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Review

# Do differences in health make a difference?

## A review for health policymakers

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**Abstract**

While many societies have made remarkable progress in population health improvements, health inequalities remain as a central concern to health policy. There is substantial evidence to show that differences in health achievements and access to health care are increasing both within and among societies. Socio-economic and environmental health determinants are strongly associated to population health status regardless of what risk factor or technological advance is in vogue. Understanding the fundamental causes underlying the existence of health inequalities is useful for guiding health policy as it provides a direction to guide resource allocation and the targeting of policy interventions. The purpose of this paper is to review current perspectives and methods in the assessment of health inequalities with particular relevance to public health policymakers and practitioners. © 2007 Elsevier Ireland Ltd. All rights reserved.

*Keywords:* Health inequalities; Population health; Socio-economic gradients; Policy intervention

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The fascination with questions related to the reasons for increases in human life expectancy and why some people are healthier than others is the primary motivational force for population health research. As an

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approach, population health focuses on the interrelated conditions and factors that influence the health of populations, identifies systematic variations in their patterns of occurrence, and applies the resulting knowledge to develop and implement policies and actions to improve the health and well-being of those populations [1].

Some of the most definitive works in exploring heterogeneities in health have occurred in the research of health outcomes among societies. Past efforts have focused on the epidemiologic transition, which is characterized by a substantial decline in rates of mortality accompanied by increases in population size and life expectancy. Explanations for this transition have focused on the decline in early childhood infections [2], technological change [3], female literacy and the status of women [4], and the relationship between standard of living (generally measured as per capita GDP) and life expectancy [5].

This discussion will examine heterogeneities in health from the perspective of health inequalities. Although not necessarily a recent phenomenon, the considerable interest and burgeoning research into health inequalities holds promise that progress is being made in terms of understanding their origin (cause) and subsequently, potential interventions to reduce or eliminate their existence. Conclusions concerning the origin of health inequalities are characterized by a lively debate shaped by several perspectives related to the concept of health inequalities, explanations as to the origin of health inequalities, and particularly the measurements and tools used to assess health differences. These perspectives are not necessarily based on a comprehensive reflection of the evidence but, more likely, a propensity to seek a cohesive explanation for the existence of health inequalities and to detract attention from other possibilities [6,7]. The purpose of this paper is to critically review current perspectives and methods in the assessment of health inequalities with particular relevance to public health policymakers in considering their own assessment of health inequalities.

## **1. Health inequalities: conceptualization and explanation**

### *1.1. Concepts*

The concept of health inequalities is used to represent systematic differences, variations, and disparities

in the health achievements of individuals and groups [8]. Health inequalities may also be construed as the way in which measures of health are distributed unevenly among a proposed unit of analysis in the population. More specifically, health inequalities capture the difference in the prevalence or incidence of health problems among people or groups according to predetermined levels of socio-economic or other strata [9]. Conceptualization of health inequalities is crucial for measuring potentially systemic health differences arising from the distribution and design of health care resources, policies and social programs [10].

Currently, health inequalities are a feature of population health in many industrialized societies [11–13]. Health inequalities have increased over time despite indications of systemic declines in infant and premature mortality. Longitudinal studies in the United Kingdom [14,15], and in Finland [12] suggest a widening of health inequalities between classes and income stratifications even when examined at multiple geographic scales [16]. A prominent feature of the observed relationship between social class and health is its monotonicity, where increases or decreases in health outcomes vary accordingly with stepwise changes in social structure [15,17,18].

A good deal of research on health inequalities is situated in the positivist [and post-positivist] tradition and concerned with the construction of reality based on phenomena that are measurable. The tenets of this position are rooted in scientism [natural science as the model for social science], phenomenism (reductionism, atomism, and objectivism), empiricism (use of experimentation to move from observation to verification), value freedom, and instrumental knowledge [19]. Variation in research methods associated with the conceptualization of health inequalities may arise from the systematic reluctance of researchers to reveal their philosophical approach, and there appears to be very little room for alternative explanations based on constructivist or culturalist perspectives.

Until very recently, predominant focus of health inequalities research has been descriptive rather than explanatory. This change has largely been facilitated by interests in health inequalities from disciplines outside of medicine and epidemiology (as apart from social epidemiology), those being geography, sociology, psy-

chology, and economics, and relevant methodologies. The interdisciplinary nature of health inequalities research has led to a focus on the question—the equality of what? For example, understanding inequality may begin with an appreciation of the inherent heterogeneity among humankind, as we are genetically and socially different [20]. Thus, notions of inequality may accommodate the circumstantial variations of individuals within groups as well as variations among groups.

