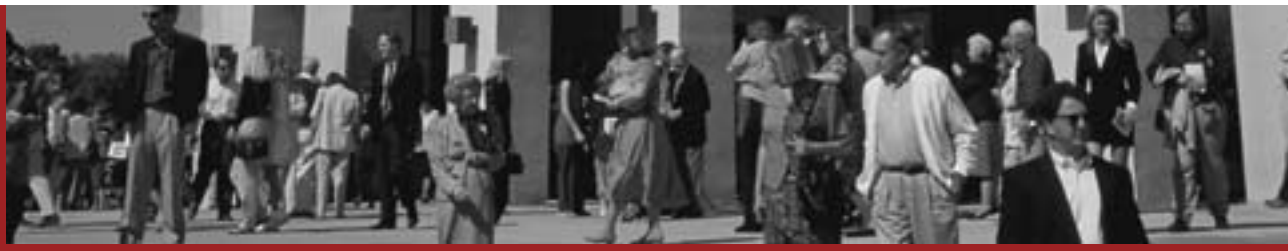
What Have We Learned Studying Income Inequality and Population Health?



CPHI SPC
Canadian Population Health Initiative | Initiative sur la santé de la population canadienne

CIHI ICIS
Canadian Institute for Health Information
Institut canadien d'information sur la santé

What Have We Learned Studying Income Inequality and Population Health?

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The views expressed in this report do not necessarily represent the views of the Canadian Population Health Initiative or the Canadian Institute for Health Information.

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About the Canadian Population Health Initiative

The Canadian Population Health Initiative (CPHI), a part of the Canadian Institute for Health Information (CIHI), was created in 1999. The mission of CPHI is twofold: to foster a better understanding of factors that affect the health of individuals and communities, and to contribute to the development of policies that reduce inequities and improve the health and well-being of Canadians.

As a key actor in population health, CPHI:

- provides analysis of Canadian and international population health evidence to inform policies that improve the health of Canadians,
- commissions research and builds research partnerships to enhance understanding of research findings and to promote analysis of strategies that improve population health,
- synthesizes evidence about policy experiences, analyzes evidence on the effectiveness of policy initiatives and develops policy options, and
- works to improve public knowledge and understanding of the determinants that affect individual and community health and well-being.

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It should be noted that the analyses and conclusions in the report do not necessarily reflect those of CPHI or CIHI.

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Introduction

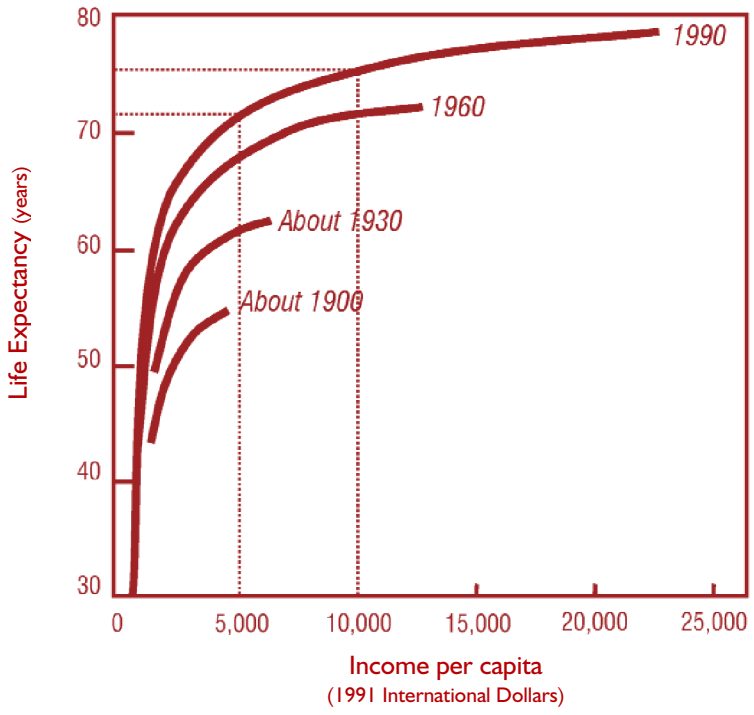
The idea that the income distribution of a place can influence the health of the people living there has captured the imagination and intellectual energy of epidemiologists and social scientists in countries all over the world for more than a decade. This paper examines research on income inequality and mortality up to the most recent international work, which explored the relationship across 528 cities in five industrialized countries. The focus of the paper then turns to a discussion of efforts to explain some of the differences between the countries, particularly those differences that are relevant to policy. Two of the countries—Canada and the United States (U.S.)—have been the subject of an ongoing "natural experiment," and the current state of the results of this work are presented, particularly those comparing the nature of the urban social ecologies of the two countries. The paper then discusses the theoretical debate that underlies much of the research on income distributions and health status, and in particular, suggests that a useful step forward may be research that considers the mechanisms that may be involved in producing inequality (particularly that related to early-life educational gaps) in various social contexts. The paper concludes with a summary and an articulation of the policy implications of the body of research that has been done to date in this area.

A Chronology of the Income Inequality—Population Health Story

The pioneers in this (relatively young) field were Preston[1] and Rodgers.[2, 3] Using ecological cross-sectional analyses of countries, they effectively set the stage for what was to become a flurry of scientific interest in this topic throughout the 1990s and into the new century. In 1975, Preston established that national-scale life expectancy in the 1900s, 1930s and 1960s exhibited a non-linear relationship with per capita national income. In other words, there was not a simple relationship between life expectancy and income; there were obvious diminishing returns to population health status with increased absolute income, and above a certain threshold of national income, gains in life expectancy were not related to higher levels of average income. His interpretation of this at the time was that over the course of the 20th century, life expectancy had become increasingly dissociated from absolute measures of wealth. The suggestion from his work was that at least some of the variation in life expectancy at the upper income levels could come from variations in income distribution between countries. In 1990, the World Bank produced a widely cited extension of this work with similar conclusions: for the very wealthy countries, it appeared that population health measures were no longer patterned by absolute income (as measured by income per capita)[4] (Figure 1).

Figure 1

Income per Capita Versus Life Expectancy



Source: Adapted from World Bank Development Report 1993: Investing in Health (New York: Oxford University Press, 1993), p.34, Fig.1.9: Life Expectancy and Income per Capita for Selected Countries and Periods. Copyright—1993 by The International Bank for Reconstruction and Development/The World Bank. Reproduced with permission from Oxford University Press, Inc.

In 1979, Rodgers looked at 50 countries at various stages of development[2] and modelled life expectancy at birth, life expectancy at age five, and infant mortality as a function of an absolute measure of income (mean income) and income inequality. The main contributions of his work were the use of sound statistical models to link income inequality and population health status, and arguably, the link between significant hypothetical gains in life expectancy to more egalitarian income distributions.

Notwithstanding these important early contributions, the piece of research that attracted the most attention from colleagues was Wilkinson's study of nine OECD nations for the late 1970s and early 1980s.[5] He showed that life expectancy at birth was clearly associated with the share of disposable income held by the least well-off 70 percent of the population and, as Rodgers had demonstrated earlier,[2,3] controlling for average national incomes did not affect this association.

So by 1992, there were three key studies using countries as the unit of analysis, all suggesting a connection between the way a nation distributes its wealth and the health status of its population. What followed through the latter half of the decade were three more key studies, using jurisdictions within the U.S. as the unit of analysis.[6, 7, 8, 9] These studies added a lot of fervour and enthusiasm for the notion that income inequality determines population health status.

