

GLOSSARY

A glossary for health inequalities

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In this glossary, the authors address eight key questions pertinent to health inequalities: (1) What is the distinction between health inequality and health inequity?; (2) Should we assess health inequalities themselves, or social group inequalities in health?; (3) Do health inequalities mainly reflect the effects of poverty, or are they generated by the socioeconomic gradient?; (4) Are health inequalities mediated by material deprivation or by psychosocial mechanisms?; (5) Is there an effect of relative income on health, separate from the effects of absolute income?; (6) Do health inequalities between places simply reflect health inequalities between social groups or, more significantly, do they suggest a contextual effect of place?; (7) What is the contribution of the lifecourse to health inequalities?; (8) What kinds of inequality should we study?

The burgeoning field of health inequalities research has given rise to many questions and debates about definitions of concepts, analytical strategies, interpretation of findings, and explanatory models.¹⁻¹⁰ Any glossary for health inequalities therefore must go further than simply defining terms and concepts—it must also acknowledge and discuss controversies in the field. The following glossary is neither intended to be a comprehensive treatment of this subject, nor an exhaustive list of textbook definitions. Rather than adopting a purely definitional approach to health inequalities, we have chosen to highlight some major debates in contemporary research as a way of introducing key concepts and terminology in the field. Many of the issues we have selected to discuss are controversial simply because there are still large gaps in the scientific understanding of the determinants of health. Readers may take different views and disagree about the issues, partly because the science has not yet gone far enough and we are left to make informed guesses.

We focus on eight key questions pertinent to health inequalities:

- 1 What is the distinction between health inequality and health inequity?
- 2 Should we measure health inequalities (that is, describing the distribution of health across individuals), or should we measure social group differences in health (for example, inequalities in health by social class)?

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- 3 Do health inequalities mainly reflect the effects of poverty or are they generated by the socioeconomic gradient?
- 4 Are health inequalities mediated by material deprivation or by psychosocial mechanisms?
- 5 Is there an effect of relative income on health, separate from the effects of absolute income?
- 6 Do health inequalities between places simply reflect health inequalities between social groups or, more significantly, do they suggest a contextual effect of place in shaping inequalities in health?
- 7 What is the contribution of the life course to health inequalities?
- 8 What other kinds of inequality should we study?

THE DISTINCTION BETWEEN HEALTH INEQUALITY AND HEALTH INEQUITY

Inequality and equality are dimensional concepts, simply referring to measurable quantities. Inequity and equity, on the other hand, are political concepts, expressing a moral commitment to social justice.

Health inequality is the generic term used to designate differences, variations, and disparities in the health achievements of individuals and groups. A straightforward example of health inequality is higher incidence of disease X in group A as compared with group B of population P. If disease X is randomly or equally distributed among all groups of population P, then there is no presence of health inequality in that population. In other words, health inequality is a descriptive term that need not imply moral judgment. To further illustrate this point, imagine individual A who dies at age 40 during a sky diving accident. His identical twin, B, who does not enjoy this hobby, lives to age 80. In this case, the unequal life spans of A and B (and for that matter, the unequal life expectancies of recreational sky divers and non-divers) reflects a personal choice that would not necessarily evoke moral concern. Besides such voluntarily assumed risks, other examples of health inequality that we would not normally consider unjust include pure chance (for example, a random genetic mutation—unlucky but not unjust) and life stage differences (for example, a 20 year old having better health than a 60 year old, but expected to succumb to the same slings and arrows of infirmity 40 years on). That said, many forms of health inequalities are also undoubtedly inequitable.

Health inequity refers to those inequalities in health that are deemed to be unfair or stemming from some form of injustice. Whitehead and Dahlgren¹¹ proposed additional considerations

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such as whether the inequalities are avoidable or unnecessary. There are some difficulties in adopting preventability and necessity as criteria for the definition of health inequity. In principle, even risk taking behaviour such as sky diving is avoidable or preventable. However, this does not make its tragic outcome more or less inequitable. As for necessity, a functionalist's defence of social stratification would view health inequalities as a "necessary" and inevitable consequence of maintaining a market economy.¹²

The crux of the distinction between equality and equity is that the identification of health inequities entails normative judgment premised upon (a) one's theories of justice; (b) one's theories of society; and (c) one's reasoning underlying the genesis of health inequalities. Because identifying health inequities involves normative judgment, science alone cannot determine which inequalities are also inequitable, nor what proportion of an observed inequality is unjust or unfair.