The difference in meanings between health inequalities and health inequities is worth noting. The terms are not synonymous since the use of equity implies a judgement of whether a particular inequality is morally acceptable or within the limits of societal values [21]. Undeserved inequalities may be morally undesirable, regardless of their source or of their sensitivity to social policy or institutions [22]. However, not all health inequalities are unfair [23]. For example, young adults are likely to be healthier than elderly adults; female newborns will, on average, weigh less than their male counterparts, and individuals will always be of different height.

### 1.2. Explanations

Beyond the work of identifying and defining health inequalities lies the more difficult task of explaining their origins. Thus it is pertinent here to explore more fully the theoretical explanations for why health inequalities indeed exist and persist. Townsend et al. [24] identified four explanations for health inequalities, and, to some degree, characterize the positions and approach of many researchers in the field. First, health inequalities can be viewed as artificial resulting from inadequate measurements of health and/or social class. For example, there are potential problems of reporting bias in relation to measures of morbidity and explains why many researchers rely more on mortality data [5]. The second explanation of health inequalities is rooted in the suggestion that health is a cause of social status rather than a result, and that more healthy individuals are naturally selected to higher status, whereas the least healthy tend to drift down the social scale. Much of the work in this area has been to rule out selection as an explanation of health inequalities although the focus has been more on how important selection is as an explanation. The general conclusion thus far is

that selection plays a small but significant role [25] but likely through indirect routes such as social mobility [17].

The third explanation contrasts the health selection explanation and views social position as a precursor to health with cultural/behavioural factors as the mechanism by which health inequalities are produced. The definition of culture can be reduced to a set of specific behaviours, typically comprised of smoking, drinking, diet, and exercise [24,26], that may conspire to affect health. Although few would dispute the relative importance of behavioural risk factors in predicting effects on morbidity and/or mortality, research results are mixed as to the extent of explanation. Health behaviours, in a study from the Netherlands, accounted for approximately 40% of the overall variance in morbidity [27]. Results from the Whitehall I study showed that traditional behavioural risk factors account for approximately 25% of the variance in CHD mortality among civil servants [28]. However, viewing behavioural factors as synonymous with cultural determinants of health may be misleading. Behavioural and cultural environments have to be seen as systems of interacting variables and processes [29]. The impact of behavioural factors can be aggravated or mitigated by a host of factors such as societal norms, values, and generational strategies for adaptation to change. Thus health policy research into health inequalities should be complimented with in-depth qualitative information to provide cultural context.

The fourth explanation, known as materialist or structuralist explanations, pertains to a host of factors that are determined by social class or income structures and that have an impact on health and well-being [24]. The materialist explanation has been the focus of research in four areas: the intrauterine environment, the external (natural) environment, psychosocial influences, and opportunity structures. For example, research has shown the possibility of a relationship between infant health and morbidity, and mortality in adult life [30]. Although somewhat contentious at the time, the relation was linked to health inequalities since birthweight and foetal growth tend to follow patterns along social class groupings. The relation between health in adult life and birthweight was subsequently supported by the results of a Swedish study that found a small but significant independent effect of birthweight on blood pressure [31].

Inclusion of health influences from early life has provided the basis for what is known as the lifecourse perspective, where the relationship between disadvantage, at specific life stages, and health is rooted in risk factors operating in both early and later life [32]. Three lifecourse models that are commonly utilized: the critical period models, accumulation models, and pathway models [33]. The first suggests that health inequalities arise from poor health and disease with origins in exposures occurring in sensitive period of development. Critical period models are based on the potential for impediments to psychosocial development arising from insecurity and instability at infancy, determined by assessments of parental interest and relationships, for example. Pathway models are similar to critical period models in that circumstances in early life are seen as predictive of adult health; however, the effect of disadvantage is indirect. For example, childhood disadvantage may restrict educational opportunities, which in turn influence health-related behaviours and outcomes later in life [34]. Accumulation models hypothesize that any exposure to disadvantage over the lifecourse has a cumulative effect on health outcomes and thus the creation of health inequalities. Thus inequalities could be mitigated through the experience of improved circumstances [35].

In continuing with materialist explanations, health inequalities may also arise from gradients in the quality of the natural environment within which individuals and/or groups reside. Work from a decade ago estimates that approximately 23% of preventable ill health at the global level is due to environmental risk factors [36]. Updated analyses report the environmental burden of disease is much larger than earlier figures state [37]. Health inequalities arise because many environmental exposures are not evenly distributed among members of society. Persons from ethnic minorities and the poor are more likely to reside near abandoned waste facilities; they are unjustly and differentially exposed to synthetic chemicals in the air, water and soil [38]. Contaminants created by human activities can migrate and interact among other natural processes in complex ways; it is not entirely clear whether the majority of the population in North America is aware of the fact that industrial processes and the release of pollutants now affect negatively the health of indigenous peoples in the far north, the majority who have no benefit from industry.