Two of these studies, which emerged from different scientific teams in the U.S., were published almost simultaneously, with remarkably similar results. Kaplan and his colleagues showed that, in 1990, the income share held by the least well-off 50 percent of the population in each state was strongly associated with overall mortality ($r=-0.62$; $p < 0.001$), even after accounting for the possible confounding effects of median state income or state poverty levels.[6] Kennedy and his colleagues also found an independent effect of income inequality on all-cause mortality and cause-specific mortality at the state level using both the Gini coefficient and a measure of inequality known as the Robin Hood Index.[7] This same group followed up their initial ecological, cross-sectional research with a multi-level analysis (a stronger research design) in 1998 and found that, even after accounting for personal characteristics including household income, those living in states with the most severe income inequality were 30 percent more likely to report their health as fair or poor than individuals living in the most equal states.[10] Also in 1998, Lynch and colleagues extended the state-level work to metropolitan areas. They found that metropolitan areas in the U.S. with high income inequality had significantly greater mortality rates than those areas with low income inequality regardless of which measure of inequality was used.[9] Finally, Soobader and LeClere found similar results one year later, this time with individual self-perceived health as the outcome and census counties and tracts as the contextual units of analysis.[11]

By the late 1990s, the research on this topic had gained sufficient momentum for the *British Medical Journal* to label the relationship between income inequality and mortality the "Big Idea."[12] To quote the editors directly, the big idea was the notion "that what matters in determining mortality and health in a society is less the overall wealth of that society and more how evenly wealth is distributed. The more equally wealth is distributed the better the health of that society."[12] (p. i) It was with this basic hypothesis that Ross and colleagues began their work comparing jurisdictions in Canada and the

U.S. on the relationship between income distribution and health. There was no reason to believe when this work began that summary measures of population health in Canada would not also be patterned by income inequality, as they were both internationally and in the U.S. But with few exceptions, which will be articulated later on in the paper, income inequality has not turned out to be particularly helpful in explaining mortality patterns within Canada.

In their study of provinces and states and 333 metropolitan areas in Canada and the U.S., Ross et al showed an overall pattern reminiscent of earlier work in the field.[13] American states and metropolitan areas had both higher income inequality and higher mortality than their Canadian counterparts (Figures 2 and 3). Indeed, the size of the effect of income inequality on mortality in the U.S. in the working-age population was incredibly large: a hypothetical 1 percent increase in the share of income to the poorer half of the income distribution was associated with a decline of 22 deaths per 100,000. This hypothetical effect was very large in mortality terms and placed income inequality in a tie (with influenza and pneumonia) for the seventh leading cause of death in the U.S. in 2001, behind diabetes mellitus at 25.3 deaths per 100,000 population.[14] Within Canada, however, there was no patterning of mortality by income inequality. This was not simply due to insufficient variation in income distribution across Canadian metropolitan areas: if only that subset of U.S. cities with income inequality measures in the same (low) range as the Canadian cities was considered, a significant negative slope in mortality remained for the U.S. metropolitan areas (Figure 4), while as before no such relationship was apparent for Canadian cities.[15] In short, the difference between Canada and the U.S. in income inequality and mortality seemed to be real and was labelled the "Canadian Paradox."

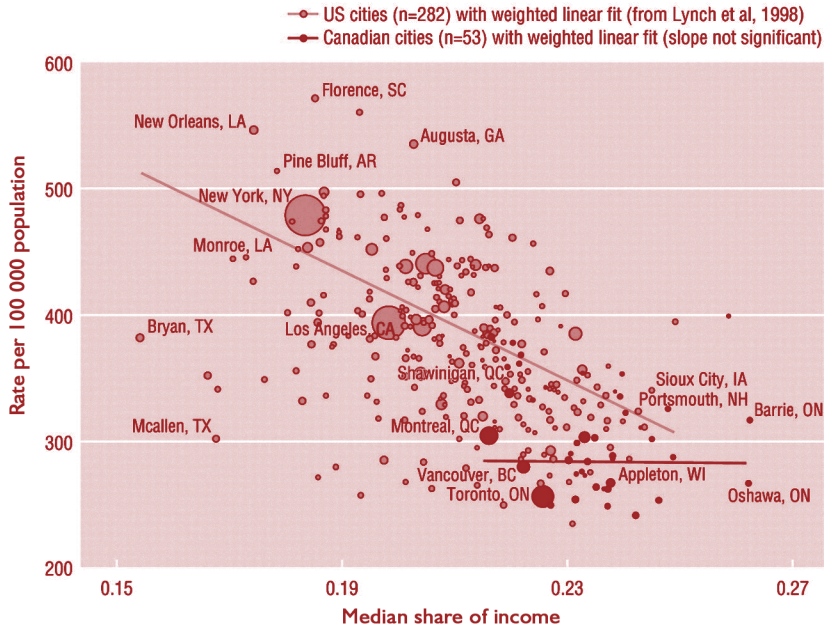
Figure 2

Relation Between Income Inequality and Mortality in Canada and the U.S. (For Working-Age Men, 25 to 64 years, by Median Share of Income for Canadian Provinces and U.S. States)

Source: N.A. Ross, M.C. Wolfson, J.R. Dunn, J.M. Berthelot, G. Kaplan, J. Lynch, "Relation Between Income Inequality and Mortality in Canada and in the United States: Cross Sectional Assessment Using Census Data and Vital Statistics," British Medical Journal 320, 7239 (2000): pp. 898–902. Reproduced with permission from the BMJ Publishing Group

Figure 3

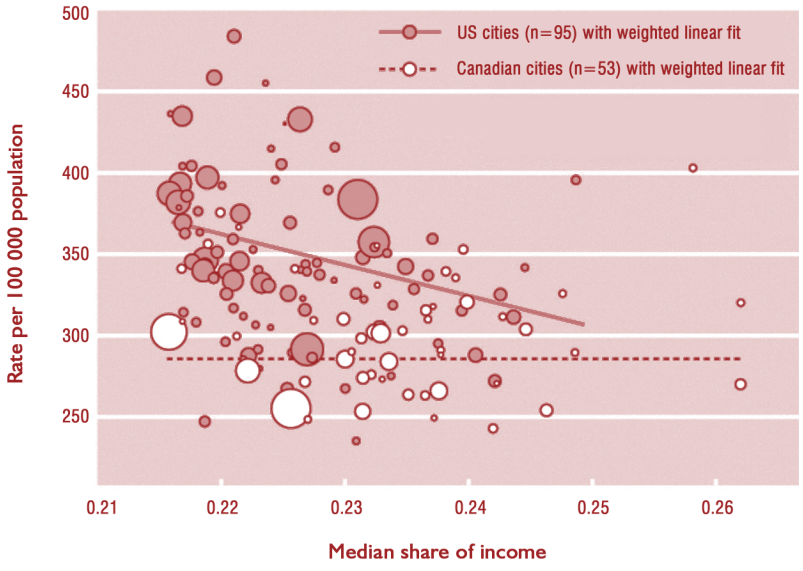
Relation Between Income Inequality and Mortality in Canada and the U.S. (For Working-Age Adults, 25 to 64 years, by Median Share of Income for Canadian and U.S. Metropolitan Areas)



Source: N.A. Ross, M.C. Wolfson, J.R. Dunn, J.M. Berthelot, G. Kaplan, J. Lynch, "Relation Between Income Inequality and Mortality in Canada and in the United States: Cross Sectional Assessment Using Census Data and Vital Statistics," British Medical Journal 320, 7239 (2000): pp. 898–902. Reproduced with permission from the BMJ Publishing Group

