Unpacking Income Inequality and Population Health

The Peculiar Absence of Geography

James R. Dunn, PhD¹

Peter Schaub, BA²

Nancy A. Ross, PhD³

ABSTRACT

Background: A large and growing body of literature investigating the negative relationship between income inequality and population health (at different geographic scales) has developed over the past several years, although the relationship is not universal apparently. We argue that there has been a peculiar absence of geography in studies of the relationship between income inequality and population health and that explanations for the mixed results have been hampered by an inattention to geography.

Methods: Using methods of spatial pattern visualization, outlier analysis and comparative case study analysis, we investigate the role of “geography” as a means of “unpacking” the relationship between income inequality and health in Canada and the United States.

Results: The findings demonstrate how analyzing the study of income inequality and population health in the context of place makes otherwise obscure patterns visible and opens up new questions and opportunities for investigating how unequal places may be less healthy than more egalitarian ones. Rather than dismissing the importance of income inequality and health because it does not appear to exist at all times and in all places, we raise questions such as: Under what conditions does the relationship between income inequality and population health hold? and What, if anything, is similar about places where it does (or does not) hold? as crucial questions requiring a different kind of analysis than has been common in this literature.

Conclusion: We recommend that place and health studies seek this balance between universalistic and particularistic explanations of place and health relationships in order to best understand the socio-geographic production of health.

MeSH terms: income inequality, mortality, geography, place and health, spatial behaviour, socio-economic factors.

La traduction du résumé se trouve à la fin de l'article.

1. Centre for Research on Inner City Health, Keenan Research Centre in the Li Ka Shing Knowledge Institute of St. Michael's Hospital, and Departments of Geography & Planning and Public Health Sciences, University of Toronto

2. Centre for Health Services and Policy Research, University of British Columbia

3. Department of Geography, McGill University

Correspondence and reprint requests: Dr. James R. Dunn, Centre for Research on Inner City Health, St. Michael's Hospital, 30 Bond. St., Toronto, Ontario, Canada M5B 1W8, Tel: 416-864-6060, ext. 3313, E-mail: jim.dunn@utoronto.ca

Acknowledgements: We gratefully acknowledge the Canadian Population Health Initiative for support for this research. Drs. Dunn and Ross are also supported by New Investigator Awards from the Canadian Institutes of Health Research. The authors gratefully acknowledge the support of the Ontario Ministry of Health and Long-Term Care. The views expressed are the views of the authors and do not necessarily reflect the views of the Ontario Ministry of Health and Long-Term Care. Dedicated to the memory of Peter Schaub.

A large and growing body of literature investigating the negative relationship between income inequality and population health (at different geographic scales) has developed over the past several years. Collectively, this work builds on the paradoxical observation that in affluent societies, although for individuals wealthier is healthier, at the population level income inequality is, in some instances, a stronger correlate of population health than aggregate income (as measured, for example, by gross domestic product [GDP] per capita). The relationship between income inequality and population health has been demonstrated at various geographic scales (US states, US metropolitan areas, British local authorities).¹⁻⁴ Recent studies, however, have called into question the association,⁵⁻⁶ and this inconsistency has ignited an intense debate over the generalizability and importance of the relationship.⁶⁻⁹

In this paper, we argue that there has been a peculiar absence of geography in studies of the relationship between income inequality and population health whether in the formulation of the question, the design and execution of empirical analyses, or in the interpretation of results. This absence exists despite the growing emphasis on place and health in the population health literature more generally. We begin from the twin propositions that (1) although the body of research on income distribution and health includes studies at multiple geographic scales, explanations for the mixed results have been hampered by an inattention to geography, and (2) inquiry into the relationship between income distribution and population health is inherently geographic, because income inequality is a “true” contextual variable: individuals do not have income distributions, only populations do, and the overriding concern has been with populations defined by shared territory (nation-states, subnational regions, metropolitan areas, etc.).