Health inequalities may also be created through psychosocial processes. For example, workers in lower status occupations, characterized as having low locus of control, little social support, and subject to policies upholding the mantra of efficiency rather than quality, tend to have increased incidences of cardiovascular-related morbidity and mortality [18]. Wilkinson [5] calls these findings “doubly significant” since, although derived from the working environment, they are likely to have domestic equivalents and thus tell us something about the factors that influence health at home or in other societal settings. For example, levels of social support and interaction at the community level are important for maintaining chances of good health [39,40]. Among groups with material disadvantage, perceived health status varies with the ability to construct a positive identity and the quality of the community within which they reside [41]. Community-level characteristics, also known as contextual influences, play a role in explaining variations in health and health experience [42,43].

## 2. Measuring health inequalities

The identification of health inequalities is crucial to health policymakers for planning of intervention and prevention strategies. Investigations of inequalities in health generally focus on health deficiencies as they occur in geographical, ethnic and socio-economically determined subgroups [44]. Two distinct approaches for the evaluation of health inequalities have been discussed [45]. The first requires measuring social group differences in health by defining specific social groups *a priori* and then examining the health differentials between them. This approach has been widely used in the health inequalities literature has provided some of the strongest evidence for the existence of large gradients in various health measures by income level, educational attainment and social class in many industrialized countries [46]. Aggregating individuals into social groups characterized by a common structure assumes the ability of each group to meaningfully reflect the unequal distribution of, or access to, resources and health providing opportunities across all segments within society.

Another approach is to calculate the inter-individual health differences, or a measure of the distribution of

health in a population, by combining data on mortality and non-fatal health outcomes in a single value. These summary measures include health expectancies (e.g. health-adjusted life expectancy, HALE), and health gaps (e.g. disability-adjusted life years, DALY). The two classes of measures are complimentary [47]. For example, DALY is the sum of the years of life lost due to premature mortality (YLL) in the population and the years lost due to disability (YLD) for incident cases of the health condition [48]. DALYs measure the distribution of life years lost from a specific health condition or risk in a population, and are advantageous to decision makers as they provide a universal metric (common currency) for measuring the health states of populations.

Policymakers will inevitably be faced with making a decision about the type of measurement to be used in decision making. If there is reason to believe that underlying social relations in society are partially responsible for the production of inequalities in health then it would be prudent to review evidence provided by the first approach. Policy-level interventions would aim to minimize health inequalities by reducing social inequalities (e.g. reducing the gap between the rich and the poor). Alternatively, the use of summary population health measures is attractive because it is possible to avoid the issues associated with selecting variables used to create social groupings [49]. Health inequalities are expressed as differences between geographic areas, risk factors for disease, gender—factual rather than constructed groupings. In this case policy interventions would be focused on specific geographic regions or on the prevention of risk factors of disease. The decision on how to develop policy for the reduction of health inequalities would include several measures and would be well informed on the advantages and disadvantages of the approach taken.

The ultimate challenge for health policymakers is the development of policy to reduce health inequalities. Effective policymaking will maximize the efficiency of scarce resources, engage the more distal determinants of health inequalities, and acknowledge the complexity of intervention (e.g. feedbacks, unintended consequences). Methods for measuring health inequalities require answers to three questions: (1) what are inequalities to be measured between (e.g. group or population level, geographic regions, risk factor prevalence, time periods)? (2) what type of inequality is of

interest (e.g. relative or absolute inequality, or risk-versus outcome-based measures)? and (3) what is the intended use of an index for health inequality (e.g. for assessing the impact of specific policies on population groups, or the creation of league tables)?

There are generally two main types of data on health and disease that can be used to investigate health inequalities. These include data from administrative sources, such as mortality and morbidity data and health services activity, and data derived from surveys of health either based on samples from the general population or from a predetermined grouping [high or low disease risk, for example]. Health comparisons of populations and subgroups are usually a product of administrative data expressed in terms of incidence and mortality rates standardized by age and stratified by gender [50]. However, rates depend on the choice of standard population, and are unsuitable as an impact measure since they give little weight (value) to the age at which morbidity or death occurs [51]. For example, rates of a specific cancer in children may be of more importance from a policy perspective than in the elderly.