Figure 4

Relation Between Income Inequality and Mortality in Canada and the U.S. (For Working-Age Adults, 25 to 64 years, by Median Share of Income for Canadian and U.S. Metropolitan Areas Over Range of Canadian Median Share Values)



Source: N.A. Ross, M.C. Wolfson, J.R. Dunn, J.M. Berthelot, G. Kaplan, J. Lynch, Author's reply: "Income Inequality and Mortality in Canada and the United States," *British Medical Journal* 321, 7275 (2000): p. 1532. Reproduced with permission from the BMJ Publishing Group

Following the release of the Canada-U.S. comparison in 2000, there were two key developments in this field. First, Lynch et al released a study in The Lancet that called into serious question Wilkinson's 1992 international findings.[16] Using an expanded set of countries (16 instead of Wilkinson's original 9) that had provided updated income data in Wave III of the Luxembourg Income Study, Lynch et al found what was essentially a "mixed bag" of evidence for an association between income inequality and population health among rich nations. While they found no overall association between income inequality and life expectancy across the countries, higher inequality was strongly associated with infant mortality (men, r=.74, p=.002; women, r=.69, p=.004), child/youth mortality (men, r=.60, p=.02; women, r=.53, p=.04), lung cancer for women (r=.65; p=.01), and homicide for both women (r=.66; p=.01) and men (r =.65; p=.01). As well, a collection of studies released in the *British Medical Journal* in early 2002 found a series of null findings for jurisdictions within Japan (self-reported health as the outcome)[17] and Denmark (mortality as the outcome).[18] In a commentary that accompanied the release of these results, Mackenbach stated that the evidence linking income inequality to health was eroding.[19] The most recent of the null findings came from a rigorously designed mortality follow-up study by Blakely and colleagues in New Zealand.[20] These authors found no association between income inequality and mortality within New Zealand and they identified that their findings are not particularly sensitive to the choice of geographical unit within that country. At the very least, then, Canada no longer seemed so very paradoxical in the income inequality and mortality relationship. Given the challenge to the validity of the international evidence by Lynch et al,[16] this essentially left the U.S. showing a seemingly strong connection between income inequality and mortality.

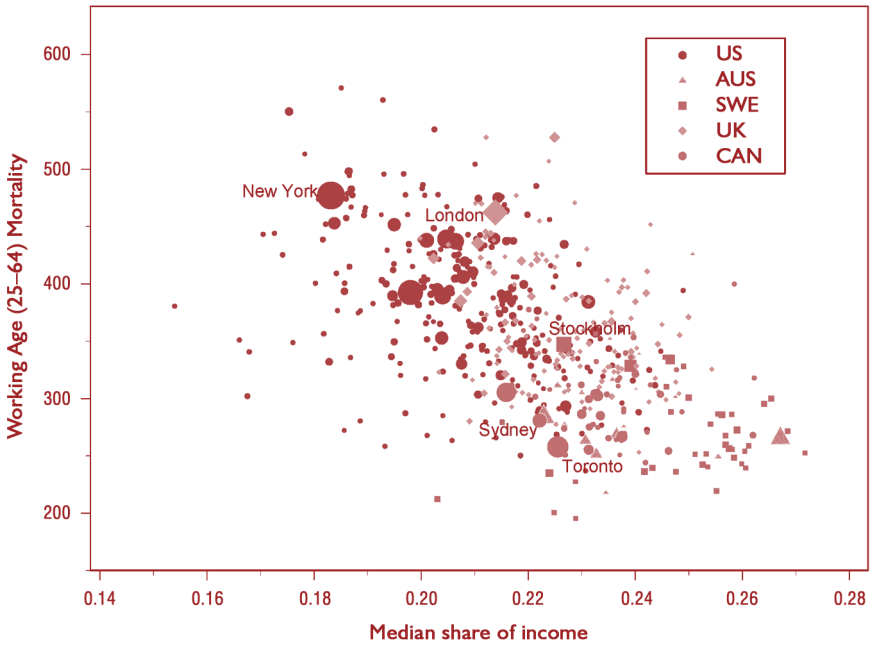
The word "seemingly" is used here because there has been a recent challenge to the validity of the findings even within U.S. jurisdictions. Deaton and Lubotsky argued that the relationship between income inequality and mortality for U.S. states, regions and metropolitan areas was confounded by the racial composition of those places.[21] The interpretation of their findings, however, is extremely difficult. In addition to elevated black mortality, they found white mortality rates to be higher in places with a high proportion of black residents, which makes it difficult to understand the mechanism linking racial composition to population health. The fact that between-group income inequality (that is, a high income gap between blacks and whites) and overall income inequality were also very high in places where a high fraction of the population was black is perhaps more suggestive of the idea that overall population health is more likely to be compromised in places where racial inequalities exacerbate multiple inequalities. The work of Deaton and Lubotsky also forces a rather awkward policy discussion: What is the policy response to a potential effect of concentrated racial composition on population health?

The Deaton and Lubotsky work, furthermore, has been recently challenged by a multilevel study (characteristics of both individuals and places are considered) of poor self-reported health in a pooled sample of more than 200,000 adults in the U.S.[22] This study showed that, while being black at the individual level increased the likelihood of reporting poor health, the racial composition of states did not remove the effect of state-level income inequality on poor health.

New research on comparable income inequality and mortality data for 528 cities in Australia, Canada, Great Britain, Sweden and the U.S. perhaps helps bring some clarity to the competing evidence.[23] In the pooled data of all the 528 cities, there was a strong association between income distribution and mortality, with inequality accounting for 34 percent of the variation in mortality (Figure 5). However, an association between income inequality and mortality was evident in within-country analyses for only the two most unequal countries: the U.S. and Great Britain. "This absence of an effect of metropolitan-scale income inequality on mortality in the more egalitarian countries of Canada, Australia and Sweden suggests a threshold effect of inequality as a determinant of population health."[23] In other words, income inequality might have to reach a certain level to affect health.

Figure 5

Relation Between Income Inequality and Working-Age Mortality. (528 Metropolitan Areas in Five Countries, 1990–1991)



Source: N. A. Ross, D. Dorling, J. R. Dunn, G. Henricksson, J. Glover, J. Lynch, "Metropolitan Scale Relationship Between Income Inequality and Mortality in Five Countries Using Comparable Data," (forthcoming), *Journal of Urban Health*. Reproduced with permission from Oxford University Press.

It might be surmised that the overall public spending patterns of the five countries would generally reflect their relative positions along the income inequality continuum, with the more egalitarian countries spending the most on public goods and services. Public goods, one could argue, effectively eliminate the need for individuals to use market income for the purchase of health resources. Universally available health resources (which could be narrowly defined as health care expenditure and more widely defined as education expenditure) should then reduce health inequalities in two ways: (1) by reducing the disparities in the life situations of individuals (through cash and non-cash transfers) and (2) by providing similar types of health resources to the entire population (for example, principally through health care, education and environmental/neighbourhood quality). However, the overall public spending patterns of the five countries do not exactly support this thinking.

In the five-country study, average 1990–1991 metropolitan-scale income inequality was highest (that is, the average median share score was lowest) in the U.S. (.21), followed by Great Britain (.22), Canada (.23), Australia (.24), and Sweden (.25).[23] While in 1990, public social expenditure* as a proportion of GDP was also lowest for the U.S. (at just over 13 percent), it was relatively high in the United Kingdom (UK) (at nearly 22 percent), and substantially higher than Canada's 18 percent (Table 1). Australia, a country with relatively egalitarian cities, allocated 14 percent of GDP to public spending. Of the five countries, Sweden had the highest public expenditure rate, at about 31 percent of GDP.[49] In summary, there are a few observations worth noting. First, income inequality and its health effects do not necessarily go hand in hand with low public spending (the British case is an example). Second, a relatively egalitarian income distribution is not necessarily matched with high public spending (the Australian case is an example).