On one account, *most* of the health inequalities across social groups (such as class and race) are unjust because they reflect an unfair distribution of the underlying social determinants of health (for example, access to educational opportunities, safe jobs, health care, and the social bases of self respect).^{13, 14} On the other hand, some extreme views would deny any role of social injustice in the creation of health inequalities. Much of this debate revolves around the issues of free will and individual responsibility for self care. Those who emphasise individual responsibility tend to view health inequalities as the outcome of differences in how people make choices (for example, the decision to start smoking, or to adhere to a risk taking hobby), whereas social determinists view the same choices as arising out of constrained and unfair circumstances (for example, targeting of tobacco advertising to low income children).

The existence of a social gradient in health behaviours itself demands an explanation. The weight of the empirical evidence in the health inequalities literature supports the social determinist's position. That is, the decision to invest in personal health is not freely chosen to the extent that (a) there are *early life course* influences on adult health (when, presumably, most individuals are not competent to make informed choices); and (b) to the extent that one's life chances depend upon *contextual factors* (that is, ambient risks that are imposed on individuals through their micro and macro environment or the behaviour of others). The conditions that need to be met for regarding health inequalities as fair are, in fact, extremely stringent. Thus, many genetic differences, exposure to different childhood conditions, differences in most health behaviours, as well as most environmental exposures are unfair.

MEASURING AND ASSESSING HEALTH INEQUALITIES

Two distinct approaches have been described for evaluating health inequalities. *Measuring social group differences in health* represents the more common approach to assessment, characterised by defining certain social groups a priori (for example, social class, race) and then examining the health differentials between them. This approach assumes the existence of meaningful social groupings that reflect the unequal (and often unjust) distribution of resources and life opportunities across segments of society.

Alternatively, some researchers have sought to measure health inequalities by measuring the distribution of *health status across individuals in a population*, analogous to measures of income distribution in a population.¹⁵ It is argued that by restricting health inequality measurements to the value-free description of the distribution of health across individuals, one can bypass the dilemmas of selecting the variables used to measure social groups, like class, and thereby steer clear of normative positions regarding the origins of health inequalities across social groups. These two lines of reasoning—

essentially reflecting the distinction between "inequity" and "inequality", respectively, have been intensely debated.

According to Murray *et al*¹⁵: "the argument that social group differences are the best approach to measuring health inequalities confounds a positive issue, the extent of inequality across individuals, and a normative question: which inequalities are unjust?"¹⁵ (page 539). In response, Braveman *et al*¹⁶ have countered that one needs to be clear about the nature of one's research question. If a researcher is concerned about equity, then it is essential to study inequalities across social groups, and therefore normative judgments cannot—indeed ought not—be shirked. A fundamental argument against purely descriptive approaches is that it does not make sense to consider individuals stripped of their social relations. Any approach that lumps together members of a given population because they share a health profile runs the risk of: (a) disregarding meaningful groupings of political relevance; and (b) preventing inquiries into the causes of health inequalities in society.

On the other hand, it is true that the descriptive approach of measuring health distributions allows for more flexible comparisons of inequalities across time and place.

There are concerns about the comparability of groups across countries, or changes in social composition over time. International comparisons of health inequalities defined by social groups are potentially problematic, because: "(e)ven if occupation-based social group health differences are larger in France than in the United Kingdom, there may always be some new variable that can be used to define other social groupings in which differences are greater in the United Kingdom than in France"¹⁵ (page 540).