To put it differently, in this paper we seek to put studies of income inequality and population health “in place” by re-inserting geography into interpretations of the meaning of the income inequality and health literature. By an absence of “geography” we mean that existing studies demonstrate an inattention to “how relations of power and discipline are inscribed into the apparently innocent spatiality of social life, how human geographies become filled with politics and

ideology.”¹⁰ We begin with an overview of findings on this issue to date and identify the missing geographies in such analyses. Next, we argue that our emphasis on this gap is not simply an issue of disciplinary parochialism but, rather, something that fundamentally undermines the ability of scholars working on this problem to explain the results of individual studies, as well as the sometimes contradictory findings as a whole. In the final substantive section, we develop and explicate some of the possible geographies of income inequality and population health that would assist with the interpretation of these studies by “unpacking” the paradoxical results of a study by Ross et al.¹¹ Using identical data, this study showed a steep, positive relationship between state-level and metropolitan-level income inequality and working-age mortality in the United States but no such relationship at either the provincial or the metropolitan level in Canada. The central argument of the present paper, therefore, is that the relation between income inequality and population health has multiple geographies and that the failure to heretofore fully “unpack” it has led to its premature dismissal and an under-appreciation of its practical significance.

Geographic scale, income inequality and population health: Previous studies

The relationship between income inequality and population health has been shown to exist at the national,¹²⁻¹⁴ metropolitan³ and other geographic levels. Wilkinson's work on OECD (Organisation for Economic Co-operation and Development) countries has been instrumental in popularizing inquiry into the question of income inequality and population health. He demonstrated that by the end of the 20th century GNP per capita was a relatively weak correlate of population health in affluent countries and argued that the stronger determinant of national health is income inequality.¹⁵ He reported a high correlation ($0.73, p < 0.01$) between the annual rate of change in life expectancy and the annual rate of change in the proportion of people living in relative poverty ($< 50\%$ of the national average disposable income) in 12 European countries between 1975 and 1985.¹² Wilkinson also showed a strong correlation ($-0.81, p < 0.001$) between life expectancy in 1970 and the Gini coefficient

of income inequality (standardized for household size) in 11 OECD countries. For a smaller set of countries (those in the Luxembourg income survey), Wilkinson found a positive relationship ($r = 0.86; p < 0.001$) between the proportion of total income held by the least well-off 70% of the population and national life expectancy at birth.¹² These results were consistent with earlier cross-national work done by Rodgers¹³ and Waldmann¹⁶ but have been called into question by Lynch, et al.,⁶ who demonstrate, among other things, that the lack of available data for other countries influences the results of cross-national analyses of income inequality and health.¹⁴

Empirical analyses of the income inequality and health relationship within subnational units have yielded similar results. Ben-Shlomo et al.⁴ computed the interquartile range of the ward-level Townsend deprivation index within Britain's 369 local authorities and the average of ward-level mortality rates for each local authority, and examined their relationship while controlling for the median Townsend score for each local authority. They found that mortality was strongly associated with both average deprivation and disparity in deprivation. Kaplan et al.,¹ using census data and vital statistics, examined the relationship between state-level income inequality (measured as the percent share of income held by the least well-off half of the population—the median share) and age-standardized mortality in 1990. They found a strong correlation ($r = 0.62, p < 0.001$) between median share and mortality that remained after adjustment for state-level median income ($r = 0.59$). Lynch et al.³ investigated the relationship between several income inequality measures and mortality in 282 US metropolitan areas. They found that metropolitan areas with higher income inequality had significantly greater age-adjusted total mortality than those with low inequality, irrespective of the income inequality measure used.

There is another important geographic wrinkle, however, in the relationship between income inequality and population health. Wilkinson¹⁷ has hypothesized that “associations between income inequality and health tend to be strongest in larger areas and weakest in smaller areas, while the opposite is true of associations between median income and health”. Studies by Mellor and

Milyo¹⁸ and Soobader and LeClere¹⁹ both incorporate an explicit comparison across geographic scales. The former find some evidence of an effect of income inequality at the state level on the health of individuals living below the federal poverty line. At other geographic levels, however, this association disappears. Similarly, Soobader and LeClere¹⁹ find that the association between population health and income inequality was larger when assessed at the county level than when examined at the census tract level.