Health surveys are also useful identifying health inequalities and contain useful information on self-perceived well-being, medical diagnoses or disability and questions of lifestyle (such as diet, exercise and, possibly, risk taking behaviours), and data on many environmental influences. Research conducted for WHO's *Health for All* program recommended standard contents for questionnaire that could be used for the monitoring of health inequalities and morbidity [52], and included measures such as perceived health, temporary and long-term measures of disability, prevalence of chronic conditions, and emotional well-being. Also of interest are efforts to convert scores from health questionnaires into an overall health rating or index. An index is an attractive proposition for health policymakers who would likely prefer a single measure on which to evaluate gains achieved by programs and interventions to reduce health inequalities. However, variations in the meaning of health raises the issue of how to weight the different construct domains from questionnaires to derive an overall health measure [26].

Policymakers must also be aware of several issues arising from the determination of health inequalities and only a few are presented here. Individuals may simultaneously occupy a position within sev-

eral grouping dimensions (marital status and ethnicity, for example) and interactions associated with belonging to more than one group may have consequences for making conclusions about health inequalities [49]. Misclassification of health outcomes (coding) is also important to consider. Retroactive investigations of health inequalities may be influenced by bias associated with the differential recording of ethnicity by the family in census data and by physicians in mortality data [53].

### 3. Reducing health inequalities

The existence of health inequalities does not in itself necessarily lead to the development of policies to alleviate them. In addition to being recognized as an important public health policy issue, the existence of health inequalities may also be seen as inequitable. Activities to reduce health inequalities are warranted because inequalities are unfair, affect everyone in society, are avoidable, and are relatively inexpensive to alleviate [54]. Health inequalities may reflect underlying inequities in the distribution of the social determinants of health [55]. Any inequality in society, social or economic, should be of greatest benefit to the least-advantaged members of society [56].

Countries in North America and Europe have undertaken actions to mitigate health inequalities and these efforts have resulted in several innovative policy approaches. The United Kingdom has instituted a government-wide plan to reduce health inequalities by improving access to health care services, developing performance indicators to achieve health targets, improving screening programs, and by focusing on the largest causes of mortality [57]. The Swedish and Finish governments have also adopted new health policy targets for dealing with health inequalities. European efforts to reduce or acknowledge health inequalities are more evident than in North America, which has either held on to the idea of a classless society or substitutes racial differences for class differences [58]. For example, the difference in life expectancy between the healthiest and most ill-prone in the United States is over 35 years [53]. Race, income and access to health care cannot explain the vast differences in life expectancy. Although policies to reduce

these differences are reflected in U.S. national health goals, inequalities in health have persisted even though measures of population health have improved overall.

The capacity for policymakers to make informed decisions about policies for the reduction of health inequalities is challenged by the type of evidence made available by the research community. The population health evidence base is variable and there are few policy-relevant outcome evaluations available [59]. Systematic reviews of research for the reduction of health inequalities, for example, are noted to have several drawbacks. These drawbacks include a tendency to focus on methods rather than the quality of intervention, emphasis on medical rather than social intervention (and on individuals rather than groups), as well as a general failure to account for the context within which policy interventions would be carried out thus limiting assessment of the generalizability of the intervention [60].

Incorporating qualitative assessments of interventions for the reduction of health inequalities can help to illuminate the causes for success or failure in specific contexts, and will enable some consideration of the local environment where policy interventions are undertaken. Qualitative assessments of population health determinants such as issues of governance or cultural settings, can serve to strengthen appraisals of evidence for policy interventions. Recent syntheses of qualitative research are useful to policymakers interested in the reduction of health inequalities for several reasons. Qualitative work provides beneficial information on how policies or programs are enacted and how they are accepted by the target population [61]. Support of policy interventions for health inequalities can be enhanced with the addition of real life experience to contextualize policy intervention outcomes [62]. Including qualitative information may also illuminate how upstream interventions to reduce health inequalities, such as government services, can influence the process behind the creation of health inequalities, and not necessarily the factors responsible for differences in health outcomes.

In addition to qualitative approaches, natural policy experiments offer an opportunity to investigate the effects of policies to reduce health inequalities. Natural policy experiments can be used to investigate the determinants of health inequalities, and

can assist in the detection of effective policy interventions [63]. For example, the addition of a large employer to a community can be analyzed to investigate effects on the socio-economic determinants of health, and ultimately health inequalities. Comparisons with similar communities without large-scale forms of economic investments provide policymakers with some evidence on which to base the allocation of resources to reduce health inequalities. An additional benefit to natural experimentation is the ability to assess the interaction among existing policy structures and institutional arrangements, and interventions to reduce health inequalities.