In summary, the two approaches yield complementary, not contradictory, information. Complementarity does not, however, imply equal priority of each approach in the construction of scientific knowledge geared towards overcoming health inequities. Measuring and monitoring health inequities can never be devoid of normative content, and accordingly priority must be given to analysing inequalities between groups constituted under social and historical criteria.²

SOCIOECONOMIC GRADIENT OR POVERTY: WHAT DRIVES HEALTH INEQUALITIES?

This question relates to the nature and shape of the relation between socioeconomic position and health. Research on health inequalities indicates that poor health is not simply confined to those at the bottom of the socioeconomic hierarchy. What, then, is the role of poverty in producing health inequalities? The answer to that question depends on one's definition of "poverty".

Poverty has been defined in both absolute and relative terms. *Absolute poverty* is defined as the inability to meet basic human needs, such as food, shelter and, avoidance of disease. It is typically operationalised in terms of a monetary threshold—a poverty line—deemed necessary to meet minimal human needs. The problem with this approach, as pointed out by Gordon and Spicker,¹⁷ is that the "absolute" requirement to meet needs such as food and shelter is relative to the rest of society. Thus:

"Nutritional requirements are dependent on the work roles of people at different points of history and in different cultures. Avoidable disease is dependent upon the level of medical technology. The idea of shelter is relative not just to climate, but also to what society uses shelter for" (Townsend,¹⁸ quoted in Gordon and Spicker,¹⁷ page 7).

The official poverty threshold in the United States is based on an absolute definition of poverty. Except for adjustment for

inflation, the US poverty definition has remained constant and invariant over time since it was introduced in 1964, based on the income needed to purchase a basic meal plan. Currently, about 11.3% of American households live below the official poverty threshold. However, the socioeconomic gradient in health (see below) clearly extends beyond individuals living below this official threshold.

Relative poverty, by contrast, defines poverty in terms of its relation to the standards that exist elsewhere in society.¹⁷ For example, Townsend¹⁸ refers to poverty as a form of relative deprivation, or “the absence or inadequacy of those diets, amenities, standards, services and activities which are common or customary in society”. The poverty line in this case is defined as some proportion of a society’s average per capita income or expenditure, for example, less than one half the country’s average per capita income. Adopting a relative poverty definition, a much greater proportion of the US population could be said to be impoverished, because of the wide disparities in income and wealth in that society. The socioeconomic gradient in health (below) is partly a reflection and consequence of the prevalence of relative poverty in society.

The socioeconomic gradient in health refers to the worse health of those who are at a lower level of socioeconomic position—whether measured by income, occupational grade, or educational attainment—even those who are already in relatively high socioeconomic groups.^{19–20} It is therefore not just the conditions associated with severe disadvantage (such as lack of access to food, housing, and medical care) that explain socioeconomic inequalities in health among those who have attained relatively high levels of socioeconomic position. That said, House and Williams²¹ emphasise that: “(I)t is most important to understand what accounts for socioeconomic inequalities in health across the broader lower range (e.g., lower 40–60%) of socioeconomic position, rather than focusing mainly or only on factors that might explain this relationship across the gradient or at higher levels” (page 89).

MATERIAL DEPRIVATION OR PSYCHOSOCIAL MECHANISMS: WHAT EXPLAINS HEALTH INEQUALITIES?

Different scholars have emphasised different explanations for the existence of health inequalities. *The material interpretation* of health inequalities emphasises the graded relation between socioeconomic position and access to tangible material conditions, from basics such as food, shelter, and access to services and amenities, as well as car and home ownership, access to telephones and the internet, and the like.²²

The psychosocial interpretation, by contrast, ascribes the existence of health inequalities to the direct or indirect effects of stress stemming from either being lower on the socioeconomic hierarchy, or living under conditions of relative socioeconomic disadvantage. Models of the direct effects of stress on physiological systems include *allostatic load*, which describes the wear and tear on the organism caused by exposure to daily adverse life circumstances.²³ Stress may also affect health indirectly by leading to a more adverse profile of behaviours such as smoking and excess drinking.