The effects of geographic scale on the income inequality and health relationship are critical, especially when considered in comparative perspective. As Wagstaff and van Doorslaer²⁰ astutely observe in the US context, “income inequality may not be capturing the hypothesized effects of social capital or psychosocial factors, but rather the effects of state-level policies towards the poor that are correlated with income inequality”. This clearly points to the fact that the issues of scale and of income inequality and health more generally depend crucially on context—the scale at which social policies for vulnerable populations are administered, as well as the actual policies themselves. This, of course, is but a first cut at the problem of geography in the income inequality and population health literature.

The zenith of interest in the income inequality and health relationship seems to have passed without any serious attempt to address problems of geography. After several years of intense interest in this hypothesis, in its January 5, 2002, issue the *British Medical Journal* published four studies on income inequality and population health, three of which failed to find evidence of a relationship. These papers were published under an editorial⁵ suggesting that, at worst, evidence for an association between income inequality and population health was “dissipating” and that, at best, the available evidence in support of a relationship was an issue of US “exceptionalism”.¹⁴ In their thorough review of the literature in this area, Lynch et al.⁶ are slightly less dismissive, finding that the evidence for the income inequality and health relationship is mixed. They suggest that the association is probably “contingent” on the health outcome and “the extent and equitable distribution of welfare state protections for the most vulnerable members of society.”^{21,22} We expand on the importance of contingency in the next section.

Placing “geography” into the relationship between income inequality and health

One of the most striking features of the existing literature on income inequality and population health has been its near complete inattention to geography not only in the formulation of the question and the execution of the empirical analyses but also, and mainly, in the interpretation of the results. There are two fundamental characteristics of the accumulated studies to date that make this inattention to geography particularly remarkable.

First, income inequality is a true contextual variable. The rapidly increasing literature on the influence of socio-economic contexts (neighbourhoods, communities, cities, regions, i.e., places) upon individual health, independently of individual socio-economic status, has been characterized by a fair degree of agonizing over the common reliance upon compositional variables (percentage low income, percentage owner-occupiers, etc.) as opposed to true contextual variables as indicators of the causal properties of places in the social production of health. However, income inequality is a true contextual variable, because individuals do not have income distributions, only populations do; and it is the income distribution of populations living in identifiable *places* that is the subject of every study to date on the relationship between income inequality and population health. By place, we mean “a portion of geographic space. Space is organized into places often thought of as bounded settings in which social relations and identity are constituted”,²³ and the places we are concerned with include countries, states, provinces, regions, metropolitan areas and counties.

The other feature of the published literature in this area that makes the absence of an explicit consideration of geography peculiar is that studies have used geographic units that span the entire politico-geographic spectrum, from nation-states to church parishes, across several countries. The difficulty is that there has been no consideration of the possibility that the meaning of income inequality is highly scale-dependent—it means different things at different geographic scales. Yet in the sequence of studies published as this question rose in popularity—first comparing select OECD countries (Wilkinson^{12,15}), then US states,^{1,24}

US metropolitan areas,³ US counties¹⁹ and, more recently, Canadian provinces and metropolitan areas,¹¹ Japanese prefectures²⁵ and Danish parishes²⁶—one could argue that the geographic scale at which these analyses were being done was treated as incidental to the question of the relationship between income inequality and population health. Put another way, the successive studies seemed to treat the question with the subtext “if the association can be shown at *multiple* scales, then it must be true”. An equally plausible and richer interpretation, which would prompt a more thorough analysis, however, is that income inequality is a marker for some set of causal process *at a given scale* and is therefore a marker for *different* causal processes at each geographic scale.

The belief that “if it exists at multiple scales it must be true” reflects an overly simplistic and outdated notion of geography in population health research, namely, that a given phenomenon is important only if it can be demonstrated to be governed by geographic “laws”, whereby certain attributes of places, for example, the relationship between income inequality and health, exists at all times and all places. Known as the “nomothetic” approach, this may be appealing from a scientific perspective for its ability to provide reliable predictions, but the world of real places seldom conforms to such law-like regularities.²⁷ The “idiographic” approach, on the other hand, emphasizes the uniqueness of places, stressing differences between places and their particularly unique historical trajectories, cultural norms, built environments, etc. According to this view, no two places are alike; rather, they are all unique. The tension between nomothetic and idiographic explanations, we argue, is critical to understanding and advancing research on place and health more generally and to interpreting the relationship between income inequality and the health of populations more specifically. This tension reflects one of the central philosophical dilemmas of geographic theory.^{28,29} According to Harvey,²⁸ geographers, perhaps more so than other social scientists, have had difficulty in specifying general theories and laws—perhaps rightly so. As he observes, “The incorporation of space into social theory, of whatever sort, always seemed to disrupt its power. The innumerable contin-

gencies, specificities and ‘othernesses’ which geographers encountered could be (and often were) regarded by geographers as fundamentally undermining ... of all forms of social scientific metatheory.”²⁸