State-of-the-art policy interventions for health inequalities are most prevalent at the intra-country level. Considering the potential scope for population health improvements arising from reductions in health inequalities, there are relatively few evidence-based reviews of policy-level interventions. There is overwhelmingly good evidence to show that policymakers can have the greatest influence through manipulation of socio-economic health determinants. Such strategies may include, for example, alterations to macroeconomic and social policies [64], progressive taxation regimes, and directed investments in physical and

social assets such as health promoting facilities and access to educational opportunities [65]. The majority of policy level interventions to reduce health inequalities can be attributed to one of three categories: (1) those targeting socio-economic disadvantage, (2) those targeted toward factors that can mediate the effect of socio-economic standing on health, and (3) policies to improve accessibility and quality of health promoting services [66].

While policy-level interventions are extremely important in reducing health inequalities, there are several barriers to policymakers that obstruct health inequality policy intervention planning and priority setting. The uptake of interventions for the reduction of health inequalities is usually more pronounced in more privileged and educated groups [65]. Additional barriers include the lack of skills for health planning, a potential lack of supportive institutional structures and processes, difficulty in obtaining intersectoral cooperation and collaboration, and the real possibility of political interference to successfully hamper the planning and execution of health inequality policy interventions [67].

While some progress has been made to research and develop policy level interventions for the reduc-

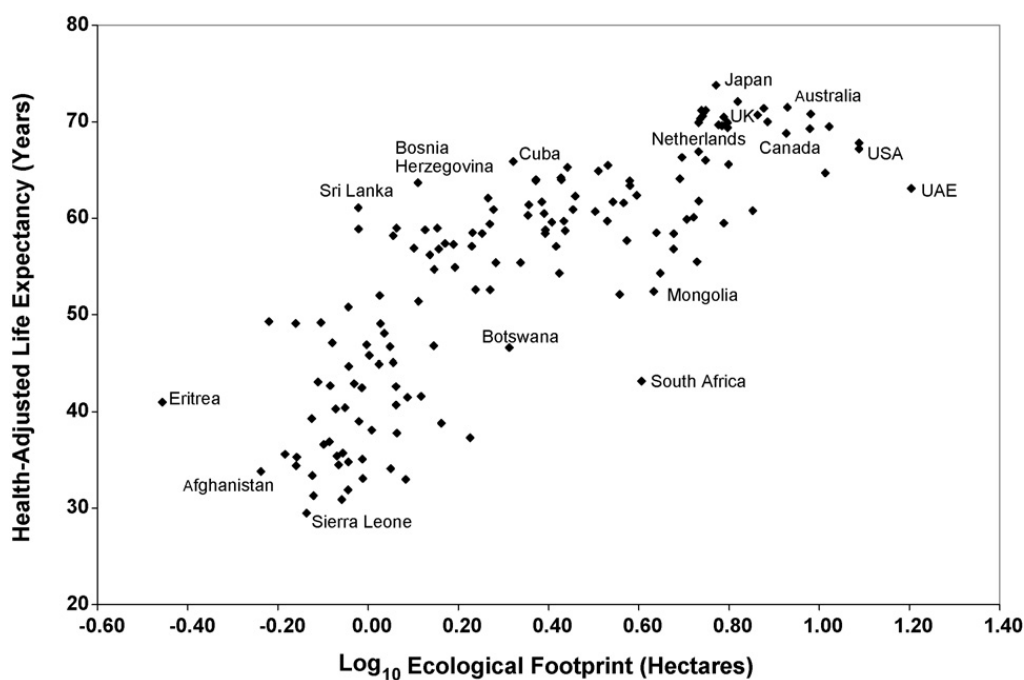


Fig. 1. The association between ecological footprint health-adjusted life expectancy for 152 countries and a population of 5.8 billion. Sources: Wackernagel et al. [70]; UNDP, Human Development Indicators, 2002 [69].

tion of health inequalities at the country level, there is a significant deficiency in efforts to understand the influence of broad transnational policy on health inequalities at the global level. For example, differences in life expectancy and rates of infant mortality at the country level can be explained to a large degree by the ability of any country to consume large amounts of imported materials and export resulting wastes. Fig. 1 shows the relationship between ecological footprint, a measure of consumption, and two population health measures, life expectancy at birth and the infant mortality rate. The ecological footprint is an impact measure designed to assess the area in hectares of biologically productive land and water required to support the consumption patterns of a society [68]. A larger footprint value indicates a greater population average rate of consumption in any given society.