Occasionally, the material and psychosocial interpretations have been cast as if they were competing accounts of the mechanisms underlying health inequalities.²⁴ In reality, these explanations are not mutually exclusive, nor is it usually possible to disentangle their effects from one another. A common source of misunderstanding stems from the use of labels according to whether researchers are referring to initial causes or underlying pathways. The predominant usage of the “material” and “psychosocial” labels seems to be according to the underlying pathways by which different factors produce health inequalities. Thus, low social status/prestige and lack of

control are often labelled as psychosocial determinants of health, even though they may be triggered by material factors (such as lack of income or bad housing).

In principle, all material resources of some relevance to daily life have some psychosocial meaning attached to it. For example, home or car ownership has both a material interpretation as well as a psychosocial one (as in the symbolic sense of security that home or car ownership affords).²⁵ An internet or telephone connection enables a subscriber to find jobs or keep their jobs (calling in sick), as well as fulfill their sense of social connectedness. Even employment or money fosters a sense of control. Asking which of these mechanisms is more important for explaining health inequalities may not be revealing or helpful, especially if the solution in both instances is to improve people’s access to tangible resources.

THE ABSOLUTE AND RELATIVE INCOME HYPOTHESIS IN HEALTH INEQUALITIES

A distinct field of research on health inequality has begun to focus on the potential health effects of relative income, as separate from the effects of absolute income.²⁶

The *absolute income hypothesis* states that an individual’s health depends on their own (and only their own) level of income. In other words, the health status of an individual with a given level of income (say, 50% of the average income) is hypothesised to be the same regardless of what everybody else makes around him. But if everybody else’s incomes suddenly doubled, our hypothetical individual would be twice as poor as before—if one happens to subscribe to the relative concept of poverty discussed earlier. It is difficult to imagine that the poor person’s health would remain unaffected by the change, especially given that the standards of consumption necessary to function under the new arrangement are also likely to change. That is, changes in how the average members of society live will often force changes in how poor people live. Many material goods that are essential for functioning in advanced societies today—such as automobiles, telephones, access to the internet—started out as luxuries and later turned into necessities.^{27–28} The inability to attain the normative level of consumption may, in turn, cause psychosocial distress.

The *relative income hypothesis* asserts that health depends not just on one’s own level of income, but also on the incomes of others in society. At any given level of income, the hypothesis states that an individual’s health status depends on the *rank* within the income distribution that is bestowed upon the individual by her level of income, and/or the *distance* between her income and the average income (or some other benchmark of social comparison). It has proved difficult to directly test the relative income hypothesis, because of the lack of agreement about the appropriate reference group for social comparison—do individuals compare themselves to other below or above them? Do they compare themselves to others like them, or to celebrities and moguls portrayed in the mass media? Most likely, people compare themselves simultaneously in several directions.

An indirect test of the relative income hypothesis is provided by examining the association between *income distribution* and individual health. If relative income matters for health in addition to absolute income, then a low income person would fare worse in a more unequal society than in a more egalitarian society. The association between income inequality and individual health has been tested in a number of studies using the Gini coefficient or its close variants.^{29–30}

The *Gini coefficient* is a summary measure of income distribution. Algebraically, the Gini coefficient is defined as half of the arithmetic average of the absolute differences between all pairs of incomes in a population, the total then being normalised on mean income. If incomes in a population are distributed completely equally, it will be zero; and if one

person has all the income, it will be 1.0. A graphical interpretation of the Gini coefficient, as well as other common measures of income inequality, is described in Kawachi and Kennedy.²⁹

To date, studies of income inequality and health outcomes have yielded mixed results, with some studies indicating a modest effect of income inequality on individual mortality,³¹ self rated health,^{32–33} depressive symptoms,³⁴ and health behaviours.³⁵ Other studies have found no such effects after controlling for individual income,^{36–38} while some have revealed a differential effect of income inequality on different income groups.³⁹ In all of the aforementioned studies, the effect of income inequality on health was examined after controlling for individual income. It needs to be pointed out that the practice of adjusting for individual income when looking for an effect of income inequality has its own problems, as eloquently stated by Diez-Roux and colleagues³⁵:

“The analytical separation of these two mechanisms (i.e., the effects of absolute and relative differences) may be theoretically interesting but is also artificial, because both are inextricably linked. In reality adjusting inequality effects for individual-level income necessarily leads to an underestimation of the total inequality effect on health” (page 685).

