et al.*, 1993). There have been several recent attempts to examine the importance of individual and area indicators (for example, Slogget & Joshi, 1994) but by teaching these as if they are independent they may underestimate the extent to which different aspects of SES cluster and interact with each other.

The most basic aggregate data are based on household characteristics. Such data are particularly valuable for people who may not be well characterized by traditional measures. For instance, women may often be better characterized by household measures of occupation that are either averaged over working household members or in which the highest rank is given to all family members. In fact, men as well may be better characterized by this system as women increasingly are in the labour force and contributing to the economic well-being of families.

Conclusions

The measurement of SES is a serious matter that requires us to think more precisely about both conceptual issues and issues more traditionally thought of as measurement issues. Progress in this area rests on our ability to identify those aspects of SES that are most closely related to health, human development, and life expectancy. In this chapter we have reviewed measures of SES based on characteristics of the individual as well as on characteristics of the environment or more ecologically based measures. Each of these types of SES measures has strengths and weaknesses and in all likelihood taps somewhat different aspects of class. In measuring SES across diverse populations, it is also crucial to be sensitive to the ways in which measurement varies across different cultures, ethnic and demographic groups.

It is likely that as we conduct more refined research in this area we will understand more fully why SES is so profoundly related to health status. However, in order to understand this relationship, we will need to expand efforts to identify not only those psychosocial or biological processes that occur 'downstream' as a result of SES but also the nature of the social experience itself and those 'upstream' forces that place so many individuals at risk.

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