It has been estimated that approximately 15% of the global population, mostly in industrialized states, consume more than 76% of the total available natural resources. The imbalance has ultimately led to a perpetuation of global health inequalities and there are many indicators to show this imbalance to be worsening [69]. Thus policymakers must also consider the development of policy level interventions, or possibly adjustments to existing policy instruments – such as global trade, tariff, and pollution policies – to reduce global inequalities in health.

#### 4. Discussion

This paper has reviewed the concept of health inequalities in terms of its associated discourse and meanings, the methods used to assess health inequalities, and has examined some potential avenues for policymakers to reduce health inequalities. Presently it is unclear whether it will be possible for policymakers to substantially reduce health inequalities. Trends in health inequalities within and among many countries have shown a widening of the gap. Health inequalities seem to be very much associated with the fundamental causes of many health determinants, such as the distribution of income, power relations, macroeconomic instruments, as well as access to health promoting resources, and should be considered in the context of economic and social policies. That is, pol-

icy level efforts to reduce health inequalities do not necessarily lie with state level health authorities, but also with policymakers in finance, education, taxation, and other areas not usually considered health related.

On a positive note, there has been a great amount of progress in the development of policies and interventions to reduce health inequalities. Several innovative policy approaches, such as those utilizing natural experiments or qualitative information, provide some evidence of effectiveness even though the evidence may not fulfill the highest of scientific standards. Good evidence for policymakers is less likely to become available unless some these and other approaches are introduced and evaluated more broadly. In addition, many countries have developed comprehensive policy strategies for the reduction of health inequalities with strong theoretical bases and are being taken seriously by policymakers. There are also many challenges in the development of effective strategies to reduce health inequalities. Relatively little evidence is available on the effectiveness of policies to reduce health inequalities and there is substantial variation in the types of policies applied. This may reflect adaptation to national circumstances, or it might suggest that policy making in this area is still largely intuitive. Proposed policy strategies are not necessarily generalizable to other locales and policymakers must be attuned to issues of governance and whether policies are politically or practically feasible. Further development of policies to reduce health inequalities at the international level must also be a priority. International organizations such as the International Monetary Fund, the World Bank, World Health Organization and the United Nations should consider the effects of policy level instruments on health inequalities globally, and have a strong role in supporting the reduction in health inequalities.