Table 1

Public Expenditures in 1990 by Various Categories as a Proportion of GDP

	Canada	U.S.	Australia	UK	Sweden
Old Age Benefits	4.45	5.08	2.91	8.52	7.23
Disability Cash Benefits	0.49	0.66	1.16	1.58	2.04
Occupational Injury and Disease	0.52	0.09	0.46	0.09	0.72
Sickness Benefits	0.06	0.25	0.16	0.36	2.48
Services for the Elderly and Disabled People		0.04	0.55	0.55	1.99
Survivors	0.42	0.93	0.31	0.87	0.67
Family Cash Benefits	0.52	0.22	1.30	1.54	2.15
Family Services	0.08	0.25	0.21	0.39	2.38
Active Labour Market Programmes	0.53	0.22	0.25	0.59	1.69
Unemployment	1.92	0.43	1.15	0.66	0.88
Health	6.73	4.77	5.31	5.00	7.60
Housing Benefits			0.26	1.28	0.66
Other Contingencies	2.52	0.40	0.32	0.16	0.53
All Public Social Expenditure	18.25	13.36	14.36	21.62	31.02

The question that arises is: "What is different in Australia?" Is there some area of public spending that might be particularly efficient, at least from a population health standpoint? In 1990, Australia spent proportionally less than Canada on health (5.3% vs. 6.7% of GDP), but relatively more on both cash and services to families (1.3% vs. 0.5% and 0.2% vs. 0.1%, respectively) (Table 1). While this investigation is indeed exploratory

* Social expenditure as defined by the OECD is "the provision by public (and private) institutions of benefits to households and individuals in order to provide support during circumstances which adversely affect their welfare. Such benefits can be cash transfers, or can be direct ("in kind") provision of goods and services, provided that the provision of the benefits constitutes neither a direct payment for a particular good or service nor an individual contract or transfer (Source: OECD, "1980-1998. 20 years of Social Expenditure. The OECD Database", 24 April, 2002. http://www.oecd.org/dataoecd/3/63/2084281.pdf).
The OECD database does not measure education expenditure. It furthermore measures public expenditure on health and not total expenditure on health.

and there have been no attempts to control for need or demography, it highlights the possibility of international comparisons providing policy makers with guidelines on how to achieve the greatest population health gains with the greatest efficiency.

The "five-country" result, furthermore, provides some evidence for the idea that there is no necessary association between income inequality and population health,[24, 25] which, in turn, means that there is likely a fair degree of policy leverage on this population health "determinant." There is similarly no necessary association between absolute income and health outcomes in high income countries, even though the patterning of health by absolute socio-economic standing at the individual or ecological scale has been well documented in epidemiology. For example, the findings from Wilkins and colleagues have shown that all-cause and cause-specific mortality is generally graded by neighbourhood income groups in Canada.[26] The patterns for both breast and prostate cancers, however, do not fit this overall pattern, in that mortality rates for these cancers in Canada tend to be higher in higher income neighbourhoods, perhaps with an etiology embedded in affluent lifestyles. When counter-examples of the well-known association between socio-economic position and health are documented, there is little movement to abandon the overall concept, but rather to work to understand the link between etiology and social conditions in health.

At this point, there are a number of philosophical questions that could be asked. First, does the number of times of occurrence of an event, or demonstration of an association, improve the explanation of why it occurs? If an association between income inequality and health is seen at some scales and for some countries but not for others, does that diminish its importance as a health determinant? At least two things are likely required from the research community to answer these questions: (1) increasing the understanding of the social conditions under which income inequality is linked with population health and (2) improving the theoretical understanding of the pathways between inequality and ill health.

There has been some work completed towards the first point, at least in regard to the comparison of Canada and the U.S. The principal question driving this work is: "What is it about Canada (Sweden, Australia and New Zealand could now be added to this list) that seems to pre-empt the strong connection between income inequality and mortality seen in the U.S.?" Two studies can help to draw attention to some of the more subtle social and economic conditions existing in urban places in the two countries that might help explain why Canada (and possibly other countries) appears to be so different from the U.S. One study connected income segregation and mortality in Canada and the U.S., and the other study explored the relative role of the gap in earnings inequality as a health determinant in the two countries.[27, 28]

Comparing Canada and the U.S.: Urban Income Segregation

Income segregation is the spatial expression of income inequality and it may serve to reinforce any negative effects of inequality, as was first pointed out by Blau in 1977 and noted by Massey et al in 1991.[29, 30] While a highly unequal income distribution within a metropolitan area is suggestive of poverty amidst affluence, income segregation means that poverty and affluence are spatially concentrated. This spatial articulation of income inequality may be thought to have additional health consequences, operating through the following mechanisms:

1. **The social isolation theory**. Concentrated poverty, especially in large contiguous areas in inner-city or older suburban areas, sets up a "spatial mismatch" involving such factors as employment opportunities in new high-growth suburban areas, public transit patterns and place of residence. Thus the poor become spatially isolated from opportunities to improve their life chances through employment. This effect is compounded by outmigration from central cities of affluent households, which further isolates the poor, this time from important job networks, as well as from institutions and norms of modern society.[31, 32]

2. **The health-enhancing public goods theory**. Poor areas lack resources to meet the social and physical needs of the people living in these regions.[32] The cost of providing local public services is extremely high, and some experts suggest that several cities in the U.S. are unable to generate property taxes to provide high-quality health-enhancing public services (such as schools, housing and recreational areas).[32] This is likely linked to the consequences of the fragmented municipal political boundaries in the U.S., where the poor are isolated and the rich are concentrated in certain wealthy suburbs.[33] The concentration of the wealthy in suburbs drives up real estate prices by removing negative externalities and generates a large degree of property tax revenue, thereby providing high-quality services to a low-need population at a relatively low cost.[32] The concentration of poverty in central cities and inner suburbs has the opposite effect: the negative externalities of dense poverty (such as abandoned buildings and criminal activity) drive down property values and, in turn, tax revenues. The only way to increase revenues is to increase tax rates, which further drives out those who can leave.[32] The result is a crisis in the production of health-enhancing public goods to serve those who need them most.[32, 33]

3. **The decline in social relations theory**. Spatial segregation based on income promotes distrust between groups and a decline in overall social connection to community, especially in poor neighbourhoods. Given what is known about the social connection and health,[34] according to this theory, declines in the social capital of an area may likely be expected to affect health.[35, 36, 37, 38]

Despite these compelling theoretical arguments, there has been little empirical work linking segregation to health outcomes and no studies that have considered the interaction between income inequality and income segregation and the effect on mortality. Perhaps the study with the most evidence on the connection between

segregation and mortality is Waitzman and Smith's eight-year mortality follow-up of individual respondents to the U.S. National Health Interview Survey in the 30 largest U.S. cities.[39] They found a large and significant relative risk of mortality (for those 30 to 64 years old and for those over 65) associated with living in a highly segregated urban area (such as New Orleans or Chicago), compared with living in a relatively non-segregated urban area (such as San José or Seattle).