Taken to extremes, to favour idiographic explanations implies that it is impossible to say anything about places in general or to generalize across places at all, but Harvey offers a promising if still challenging solution:

“The inference, of course, is that geography is not open to universal theory and is the realm of specificity and particularity. My own view, however, is that while too much can be made of the universal at the expense of understanding particularity, there is no sense in blindly cantering off into the other direction into that opaque world of supposedly unfathomable differences in which geographers have for so long wallowed. The problem is to rewrite the metatheory, to specify dialectical processes in time-space, rather than abandon the whole project.”²⁸

The implications of Harvey’s search for a resolution to this dilemma for income inequality and population health research is that (a) the current debate about whether the relationship between income inequality and health is “real” or not^{6,8} is stuck in a nomothetic rut and is therefore missing critically important aspects of the problem, namely, (b) we need to better understand the ways in which income inequality *in specific places* is manifest in elevated risks of death and illness, *in addition to* how widespread this issue is. One way of focusing such an effort in the income inequality and health example is to identify specific places that do not fit the expected pattern and investigate their unique characteristics in order to determine why they do not fit the relationship. This can be particularly helpful in hypothesizing the mechanisms linking income inequality and population health more generally.

Using the example of the paradoxical relationship between income inequality and population health in Canada, we take a middle ground between the idiographic and nomothetic approach. Side-stepping the debate about whether the income inequality and population health relationship is real or generalizable (or generalizable enough to warrant attention from researchers and policy-makers), we

Figure 1. Mortality in all working people by proportion of income belonging to less well-off half of households, US metropolitan areas, Canadian cities¹⁰

Figure 2. Metropolitan working-age (25-64) mortality vs. median share, by region

argue that *differences* in the relationship between income inequality and population health in different places is the starting point for a rich style of inquiry, rather than an end point to be debated for its authenticity.

Putting income inequality and population health in place: Unpacking the Canada-US comparison of metropolitan areas

The fundamental importance of geography can be seen from data drawn from a study of

income inequality and mortality in North American metropolitan areas. Using data from a paper by Ross et al.,¹¹ we unpack the geographies of income inequality and population health in North American metropolitan areas, states and provinces, and regions. Ross et al.¹¹ found a strong and statistically significant association between income inequality and working-age mortality (age 25-64) for US metropolitan areas ($n = 282$) but no such relationship in Canadian metropolitan areas ($n = 53$) (Figure 1).

In the first of these analyses, we investigate the role of region in the production of an overall relationship between income inequality and population health in the United States by stratifying our sample of US cities according to regions of socio-economic similarity, as argued by Lynch et al.³⁰ Second, we visualize the relationship between metropolitan income inequality and population health and map it in an attempt to visualize any regional patterns of income inequality and mortality in Canada and the United States. Our technique allows us to easily characterize the geographic pattern of metropolitan areas that are outliers in the income inequality and mortality relationship. Third, as an extension to the mapping of empirical outliers, we quantitatively define outliers that are more than 1.5 standard deviations from the regression line in the income inequality-health relationship. Finally, after identifying two significant patterns of outliers for US cities and two specific outliers for Canadian cities of interest, we propose future research directions needed to develop possible explanations of the income inequality and health relationship in North America.

Region and the income inequality and population health relationship

The first geography we unpack is the effect of region on the income inequality and population health relationship, limiting ourselves to metropolitan areas in the United States because there are too few Canadian metropolitan areas to execute a meaningful stratified analysis. The results are shown in Figure 2. The relationship between median share of income and working-age mortality is statistically significant in all regions but strongest in the Midwest and Northeastern regions of the United States and weakest in the South. At this level of resolution it is difficult to

speculate on the reasons for the weaker relationship in the South, but it is interesting to note that this is the region with both the highest income inequality and highest mortality of the United States. It is possible that factors other than income inequality (such as poverty, discrimination and regional economic dependency and underdevelopment, or even smoking rates and regional dietary patterns) may be the more important determinants of health in the South. In the Midwest and the Northeast, however, it appears that income inequality, quite likely in concert with related factors, varies closely with working-age mortality.