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## References

- [1] Federal/Provincial/Territorial Advisory Committee on Population Health (Canada), Canada, Health C. Report on the health of Canadians. Ottawa: Health Canada; 1996.
- [2] McKeown T, Lowe CR. An introduction to social medicine. 2nd ed. Oxford: Blackwell Scientific; 1974.
- [3] Caldwell JC. Population health in transition. *Bulletin of the World Health Organization* 2001;79(2):159–60.
- [4] Sandiford S, Cassel J, Montenegro M, Sanchez G. The impact of women's literacy on child health and its interaction with access to health services. *Population Studies* 1995;49:5–18.
- [5] Wilkinson RG. *Unhealthy societies the afflictions of inequality*. London: Routledge; 1996.
- [6] Macintyre S. The Black report and beyond: what are the issues? *Social Science and Medicine* 1997;44(6):723–45.
- [7] Forbes A, Wainwright SP. On the methodological, theoretical and philosophical context of health inequalities research: a critique. *Social Science and Medicine* 2001;53(6):801–16.
- [8] Kawachi I, Subramanian SV, Almeida-Filho N. A glossary for health inequalities. *Journal of Epidemiology and Community Health* 2002;56(9):647–52.
- [9] Mackenbach JP, Kunst AE. Measuring the magnitude of socioeconomic inequalities in health: an overview of available measures illustrated with two examples from Europe. *Social Science and Medicine* 1997;44:757–71.
- [10] Braveman P, Gruskin S. Defining equity in health. *Journal of Epidemiology and Community Health* 2003;57(4):254–8.
- [11] Pearce N, Marshall S, Borman B. Undiminished social class mortality differences in New Zealand men. *The New Zealand Medical Journal* 1991;104(910):153–6.
- [12] Valkonen T, Martelin T, Rimpela A, Notkola V, Savela S. Socio-economic mortality differences in Finland 1981–90. Helsinki: Statistics Finland; 1993.
- [13] Kunst AE, Mackenbach JP. International variation in the size of mortality differences associated with occupational status. *International Journal of Epidemiology* 1994;23(4):742–50.
- [14] Davey Smith G, Blane D, Bartley M. Explanations for socioeconomic differentials in mortality: evidence from Britain and elsewhere. *European Journal of Public Health* 1994;4:131–44.
- [15] Davey Smith G, Neaton JD, Stamler J. Socioeconomic differentials in mortality risk among men screened for the multiple risk factor intervention trial: I. White men. *American Journal of Public Health* 1996;86:486–96.
- [16] Dorling D, Joseph Rowntree Foundation. *Death in Britain how local mortality rates have changed: 1950s–1990*. York: Joseph Rowntree Foundation; 1997.
- [17] Macintyre S. The patterning of health by social position in contemporary Britain: directions for sociological research. *Social Science and Medicine* 1986;23(4):393–415.
- [18] Marmot M, Ryff CD, Bumpass LL, Shipley M, Marks NF. Social inequalities in health: next questions and converging evidence. *Social Science and Medicine* 1997;44(6):901–10.
- [19] Delanty G. *Social science beyond constructivism and realism*. Buckingham: Open University Press; 1997.
- [20] Sen AK. *Inequality reexamined*. New York: Russell Sage Foundation; 1992.
- [21] Asada Y. A framework for measuring health inequity. *Journal of Epidemiology and Community Health* 2005;59(8):700–5.
- [22] Temkin LS. *Inequality*. New York: Oxford University Press; 1993.
- [23] Anand S. The concern for equity in health. *Journal of Epidemiology and Community Health* 2002;56(7):485–7.
- [24] Townsend P, Davidson N, Black D, Whitehead M. *Inequalities in health the Black report*. London: Penguin; 1988.
- [25] Blane D, DaveySmith G, Bartley M. Social selection: what does it contribute to social class differences in health? *Sociology of Health & Illness* 1993;15:1–15.
- [26] Blaxter M. *Health and lifestyles*. London: Tavistock/Routledge; 1990.
- [27] Stronks K. *Inequalities in health: individual choice or social circumstances?* Wageningen: Ponsen & Looijen; 1997.
- [28] Rose G. Social class and coronary heart disease. *British Heart Journal* 1981;45:13–9.
- [29] Corin E. The social and cultural matrix of health and disease. In: Evans RG, Barer ML, Marmor TR, editors. *Why are some people healthy and others not?* New York: Aldine de Gruyter; 1994. p. 93–132.
- [30] Barker D. *The foetal and infant origins of adult disease*. London: BMJ Publications; 1992.
- [31] Koupilova I, Leon DA, Vagero D. Can confounding by sociodemographic and behavioural factors explain the association between size at birth and blood pressure at age 50 in Sweden? *Journal of Epidemiology and Community Health* 1997;51(1):14–8.
- [32] Kuh DJ, DaveySmith G. When is mortality risk determined? Historical insights into the current debate. *Social History of Medicine* 1993;6:101–23.
- [33] Graham H. Building an inter-disciplinary science of health inequalities: the example of lifecourse research. *Social Science and Medicine* 2002;55(11):2005–16.
- [34] Wadsworth ME, Kuh DJ. Childhood influences on adult health: a review of recent work from the British 1946 national birth cohort study, the MRC National Survey of Health and Development. *Paediatric and Perinatal Epidemiology* 1997;11(1):2–20.
- [35] Power C, Manor O, Matthews S. The duration and timing of exposure: effects of socioeconomic environment on adult health. *American Journal of Public Health* 1999;89(7):1059–65.
- [36] Murray CJL, Lopez AD. Harvard School of Public Health, World Health Organization, World Bank. *The global burden of disease a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020: summary*. Cambridge, MA: Published by the Harvard School of Public Health on behalf of the World Health Organization and the World Bank; 1996.
- [37] Smith KR, Corvalan CF, Kjellstrom T. How much global ill health is attributable to environmental factors? *Epidemiology* 1999;10(5):573–84.
- [38] Jerrett M, Eyles J, Cole D. Environmental equity in Canada: an empirical investigation into the income distribution of pollution in Ontario. *Social Science and Medicine* 1997;47:33–49.
- [39] Mitchell R, Gleave S, Bartley M, Wiggins D, Joshi H. Do attitude and area influence health? A multilevel approach to health inequalities. *Health & Place* 2000;6(2):67–79.