Researchers have emphasised different mechanisms underlying the postulated link between income inequality and health. Some have focused on the psychosocial harm (for example, the shame, loss of self respect) produced by invidious social comparisons in an unequal society.⁴⁰ Others have focused on the patterns of social investment (for example, lower state effort on education and welfare spending) that often accompanies a growing distance between the rich and poor.⁴¹ Erosion of social cohesion and social capital has been cited as an additional mechanism underlying the relation between income inequality and health.^{42–43}

Social capital is defined as the resources available to individuals and to society through social relationships. Social capital has sometimes been erroneously identified as a purely psychosocial variable.²⁴ It should be obvious, however, that the resources available through social relationships can sometimes take the form of tangible factors (such as cash loans, labour in kind, access to information), in addition to psychosocial resources (such as trust, norms of reciprocity, and emotional support).

“UNHEALTHY” PEOPLE OR “UNHEALTHY PLACES”: THE SOURCE OF INEQUALITIES IN HEALTH

There is growing interest in documenting the role of place or context (defined as neighbourhoods, workplaces, regions, states) in (re)producing health inequalities.^{44–46} *Area or place effects* refers to the health effects of variables that tell us something about the places or contexts, and not simply the people who inhabit them. Macintyre⁴⁷ provides a useful distinction between types of place effects, referred to as collective and contextual place effects.

A *collective effect* refers to aggregated group properties that exert an influence on health over and above individual characteristics. For example, living in areas with a high proportion of people who have certain individual characteristics (for example, based on age, social class, income or race).

A *contextual effect*, meanwhile relates to the broader political, cultural, or institutional context, for example the presence or absence of features that are intrinsic to places, such as infrastructural resources, economic policies of states, social and public support programmes. Contextual effects can also include influences of cultural background, such as the ethnic, religious, and linguistic make up of communities, as well as certain ecological or environmental influences.

Place effects can be further unpacked in three different steps, in ascending order of complexity.⁴⁸ At the simplest level, the task is to distinguish compositional explanations from contextual explanations of spatial variations in health outcomes.

A *compositional explanation* for area differences ascribes the variations in health outcomes to the characteristics of individuals who reside in them. For example, higher mortality rates in high poverty areas may simply reflect the worse health status of poor individuals who make up a poor area. Similar types of people will experience similar health outcomes no matter where they live. If, however, contextual effects matter, then similar types of people can be expected to achieve very different levels of health depending upon where they live.

A second level of analytical complexity involves the unpacking of *contextual heterogeneity*. For instance, places vary differentially: places with high rates of poor health for one social group may have lower rates for the other groups and vice versa.

The third level of analytical complexity is unpacking *individual-contextual interactions*. Contextual factors (such as social capital or income inequality—both are examples of group characteristics)—may differentially affect different population groups. Thus, for instance contextual factors may have a greater impact on poor population groups as compared with non-poor groups, or vice versa. In summary, the notion of contextual analysis is that it matters not simply “who you are in relation to where you are”, but rather the question of “who you are depends upon where you are”.

Multilevel analytical approach provides a useful way of addressing the issues outlined above.^{48–49} As the name suggests, this approach anticipates that determinants of health inequalities occur simultaneously at several levels, from the individual, to neighbourhoods, regions, and states. Consequently, multilevel regression techniques are essentially about modelling heterogeneity at each of the desired levels of the conceptual model through a range of variables that tell us something about each of the levels. Importantly, these methodological and substantive perspectives⁵⁰ are supported by a robust technical estimation process.^{51–52} Indeed, any research on health inequalities that takes context and place seriously is intrinsically multilevel and cannot be otherwise. Multilevel methods consider most data structures within a nested framework and such nesting could be hierarchic and/or non-hierarchic. Seen this way, repeated/longitudinal analysis (whether it is people who are repeatedly measured or places), multivariate analysis (when there are more than one inter-related outcomes) or a cross classified analysis (when we do not have neat hierarchic nesting) are simply special cases of a multilevel regression framework.⁴⁸ Most existing multilevel applications have, however, failed to capitalise on the full potential offered by these frameworks and in particular the ability to model contextual heterogeneity (as defined here) and the idea of nested and correlated data structures.