In studies that appeared in the literature almost simultaneously in 2002, Ross et al[27] and Lobmayer and Wilkinson[40] reported that mortality was indeed patterned by income segregation in the U.S., but not in Canada. Therefore, there appears to be some evidence of a possible fundamental population health difference growing from the very different urban social ecologies in the two countries. Additionally, research shows that Canada has some reason to worry in this regard. Even though there was no patterning of urban mortality by income segregation in Canada in 1991, there is clear evidence that income segregation increased in almost every city in Canada between 1991 and 1996.[41] Overall, the story of income segregation in Canada during the early- to mid-1990s was one of a rise in the spatial separation of income groups across the urban landscape. The increase in segregation occurred in most cities and for most of the dimensions of segregation throughout the period. Indeed, there was an increase in the spatial isolation of low-income households in all but one (almost 98%) of the metropolitan areas and an increase in the centralization of low-income households in all but four (almost 90%) of the metropolitan areas (Table 2).

Table 2

Summary of Changes Across Multiple Dimensions of Segregation, 39 Canadian Cities, 1991–1996*

	Evenness (Index of Dissimilarity)§	Exposure (Isolation Index)¤	Concentration (Relative Concentration Index)§	Centralization (Absolute Centralization Index)§	Clustering (Spatial Proximity Index)¤
St. John's	+	+	+	-	+
Halifax	+	+	+	+	-
Moncton	+	+	+	+	+
Saint John	+	+	+	+	+
Chicoutimi—Jonquière	-	+	-	+	-
Québec	-	+	+	+	+
Sherbrooke	-	+	-	+	-
Trois-Rivières	-	+	+	+	-
Montréal	+	+	+	+	+
Hull/Ottawa	+	+	+	+	+
Kingston	+	+	+	+	+
Peterborough	-	+	-	+	+
Oshawa	+	+	+	+	+
Toronto	+	+	+	-	+
Hamilton	+	+	+	+	+

(table continued on next page)

Table 2 (cont'd)

	Evenness (Index of Dissimilarity)§	Exposure (Isolation Index)¤	Concentration (Relative Concentration Index)§	Centralization (Absolute Centralization Index)§	Clustering (Spatial Proximity Index)¤
St. Catharines—Niagara	+	+	+	+	+
Kitchener	+	+	+	+	+
Brantford	+	+	-	+	+
Guelph	-	+	-	+	-
London	+	+	+	+	-
Windsor	-	+	-	+	+
Sarnia	+	+	+	+	+
North Bay	+	+	+	+	-
Sudbury	+	+	-	-	+
Sault Ste. Marie	-	+	-	+	+
Thunder Bay	+	+	+	+	+
Winnipeg	+	+	-	+	+
Regina	+	+	+	+	+
Saskatoon	+	+	+	+	+
Lethbridge	+	+	-	+	+
Calgary	+	-	+	-	-
Red Deer	+	+	+	+	+
Edmonton	-	+	+	+	+
Kelowna	-	+	+	+	+
Kamloops	+	+	-	+	+
Abbotsford	-	+	+	+	-
Vancouver	-	+	+	+	-
Victoria	-	+	+	+	+
Prince George	+	+	+	+	+
Percent Changing in Expected Direction	66.67	97.44	71.79	89.74	74.36

*1991 values subtracted from1996; "+" indicates an increase, "-" indicates a decrease

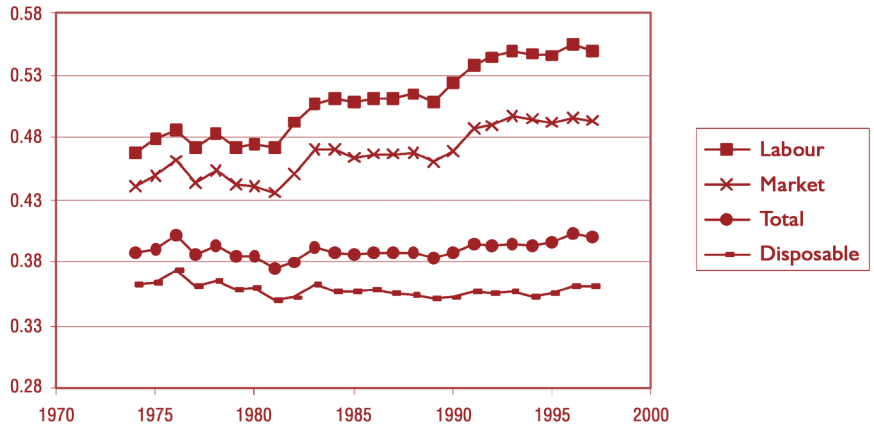
§ Source: N. A. Ross, C. Houle, J. R. Dunn, "The Dimensions and Dynamics of Income Segregation in Canadian Metropolitan Areas: 1991-96," *The Canadian Geographer* (forthcoming). Reproduced with permission from Blackwell Publishing.

¤ N.A. Ross, C. Houle, J.R. Dunn, "Dimensions and Dynamics of Residential Segregation by Income in Urban Canada, 1991-1996," unpublished data.

It should be noted that the increase in income segregation within Canadian cities took place during a time when Canada as a whole did not experience an increase in overall income inequality at the national level (Figure 6), largely due to an increased role in transfer payments to low-income households.[41] The study suggests that spatial separation and spatial concentration by socio-economic position can occur and be experienced by urban residents without a corresponding change in the traditional national-scale inequality measures.[41]

Figure 6

Trends in the Gini Coefficient by Income Type in Canada, 1971–1997



Source: C. Sanmartin, N.A. Ross, S. Tremblay, M. Wolfson, J.R. Dunn, J.L. Lynch, "Labour Market Income Inequality and Mortality in North American Metropolitan Areas", Journal of Epidemiology and Community Health 57, 10 (2003): pp.792-797. Adapted from Survey of Consumer Finance, Statistics Canada, Custom Tabulation. Reproduced with permission from BMJ Publishing Group.

Summary and Author's Conclusions

Overall, the income segregation findings might serve as an indicator for those studying social ecologies of Canadian cities. If the relationship between income inequality and mortality involves a threshold effect, as the "five-country" study suggests, then crossing the threshold might produce unwanted health consequences.[23] Furthermore, if Canadian policy has historically either directly or indirectly produced health enhancing social and economic conditions in its cities, effort should be made to continue the trend.

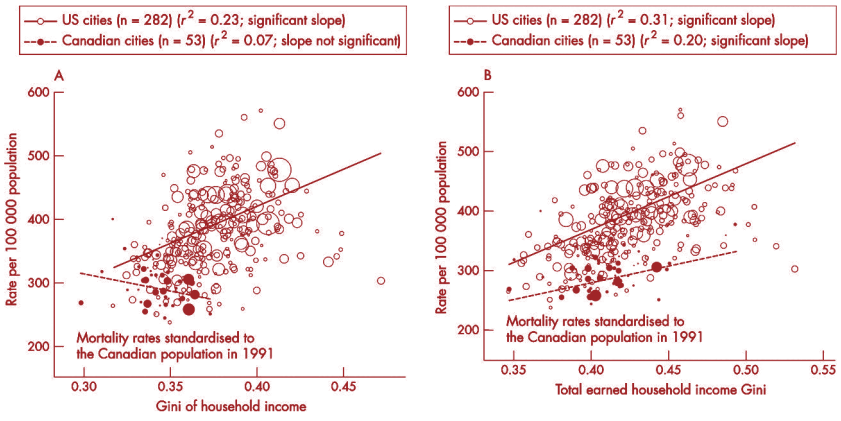
Comparing Canada and the U.S. on the Earnings Gap

To date, the majority of work on income inequality and health has used pre-tax income, post-transfer income or total household income. But there remains the possibility that inequalities generated in the labour market are health-compromising, even though the bottom line income for many Canadian households is supplemented with transfers. In other words, income that is earned through a well-paid job may be a better marker for factors important to health than income received but not earned.