Visualizing geographies of income inequality and population health

Figures 3 and 4 unpack yet another view of the geography of income inequality and population health in the United States and Canada respectively. In both of the maps shown in these figures, both the level of income inequality and the mortality rate are represented on the dot for each metropolitan area. The darkness of the dots represents the level of income inequality (darker dots, higher income inequality), and the darkness of the triangles superimposed on each dot represents the mortality level (darker triangles, higher mortality). This display allows for an easy visualization of the geographic patterning of the income inequality and population health relationship. Places that fit the relationship well have consistent shading, so that light shading on light indicates places that fit the relationship well at the egalitarian and healthy end of the spectrum and dark on dark fit it at the other end of the spectrum. Where there is a shading contrast, however, it indicates a place that is an outlier. Any patterning of these places is of particular interest, because it could help to reveal possible causal processes in the income inequality and population health relationship.

There are a number of interesting patterns that emerge from this visualization analysis. First, in the United States, we can see a number of patterns at a higher level of resolution. In the west, for example, it is possible to see the difference between California and the Pacific Northwest. The former has a level of inequality that is, on the whole, higher than the remainder of

Figure 3. Working-age mortality and median share of income (1991 data, United States excluding Alaska and Hawaii)

Figure 4. Median share of income and working-age mortality (1991, Canadian metro areas)

the West, which may be a result of differential migration of both very high-income and very low-income households. One exception to this pattern, however, is San Diego, which has a high level of military employment and a strong presence from the higher education sector, and is both

egalitarian and healthy. Also of note is Santa Barbara, which is both a wealthy enclave and a university town, making it a highly unequal, but healthy, place to live. Further up the coast are the cities of the Pacific Northwest, which typically have stable employment and healthy lifestyles.

Figure 5. Income inequality and working-age mortality in US metropolitan areas highlighting university towns and military towns

Bremerton and Olympia are good examples, as they are healthy and egalitarian small cities. Even the larger cities of the region like Portland and Seattle fare well in health terms.

The Midwest consists mainly of small and mid-sized cities, most of which are very healthy and egalitarian, but some cities, like Lawrence (Kansas) and Sioux Falls (Iowa), produce high levels of health despite high inequality. Bloomington (Illinois), South Bend (Indiana) and Lafayette (Indiana) are cities with a similar pattern and also share an important trait with Kansas and Sioux Falls—they are university towns. Indeed, the United States contains numerous university cities, relatively small cities that are dominated by either public or private universities. These cities bring together high concentrations of wealth (faculty, staff and scientists at technology firms) along with a temporarily poor (and young and healthy) student population. In fact, this example demonstrates one of the shortcomings of income as a marker of socio-economic position. Most students at universities may have low incomes, but they are often raised in affluent families and are destined for high social standing themselves. It appears that the

pattern of low mortality and high inequality, therefore, stems from the unusual population mix that congregates in US university cities. A number of university towns, maybe as many as 13, appear on the map as unusually healthy outliers. We investigate this further in the following section.

The relationship between income inequality and population health in the Northeast is the strongest of any region in the United States, as Figure 2 shows. Unpacking this further, however, reveals a number of healthy, egalitarian, blue-collar cities (e.g., Allentown, Pennsylvania) alongside others where the industrial base has eroded, like Flint (Michigan), which has both high inequality and high mortality. Additionally, many of the larger industrial cities in this region, like Detroit and Cleveland, are highly segregated by income and race.

In the South, a preponderance of the dots have dark-shaded triangles on dark-shaded circles, implying high inequality and high mortality. These cities are visible in Louisiana, Tennessee, Alabama, Georgia, the Carolinas and into east Texas. In addition to showing high inequality they also tend to have lower median incomes, high levels of racial segregation

and poor overall health. This region is home to the city with the highest working-age mortality rate, Florence (South Carolina). In addition to the noticeable dark on dark cities, however, there are a few cities with only moderate to low levels of inequality, like Clarksville (Tennessee), Fort Walton Beach (Florida) and Huntsville (Alabama). These cities are all the beneficiaries of relatively high levels of military employment, which reduces overall inequality.