- [40] Subramanian SV, Lochner KA, Kawachi I. Neighborhood differences in social capital: a compositional artifact or a contextual construct? *Health & Place* 2003;9(1):33–44.
- [41] Popay J, Thomas C, Williams G, Bennett S, Gatrell A, Bostock L. A proper place to live: health inequalities, agency and the normative dimensions of space. *Social Science and Medicine* 2003;57(1):55–69.
- [42] 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.
- [43] Shaw M, Dorling D, Mitchell R. *Health, place, and society*. Harlow, England: Prentice Hall; 2002.
- [44] Ashton J, Alvarez-Dardet C. Inequalities in health: then and now. *Journal of Epidemiology and Community Health* 1999;53:321.
- [45] Kawachi I, Berkman LF. Social cohesion, social capital, and health. In: Berkman LF, Kawachi I, editors. *Social epidemiology*. New York: Oxford University Press; 2000. p. 174–90.
- [46] Marmot M, Davey Smith G, Standfield S, Patel C, North F, Head J. Health inequalities among British civil servants: the Whitehall II study. *Lancet* 1991;337:1387–93.
- [47] Lopez A. The evolution of the global burden of disease framework for disease, injury and risk factor quantification: developing the evidence base for national, regional and global public health action. *Global Health* 2005;1:5.
- [48] Lopez A, Murray CC. The global burden of disease, 1990–2020. *Nature Medicine* 1998;4:1241–3.
- [49] Murray CJ, Gakidou EE, Frenk J. Health inequalities and social group differences: what should we measure? *Bulletin of the World Health Organization* 1999;77(7):537–43.
- [50] Selvin S. *Statistical analysis of epidemiologic data*. 2nd ed. New York: Oxford University Press; 1996.
- [51] Gardner JW, Sanborn JS. Years of potential life lost (YPLL)—what does it measure? *Epidemiology* 1990;1(322):329.
- [52] Kunst A, Mackenbach J. *Measuring socioeconomic inequalities in health*. Copenhagen: World Health Organization; 1995.
- [53] Murray CJ, Kulkarni SC, Michaud C, Tomijima N, Bulzacchelli MT, Iandiorio TJ, et al. Eight Americas: investigating mortality disparities across races, counties, and race-counties in the United States. *PLoS Medicine* 2006;3(9):e260.
- [54] Woodward A, Kawachi I. Why reduce health inequalities? *Journal of Epidemiology and Community Health* 2000;54(12):923–9.
- [55] Daniels N, Kennedy BP, Kawachi I. Why justice is good for our health: the social determinants of health inequalities. *Daedalus* 1999;128:215–51.
- [56] Rawls J. *Justice as fairness: a restatement*. Cambridge, MA: Belknap Press; 2001.
- [57] Dean M. A fresh look at UK health inequalities. *Lancet* 2002;360(9349):1949.
- [58] Spasoff R. *Epidemiologic methods for health policy*. New York, NY: Oxford University Press; 1999.
- [59] Millward L, Kelly M, Nutbeam D. *Public health intervention research: the evidence*. London: Health Development Agency; 2001.
- [60] Asthana S, Halliday J. Developing an evidence base for policies and interventions to address health inequalities: the analysis of “public health regimes”. *The Milbank Quarterly* 2006;84(3):577–603.
- [61] Graham H, McDermott E. Qualitative research and the evidence base of policy: insights from studies of teenage mothers in the UK. *Journal of Social Policy* 2005;35:21–37.
- [62] Petticrew M, Whitehead M, Macintyre S, Graham H, Egan M. Evidence for public health policy on inequalities: 1. The reality according to policymakers. *Journal of Epidemiology and Community Health* 2004;58:811–6.
- [63] Petticrew M, Cummins S, Ferrell A, Findlay A, Higgins C, Hoy C, et al. Natural experiments: an underused tool for public health. *Public Health* 2005;119:751–7.
- [64] Oldenburg B, McGuffog ID, Turrell G. Socioeconomic determinants of health in Australia: policy responses and intervention options. *The Medical Journal of Australia* 2000;172(10):489–92.
- [65] Catford J. Reducing health inequalities—time for optimism. *Health Promotion International* 2002;17(2):101–4.
- [66] Mackenbach JP, Stronks K. A strategy for tackling health inequalities in the Netherlands. *British Medical Journal* 2002;325(7371):1029–32.
- [67] Tugwell P, O’Conner A, Andersson N, Mhatre S, Kristjansson E, Jacobsen MJ, et al. Reduction of inequalities in health: assessing evidence-based tools. *International Journal for Equity in Health* 2006;5:11.
- [68] Wackernagel M, Rees WE. *Our ecological footprint reducing human impact on the earth*. Gabriola Island, BC: New Society Publishers; 1996.
- [69] United Nations Development Program. *Human development report*. New York: Oxford University Press; 1997.
- [70] Wackernagel M, Cellejas A, Deumling D, Sanchez M, Falfan I, Loh J. *Ecological footprints and ecological capacities of 152 nations: the 1996 update*. Redefining progress with Centro de Estudios para la Sustentabilidad and WWF Internacional; 2000.