A recent analysis of multiple concepts of income inequality and working-age mortality among U.S. and Canadian metropolitan areas sheds some light on the effect of labour market inequality on the health of Canadians.[28] This study considered the population health correlates of inequality generated from two different earned-income concepts: (1) non-trivial earned income inequality for the subset of households reporting at least $1,000, intended to capture inequality among those households with major attachments to the labour force and (2) all earned income inequality for all households including the unemployed (that is, households reporting zero or negative earnings). In the U.S., the effect of income inequality on working-age mortality held across all income concepts and inequality measures. That is, health-compromising inequality was apparent in the labour force, among both high and low earners (Figure 7A), as well as among those with and without jobs (Figure 7B).[28] In Canada, however, the story differs. The only significant relationship between income inequality and mortality at the metropolitan-area level in Canada occurred when inequality in labour market income that included the unemployed was considered (Figure 7B).

Figure 7(A–B)

Working Age Mortality by Gini Coefficient for Non-Trivial Earned Income (≥ $1K), (Figure 7A) All Earned Income Inequality (Figure 7B) With Weighted Linear Fit



Source: C. Sanmartin, N. A. Ross, S. Tremblay, M. Wolfson, J. R. Dunn, J. L. Lynch, "Labour Market Income Inequality and Mortality in North American Metropolitan Areas," Journal of Epidemiology and Community Health 57, 10 (2003): pp. 792–797. Reproduced with permission from the BMJ Publishing Group

These findings could be interpreted as showing that to better understand the geographic distribution of mortality across Canada, it is important to include information on the role of labour market exclusion. In the U.S., this is not the case. In the U.S., it appears to make no difference whether labour market exclusion is considered or not, perhaps because of the nature of the U.S. labour market, where there is less distinction—at least in terms of mortality risk—between being employed in a low-wage job at the bottom of the earnings distribution and being unemployed.[28] Whatever the mechanism involved, patterns of health vulnerability of the U.S. population are still revealed by truncating the earnings distribution (excluding the unemployed households); however, this is not so for patterns of health vulnerability in Canada.[28]

There is an extensive literature linking unemployment to poor health outcomes in individuals. Bartley's review outlined a number of mechanisms that might account for the consistent relationship between unemployment and health, and these are very similar to the types of explanations often offered linking income inequality to poor health: the role of relative poverty, social isolation/loss of self-esteem and the creation of cultures of risky health behaviours.[42]

Summary and Author's Conclusions

In summary, it would appear that whether the statistical relationship is between health and unemployment or between health and income inequality, the mechanisms thought to increase the risk of adverse health are very similar and could likely be approached in much the same way from a policy perspective.

Theoretical Development and Research Gaps

One of the leading gaps in this research area is the lack of a generally agreed upon conceptualization of the connections between income inequality (a property of a place) and health outcomes in aggregates of individuals. At the risk of oversimplifying the state of theoretical development in this area, the broad theories that attempt to explain an association between income inequality and health traditionally consist of two different interpretations: the material interpretation and the psychosocial interpretation.

Is the relationship merely a reflection of access to health-enhancing resources and differential health-influencing exposures within various social groupings (the materialist viewpoint)? Or are cognitive processes at work, producing feelings of shame and low self-esteem, and, over time, compromised health in those appraising (negatively) their social position against others?

Kawachi et al suggest that the psychosocial and material approaches should not be seen as competitive, and that these explanations are not mutually exclusive.[43] In principle, all material resources are of some relevance to everyday life and have some psychosocial meaning attached to them. However, a model of relative deprivation that includes reference groups, norms of fairness and social comparison processes has seldom been studied or utilized by researchers of health inequalities, and this remains an area fertile for multidisciplinary research possibilities. [44]

What is known outside the health literature about social comparisons? Schor argued that individuals will use a reference group, or "a comparison group located nearby in the social hierarchy,"[45] (p. 27) in helping them to assess their "proper" position, thereby creating a social identity.[45] In addition to income, education and occupation also help determine where one stands. Additional to these traditional sources of social identity, Schor also argued that Americans are increasingly becoming defined by consumption in a consumer society where "discretionary consumption has become a mass phenomenon,"[45] (p. 217) not limited to the rich or the middle classes. In fact, Bourdieu has made this point in the past, arguing that consumption patterns and tastes are stratified by income, education and occupation.[46] However, one of the difficulties in testing these ideas is that there is lack of agreement about what reference groups are appropriate for social comparisons.[43] In terms of income, do individuals compare themselves to others with higher incomes, such as celebrities, or to those with lower incomes, such as the homeless?

There are a number of ways in which increased attention to theoretical development in the field would improve the understanding of income inequality as a health determinant. The above discussion suggests that one way forward is to improve the understanding of social identity in consumer societies and, in turn, improve the understanding of the historical political economies of various nations that set the stage for consumption to become such an influential social marker. One might test the idea that class-based consumption patterns are behind some of the U.S. "exceptionalism" seen in the research evidence to date.

Along with this rather ambitious research agenda, there are some short-term gaps in this field that need to be addressed. To begin, there is very little understanding of the relative role of income inequality as a health determinant for various population subgroups, especially women. There is some evidence in Canada that social gradients in health are not as steep for women as they are for men.[26] Therefore, more gendered analyses of social contextual influences on health status would be useful. It would also be helpful to establish which income groups in the population are most affected by unequal social environments. For example, is inequality unhealthy for the rich?

An important contribution would also be a more thorough understanding of educational gradients within and between various countries that produce unequal skills and life chances and more varied labour markets. It has been suggested that one of the reasons that the U.S. and Great Britain have the highest inequality and the highest mortality rates vis-à-vis the other three countries in the five-country study is that their educational systems from the primary years through to postsecondary tend to have more variability in both quality and outcomes.[47] Indeed, there is some evidence to support this idea. Among these five countries, almost all Swedish students at primary, lower secondary and upper secondary levels attend public institutions (96.6%, 97.3% and 98.0% of the student population respectively at this level). Sweden is followed by Canada in the number of students enrolled in public education institutions; followed by the U.S., Australia and the UK. In particular, students from the UK are second amongst these five countries in receiving public primary education (95.3% of the student population at this level), but have the lowest proportion of students attending public upper secondary schools (29.6% of the student population) (Table 3). Furthermore, international student achievement data suggest that the *variation* (that is, the dispersion of achievement as measured by the standard errors as opposed to the mean overall scores) in reading, science and mathematical literacy in 15-year-olds (Tables 4 to 6) is uniformly highest in the U.S., followed by Australia and the UK (Sweden is tied with the U.K. for mathematical achievement variation). Thus, there needs to be more research on understanding how life trajectories become set in various societal contexts, which then might turn early educational disparities into income disparities visible in national scale summary measures of income distribution.