LIFE COURSE PERSPECTIVES TO HEALTH INEQUALITY

Parallel with the growing interest in the dimension of place, researchers have increasingly sought to understand the emergence of health inequality across the dimension of time. *Life course effects* refers to how health status at any given age, for a given birth cohort, reflects not only contemporary conditions but embodiment of prior living circumstances, in utero onwards.⁵³ Detailed presentations of this perspective have been articulated elsewhere.^{54–55}

Three distinct pathways are hypothesised to be relevant to life course effects: firstly, *latent effects* by which the early life environment affects adult health independent of intervening experience; secondly, *pathway effects*, through which the early

life environment sets individuals onto life trajectories that in turn affect health status over time; and thirdly, *cumulative effects* whereby the intensity and duration of exposure to unfavourable environments adversely affects health status, according to a dose-response relation.⁵⁵ Regardless of the mechanisms leading to their expression, life course effects are fundamental to an understanding of the origins of health inequality.^{56–57} To the extent that health inequalities in adult life are partly determined by early life circumstances, their elimination cannot be left to individual choice alone.

WHAT OTHER KINDS OF INEQUALITY SHOULD WE STUDY?

Although we have emphasised health inequalities across socioeconomic groups, an analysis of inequalities would be incomplete without consideration of ascriptive characteristics. *Ascriptive* characteristics refer to traits present at birth (such as gender and race). Such characteristics may themselves influence the subsequent social position of individuals. Limitations of space do not allow us to extend this glossary to cover the concepts used in the analysis of gender and racial inequalities in health. Beyond gender and race, there are many other dimensions along which health inequalities could be described, including: political power (household authority, work place control, legislative authority), cultural assets (privileged lifestyles, high status consumption practices), social assets (access to social networks, ties, associations), honorific status (prestige, respect), and human resources (skills, expertise, training).⁵⁸ The empirical inquiry into health inequalities has only begun to scratch this surface.

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REFERENCES

- 1 **Hexel PC**, Wintersberger H. Inequalities in health: strategies. *Soc Sci Med* 1986;**22**:151–60.
- 2 **Breilh J**, Granda E. Epidemiología y Contrahegemonía. *Soc Sci Med* 1989;**28**:1121–7.
- 3 **Whitehead M**. *The concept and principles of equity and health*. Washington DC: Pan American Health Organization (CID/HSP/PAHO), 1991.
- 4 **Castellanos PL**. *Health status and social class in Latin America: implications for research and policy*. Washington: Pan American Health Organization/World Health Organization (PAHO-WHO), 1992.
- 5 **Montoya C**. La equidad: Usos del concepto como criterio de progreso. *Cuadernos Médicos Sociales* 1997;**38**:6–12.
- 6 **Wilkinson RG**. Socioeconomic determinants of health. Health inequalities: relative or absolute material standards? *BMJ* 1997;**314**:591–5.
- 7 **Whitehead M**. Diffusion of ideas on social inequalities in health: a European perspective. *Milbank Q* 1998;**76**:469–92, 306.
- 8 **Bartley M**, Sacker A, Firth D, et al. Towards explaining health inequalities. *BMJ* 2000;**320**:1303–7.
- 9 **Oliver A**, Cookson R. Towards multidisciplinary research into health inequalities. *Health Econ* 2000;**9**:565–6.
- 10 **Gwatkin DR**. Health inequalities and the health of the poor: what do we know? What can we do? *Bull World Health Organ* 2000;**78**:75–85.
- 11 **Dahlgren G**, Whitehead M. *Policies and strategies to promote social equality in health*. Stockholm: Institute of Future Studies, 1991.
- 12 **Davis K**, Moore WE. Some principles of stratification. *Am Sociol Review* 1945;**10**:242–9.
- 13 **Daniels N**, Kennedy B, Kawachi I. *Is inequality bad for our health?* Boston: Beacon Press, 2000.
- 14 **Woodward A**, Kawachi I. Why reduce health inequalities? *J Epidemiol Community Health* 2000;**54**:923–9.
- 15 **Murray CJL**, Gakidou EE, Frenk J. Health inequalities and social group differences: what should we measure? *Bull World Health Organ* 1999;**77**:537–43.