Table 3

Students Enrolled in Public and Private Institutions, in Primary and Secondary Education (2000)

	Type of Institution								
	Primary Education			Lower Secondary Education			Upper Secondary Education		
	Public	Government Dependent Private	Independent Private	Public	Government Dependent Private	Independent Private	Public	Government Dependent Private	Independent Private
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OECD Countries									
Australia	72.8	27.2	a	69.1	30.9	a	82.9	17.1	a
Canada	93.5	1.4	5.1	92.1	1.1	6.7	94.4	0.7	4.9
Sweden	96.6	3.4	a	97.3	2.7	a	98.0	2.0	a
UK	95.3	a	4.7	93.6	0.3	6.1	29.6	67.4	3.0
U.S.	88.4	a	11.6	90.1	a	9.9	90.6	a	9.4
Country Mean	**89.9**	**7.8**	**2.7**	**83.6**	**10.4**	**3.1**	**81.2**	**13.9**	**5.7**

Table 4

Variation in Performance in Reading Literacy of 15-Year-Olds (2000)

	Mean	
	Mean Score	S.E.*
OECD Countries		
Australia	528	(3.5)
Canada	534	(1.6)
Sweden	516	(2.2)
UK	523	(2.6)
U.S.	504	(7.1)
OECD Total	**499**	**(2.0)**
Country Mean	**500**	**(0.6)**

* S.E. Standard Error

Table 5

Variation in Performance of Scientific Literacy of 15-Year-Olds (2000)

	Mean	
	Mean Score	**S.E.***
OECD Countries		
Australia	528	(3.5)
Canada	529	(1.6)
Sweden	512	(2.5)
UK	532	(2.7)
U.S.	499	(7.3)
OECD Total	**502**	**(2.0)**
Country Mean	**500**	**(0.7)**

* S.E. Standard Error

Table 6

Variation in Performance in Mathematical Literacy of 15-Year-Olds (2000)

	Mean	
	Mean Score	**S.E.***
OECD Countries		
Australia	533	(3.5)
Canada	533	(1.4)
Sweden	510	(2.5)
UK	529	(2.5)
U.S.	493	(7.6)
OECD Total	**498**	**(2.1)**
Country Mean	**500**	**(0.7)**

* S.E. Standard Error

Lastly, in cross-sectional studies, it would be useful to examine outcomes beyond death (mortality) to something more closely linked to low-level, but cumulative and chronic, "exposures" to unequal social conditions. In the words of Smith, "inequality may make people miserable long before it kills them,"[48] (p. 988) and so cross-nationally comparable studies of mental health (anxiety, self-esteem, depression) or measures of health behaviours would be useful additions to the now well-worn mortality studies.

Summary and Author's Policy Implications*

This paper has discussed and raised questions about income inequality and health. Is income inequality a health determinant? A definitive "yes" in response to this question is perhaps premature or even unattainable, given that the "science" underlying the research typically employs designs that can never control for all the conditions of places that influence health status. Furthermore, such studies often cannot establish the correct temporal sequencing of cause (inequality) and effect (poor health or death); even if they could, what is the appropriate lag time between the experience of inequality and morbidity and mortality? The gold standard for epidemiological research is, after all, a clinical trial, which, by definition, is conducted in a controlled setting. When the units of study are places and not people, the clinical trial study design becomes impractical at best, and, many would argue, impossible to implement. What is left then are observational studies like the international work of Rodgers, Wilkinson and Lynch and quasi-experimental designs like the Canada-U.S. comparisons. Internationally, the work can be challenged by the availability of comparable data and the arbitrariness of the choice of countries to include in the research.

There are now, however, two pictures of population health that are difficult to ignore. The first is the picture of the scatterplot of U.S. and Canadian cities with income distribution on the horizontal axis and working-age mortality on the vertical axis. Regardless of the presence or absence of within-country relationships between income inequality and mortality, there is little dispute that Canadian cities are both more equal and have a better population health record than their American counterparts.[15] The second is the similar picture of the distribution of 528 cities internationally. Again, this distribution is difficult to ignore—more equal cities within more equal countries have better summary measures of population health than do their counterparts in more unequal places.[23]

The policy story in the Canadian context, then, is more of a cautionary tale. Recent evidence has shown that during the 1990s Canadian cities became more segregated along income lines, and this may be a worry both for social cohesion and for population health.[41]

If population health or "health for all" is a core value of a society, then the policies that are aimed at providing health infrastructure (such as universal health care, high-quality publicly available education, safe neighbourhoods and a healthy physical environment) are likely to go hand-in-hand with a more even distribution of income (especially post-tax). Overall, research linking income inequality to population health has been incredibly important for forcing both academics and policy makers to ask: "What are some of the key features of societies that produce the healthiest populations?" Income distribution is one of these features that could be considered in this discussion.

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* Please note that the analyses and conclusions in the report do not necessarily reflect those of the Canadian Population Health Initiative or the Canadian Institute for Health Information.

For More Information

1. S. H. Preston, "The Changing Relation Between Mortality and Level of Economic Development," *Population Studies* 29 (1975): pp. 231–248.

2. G. B. Rodgers, "Income and Inequality as Determinants of Mortality: An International Cross-Section Analysis," *Population Studies* 33 (1979): pp. 343–351.

3. G. B. Rodgers, "Income and Inequality as Determinants of Mortality: An International Cross-Section Analysis," Reprints and Reflections, *International Journal of Epidemiology* 31, 3 (2002): pp. 533–538.

4. World Bank, *World Development Report 1993: Investing in Health* (New York: Oxford University Press, 1993), p. 34.

5. R. G. Wilkinson, "Income Distribution and Life Expectancy," *British Medical Journal* 304, 6820 (1992): pp. 165–168.

6. G. A. Kaplan, E. Pamuk, J. W. Lynch, R. D. Cohen, J. Balfour, "Inequality in Income and Mortality in the United States: Analysis of Mortality and Potential Pathways," *British Medical Journal* 312, 7037 (1996): pp. 999–1003.

7. B. P. Kennedy, I. Kawachi, D. Prothrow-Stith, "Income Distribution and Mortality: Cross Sectional Ecological Study of the Robin Hood Index in the United States," *British Medical Journal* 312, 7037 (1996): pp. 1004–1007.

8. B. P. Kennedy, I. Kawachi, D. Prothrow-Stith, "Income Distribution and Mortality: Cross Sectional Ecological Study of the Robin Hood Index in the United States. Important Correction," *British Medical Journal* 312 (1996): pp. 1194.

9. J. W. Lynch, G. A. Kaplan, E. R. Pamuk, R. D. Cohen, K. E. Heck, J. L. Balfour, I. H. Yen, "Income inequality and Mortality in Metropolitan Areas of the United States," *American Journal of Public Health* 88, 7 (1998): pp. 1074–1080.

10. B. P. Kennedy, I. Kawachi, R. Glass, D. Prothrow-Stith, "Income Distribution, Socioeconomic Status, and Self-Rated Health in the United States: Multilevel Analysis," *British Medical Journal* 317, 7163 (1998a): pp. 917–921.

11. M.-J. Soobader, F. B. LeClere, "Aggregation and the Measurement of Income Inequality: Effects on Morbidity," *Social Science and Medicine* 48, 6 (1999): pp. 733–744.

12. [Author unknown], "Editor's Choice: The Big Idea," *British Medical Journal* 312, 7037 (April 20, 1996) [on-line], cited October 2003, from <http://bmj.bmjjournals.com/cgi/content/full/312/7037/0>.

13. N. A. Ross, M. C. Wolfson, J. R. Dunn, J.-M. Berthelot, G. Kaplan, J. Lynch, "Relation Between Income Inequality and Mortality in Canada and in the United States: Cross Sectional Assessment Using Census Data and Vital Statistics," *British Medical Journal* 320, 7239 (2000): pp. 898–902.

14. E. Arias, R. N. Anderson, H.-C. Kung, S. L. Murphy, K. D. Kochanek, "Deaths: Final Data for 2001," *National Vital Statistics Reports* 52, 3 (2003), pp. 1–116.