- 16 **Braveman P**, Krieger N, Lynch J. Health inequalities and social inequalities in health. *Bull World Health Organ* 2000;**78**:232–4.
- 17 **Gordon D**, Spicker P, eds. *The international glossary on poverty*. London: CROP Publications, 1999.
- 18 **Townsend P**. *Poverty in the United Kingdom*. London: Penguin, 1979.
- 19 **Marmot MG**, Davey Smith G, Stansfeld S, et al. Health inequalities among British civil servants. The Whitehall II study. *Lancet* 1991;**337**:1387–93.
- 20 **Adler NE**, Ostrove JM. Socioeconomic status and health: What we know and what we don't. *Ann NY Acad Sci* 1999;**896**:3–15.
- 21 **House JS**, Williams DR. Understanding and reducing socioeconomic and racial/ethnic disparities in health. In: Smedley BD, Syme SL, eds. *Promoting health. Intervention strategies from social and behavioral research*. Washington DC: National Academy Press, 2000:81–124.
- 22 **Lynch J**, Kaplan G. Socioeconomic position. In: Berkman LF, Kawachi I, eds. *Social epidemiology*. New York: Oxford University Press, 2000:13–35.
- 23 **McEwen BS**, Seeman T. Protective and damaging effects of mediators of stress. Elaborating and testing the concepts of allostasis and allostatic load. *Ann NY Acad Sci* 1999;**896**:30–47.
- 24 **Lynch JW**, Davey Smith G, Kaplan GA, et al. Income inequality and health: importance to health of individual income, psychosocial environment, or material conditions. *BMJ* 2000;**320**:1200–4.
- 25 **Macintyre S**, Ellaway A, Der G, et al. Do housing tenure and car access predict health because they are simply markers of income or self esteem? A Scottish study. *J Epidemiol Community Health* 1998;**52**:657–64.
- 26 **Kawachi I**, Kennedy BP, Wilkinson RG, eds. *Income inequality and health. A reader*. New York: The New Press, 1999.
- 27 **Jencks C**. *Rethinking social policy. Race, poverty, and the underclass*. Cambridge, MA: Harvard University Press, 1992.
- 28 **Frank RH**. *Luxury fever. Why money fails to satisfy in an era of excess*. New York: The Free Press, 1999.
- 29 **Kawachi I**, Kennedy BP. The relationship of income inequality to mortality—Does the choice of indicator matter? *Soc Sci Med* 1997;**45**:1121–7.
- 30 **Wagstaff A**, van Doorslaer E. Income inequality and health: What does the literature tell us? *Annu Rev Public Health* 2000;**21**:543–67.
- 31 **Lochner K**, Pamuk ER, Makuc D, et al. State-level income inequality and individual mortality risk: a prospective, multi-level study. *Am J Public Health* 2001;**91**:385–91.
- 32 **Kennedy BP**, Kawachi I, Glass R, et al. Income distribution, socioeconomic status, and self-rated health: a US multi-level analysis. *BMJ* 1998;**317**:917–21.
- 33 **Soobader M-J**, LeClere F. Aggregation and the measurement of income inequality: effects on morbidity. *Soc Sci Med* 1999;**48**:733–44.
- 34 **Kahn RS**, Wise PH, Kennedy BP, et al. State income inequality, household income, and maternal mental and physical health: cross-sectional national survey. *BMJ* 2000;**321**:1311–15.
- 35 **Diez-Roux AV**, Link BG, Northridge ME. A multilevel analysis of income inequality and cardiovascular disease risk factors. *Soc Sci Med* 2000;**50**:673–87.
- 36 **Fiscella K**, Franks P. Poverty or income inequality as predictors of mortality: longitudinal cohort study. *BMJ* 1997;**314**:1724–8.
- 37 **Daly M**, Duncan GJ, Kaplan GA, et al. Macro-to-micro links in the relation between income inequality and mortality. *Milbank Q* 1998;**76**:315–39.