15. N. A. Ross, M. C. Wolfson, J. R. Dunn, J.-M. Berthelot, G. Kaplan, J. Lynch, "Authors' Reply," *British Medical Journal* 321, 1532 (2000): pp. 1533–1534.

16. J. W. Lynch, G. D. Smith, M. Hillemeier, M. Shaw, T. Ragunathan, G. A. Kaplan, "Income Inequality, Psychosocial Environment and Health: Comparisons Across Wealthy Nations," *The Lancet* 358, 9277 (2001): pp. 194–200.

17. K. Shibuya, H. Hashimoto, E. Yano, "Individual Income, Income Distribution, and Self Rated Health in Japan: Cross Sectional Analysis of Nationally Representative Sample," *British Medical Journal* 324, 7328 (2002): pp. 16–19.

18. M. Osler, E. Prescott, M. Gronbaek, U. Christensen, P. Due, G. Engholm, "Income Inequality, Individual Income, and Mortality in Danish Adults: Analysis of Pooled Data from Two Cohort Studies," *British Medical Journal* 324, 7328 (2002): pp. 13–16.

19. J. P. Mackenbach, "Income Inequality and Population Health," *British Medical Journal* 324, 7328 (2002): pp. 1–2.

20. T. Blakely, J. Atkinson, D. O'Dea, "No Association of Income Inequality with Adult Mortality Within New Zealand: A Multi-Level Study of 1.4 Million 25-64 Year Olds," *Journal of Epidemiology and Community Health* 57, 4 (2003): pp. 279–284.

21. A. Deaton, D. Lubotsky, *Mortality, Inequality and Race in American Cities and States*. (Cambridge, Mass.: National Bureau of Economic Research, 2001), pp. 1–35 (Working Paper No. 8370).

22. S. V. Subramanian, I. Kawachi, "The Association Between State Income Inequality and Worse Health Is Not Confounded by Race," *International Journal of Epidemiology* 32 (2003): pp. 1022–1028.

23. N. A. Ross, D. Dorling, J. R. Dunn, G. Henricksson, J. Glover, J. Lynch, "Metropolitan Scale Relationship Between Income Inequality and Mortality in Five Countries Using Comparable Data," (forthcoming), *Journal of Urban Health*.

24. J. W. Lynch, G. Davey Smith, "Commentary: Income Inequality and Health: The End of the Story?," *International Journal of Epidemiology* 31, 3 (2002): pp. 549–551.

25. J. W. Lynch, G. D. Smith, G. A. Kaplan, J. House, "Income Inequality and Mortality: Importance to Health of Individual Income, Psychosocial Environment, or Material Conditions," *British Medical Journal* 320, 7243 (2000): pp. 1200–1204.

26. R. Wilkins, J.-M. Berthelot, E. Ng, "Trends in Mortality by Neighbourhood Income in Urban Canada from 1971 to 1996," *Health Reports Supplement* 13 (2002): pp. 1–28.

27. N. A. Ross, K. Nobrega, J. Dunn, "Income Segregation, Income Inequality and Mortality in North American Metropolitan Areas," *GeoJournal* 53, 2 (2002): pp. 117–124.

28. C. Sanmartin, N. A. Ross, S. Tremblay, M. Wolfson, J. R. Dunn, J. L. Lynch, "Labour Market Income Inequality and Mortality in North American Metropolitan Areas," *Journal of Epidemiology and Community Health* 57, 10 (2003): pp. 792–797.

29. P. M. Blau, *Inequality and Heterogeneity: A Primitive Theory of Social Structure* (New York/London: The Free Press, 1977), pp. 77–100.

30. D. S. Massey, A. B. Gross, M. L. Eggers, "Segregation, the Concentration of Poverty, and the Life Chances of Individuals," *Social Science Research* 20 (1991): pp. 397–420.

31. W. J. Wilson, *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy* (Chicago: University of Chicago Press, 1987), pp. 3–21.

32. M. Orfield, *American Metropolitics: The New Suburban Reality* (Washington, D.C.: Brookings Institution Press, 2002), pp. 23–48.

33. D. S. Massey, "The Age of Extremes: Concentrated Affluence and Poverty in the Twenty-First Century" *Demography* 33, 4 (1996): pp. 395–412.

34. N. A. Ross, "Community Belonging and Health," *Health Reports* 13, 3 (2002): pp. 33–39.

35. D. Hemenway, B. P. Kennedy, I. Kawachi, R. D. Putnam, "Firearm Prevalence and Social Capital," *Annals of Epidemiology* 11, 7 (2001): pp. 484–490.

36. R. D. Putnam, "Social Capital: Measurement and Consequences," *ISUMA*: *Canadian Journal of Policy Research* 2 (2001): pp. 41–52.

37. B. P. Kennedy, I. Kawachi, D. Prothrow-Stith, K. Lochner, V. Gupta, "Social Capital, Income Inequality, and Firearm Violent Crime," *Social Science and Medicine* 47, 1 (1998b): pp. 7–17 (Erratum in *Social Science and Medicine* 47, 10 (November 1998): p. 1637.

38. I. Kawachi, B. P. Kennedy, K. Lochner, D. Prothrow-Stith, "Social Capital, Income Inequality, and Mortality," *American Journal of Public Health* 87, 9 (1997): pp. 1491–1498.

39. N. J. Waitzman and K. R. Smith, "Separate But Lethal: The Effects of Economic Segregation on Mortality in Metropolitan Areas," *The Milbank Quarterly* 76 (1998): pp. 341–373.

40. P. Lobmayer, R. G. Wilkinson, "Inequality, Residential Segregation by Income, and Mortality in US Cities," *Journal of Epidemiology and Community Health* 56, 3 (2002): pp. 183–187.

41. N. A. Ross, C. Houle, J. R. Dunn, "The Dimensions and Dynamics of Income Segregation in Canadian Metropolitan Areas: 1991-96," (forthcoming) *The Canadian Geographer*.

42. M. Bartley, "Unemployment and Ill Health: Understanding the Relationship," *Journal of Epidemiology and Community Health*, 48, (1994): pp. 333-337.

43. I. Kawachi, S. V. Subramanian, N. Almeida-Filho, "A Glossary for Health Inequalities," *Journal of Epidemiology and Community Health* 56, 9 (2002): pp. 647–652.

44. J. I. Elstad, "The Psycho-Social Perspective on Social Inequalities in Health," *Sociology of Health & Illness* 20, 5 (1998): pp. 598–618.

45. J. B. Schor, *The Overspent American* (New York: Basic Books, 1998), pp. 1–42; 217.

46. P. Bourdieu, *Distinction: A Social Critique of the Judgement of Taste* (Cambridge, Mass.: Harvard University Press, 1984), pp. 9–96.

47. J. R. Dunn, personal communication, June 2003.

48. G. D. Smith, "Income Inequality and Mortality: Why Are They Related? Income Inequality Goes Hand in Hand with Underinvestment in Human Resources," *British Medical Journal* 312, 7037 (1996): pp. 987–988.

49. Organization of Economic Co-operation and Development, *Public Social Expenditure by Main Category at Current Prices in National Currency (1980-1998)* (2002). [on-line], last modified May 7, 2002, from:
<http://www.oecd.org/statisticsdata/0,2643,en_2649_34635_1_119656_1_1_1,00.html>
under Social Expenditures/Statistics.

This publication is part of CPHI's ongoing inquiry into the patterns of health across this country. Consistent with our broader findings, it reflects the extent to which the health of Canadians is socially determined, interconnected, complex and changing. CPHI is committed to deepening our understanding of these patterns.

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