- 38 **Mellor JM**, Milyo J. Reexamining the evidence of an ecological association between income inequality and health. *J Health Polit Policy Law* 2001;**26**:487–522.
- 39 **Subramanian SV**, Kawachi I, Kennedy BP. Does the state you live in make a difference? Multilevel analysis of self-rated health in the U.S. *Soc Sci Med* 2001;**53**:9–19.
- 40 **Wilkinson RG**. The culture of inequality. In: Kawachi I, Kennedy BP, Wilkinson RG, eds. *Income inequality and health. A reader*. New York: The New Press, 1999:492–8.
- 41 **Kawachi I**, Kennedy BP. Health and social cohesion: why care about income inequality? *BMJ* 1997;**314**:1037–40.
- 42 **Kawachi I**, Kennedy BP, Lochner K, et al. Social capital, income inequality, and mortality. *Am J Public Health* 1997;**87**:1491–8.
- 43 **Kawachi I**, Berkman LF. Social cohesion, social capital, and health. In: Berkman LF, Kawachi I, eds. *Social epidemiology*. New York: Oxford University Press, 2000:174–90.
- 44 **Jones K**, Moon G. Medical geography: taking space seriously. *Progress in Human Geography* 1993;**17**:515–24.
- 45 **Macintyre S**, Maciver S, Sooman A. Area, class and health: should we be focusing on places or people? *Journal of Social Policy* 1993;**22**:213–34.
- 46 **Macintyre S**, Ellaway A. Ecological approaches: rediscovering the role of the physical and social environment. In: Berkman LF, Kawachi I, eds. *Social epidemiology*. New York: Oxford University Press, 2000:332–48.
- 47 **Macintyre S**. What are the spatial effects and how can we measure them? In: Dale A, ed. *Exploiting national surveys and census data: The role of locality and spatial effects*. OP 12. Manchester: Centre for Census and Survey Research, University of Manchester, 1997:1–28.
- 48 **Subramanian SV**, Jones K, Duncan C. Towards a multilevel geography of health. In: Kawachi I, Berkman LF, eds. *Neighborhoods and health*. New York: Oxford University Press (in press).
- 49 **Pickett KE**, Pearl M. Multilevel analyses of neighborhood socioeconomic context and health outcomes: a critical review. *J Epidemiol Community Health* 2001;**55**:1111–22.
- 50 **Leyland AH**, Goldstein H, eds. *Multilevel modeling of health statistics*. Chichester: Wiley, 2001.

- 51 **Goldstein H.** *Multilevel statistical models*. 2nd edn. London: Arnold, 1995.
- 52 **Jones K, Bullen N.** Contextual models of urban house prices: a comparison of fixed- and random-coefficients model developed by expansion. *Economic Geography* 1994;**70**:252–72.
- 53 **Krieger N.** A glossary for social epidemiology. *J Epidemiol Community Health* 2001;**55**:693–700.
- 54 **Kuh DL, Ben Shlomo Y, eds.** *A life course approach to chronic disease epidemiology. Tracing the origins of ill health from early to adult life*. Oxford: Oxford University Press, 1997.
- 55 **Hertzman C.** The biological embedding of early experience and its effects on health in adulthood. *Ann NY Acad Sci* 1999;**896**:85–95.
- 56 **Marmot M.** Aetiology of coronary heart disease. *BMJ* 2001;**323**:1261–2.
- 57 **Barker DJP, Forsen T, Uutela A, et al.** Size at birth and resilience to effects of poor living conditions in adult life: longitudinal study. *BMJ* 2001;**323**:1273–6.
- 58 **Grusky DB, ed.** *Social stratification in sociological perspective*. Boulder, CO: Westview Press, 1994.



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