In Florida, with the exception of some of the much larger cities like Miami, there is evidence of a possible healthy migrant effect. It appears that the influx of relatively healthy, affluent and young retirees from other regions may have reduced overall mortality rates, especially in the coastal cities. The final area of interest is in the southwestern part of Texas along the Mexican border, where a few cities in the Rio Grande Valley (Laredo, Brownsville and McAllen) exhibit unusually low mortality for very high inequality. Undoubtedly due at least in part to the well-known “Latino mortality paradox” (i.e., Latinos tend to have very good health despite low socio-economic position)^{31,32} this phenomenon invites further analysis, because it appears that few other cities in the state enjoy this protective effect.

In Canada (Figure 4), the absence of a relationship between income inequality and working-age mortality, the smaller number of cities and the narrower differences among cities in terms of mortality or income inequality all make it more difficult to discern any strong patterns. Nevertheless, it is possible to see a number of cities that produce either unexpectedly good or poor health when compared with their level of inequality. Places like Prince George (British Columbia) and Chicoutimi-Jonquière (Quebec), and even Kingston and Barrie (Ontario) have unusually high mortality despite their low levels of inequality. In the case of Prince George and Chicoutimi, the relatively flat income distribution is likely due to the traditional reliance on primary resource extraction (forestry), and the high mortality could be due to occupational injuries or chronic pollutant exposures from pulp and paper, and wood processing. In addition, Prince George has a significant Aboriginal population (9.4%)³³ with significantly

greater mortality risks than the general population for a wide range of causes, although there are other cities with similar proportions of Aboriginal people, like Saskatoon and Winnipeg, that do not appear as outliers on the income inequality and mortality relationship.

Kingston has traditionally been a university, government, military and prison town, and this would account for the flat income distribution there. Kingston, in other words, is neither a university nor a military town in the sense that such towns exist in the United States, although we can speculate on why it has such a flat income distribution. In terms of mortality, it may be that the number of former inmates and their families living in the area may account for the slightly higher than expected mortality. Among Canadian cities, therefore, there is no strong pattern that could explain the outliers with unusually poor health for egalitarian income distribution.

At the other end of the spectrum in Canada, two of the big cities, Toronto and Vancouver, appear to be able to produce high levels of health despite high levels of inequality. A similar, but less pronounced, effect is seen in Kelowna and Chilliwack (British Columbia). In Toronto and Vancouver, this pattern is most likely to be attributable to a healthy immigrant effect.³⁴⁻³⁷ Despite the fact that the data for this analysis are from 1990-1991, the immigrant influence on population health patterns was well under way by that time and only continues. In Kelowna and Chilliwack, young, affluent and healthy retirees may be reducing the mortality rates while increasing the inequality in income distribution.

Quantitative assessment of outlier patterns of income inequality and population health

Having visualized the pattern of outliers on the map, we now move to a quantitative assessment of outlier patterns. Like the regional analysis, we restrict our focus to metropolitan areas in the United States because of the lack of a relationship in Canada and the small number of observations. We analyzed all 282 US cities and determined which cities were more than 1.5 standard deviations from the regression line for the income inequality and working-

age mortality relationship. We then highlighted on a scatterplot diagram (Figure 5) cities that fit two patterns that had already begun to emerge in the previous map visualization analysis. The stronger of the two patterns is the influence of university towns (the squares in Figure 5). Numerous university towns can be seen below the regression line, meaning that they have unexpectedly good health status despite their high inequality. The majority of these highlighted squares were more than 1.5 standard deviations below the regression line. One university town, Fayetteville (Arkansas), actually falls on the other side of the regression line, but the pattern is still quite striking.

The other pattern to emerge from the scatterplot is that several of the cities with worse mortality than expected given their level of inequality are, in fact, cities characterized by high military employment. While the high levels of mortality are unlikely due to direct military service, the pattern may be attributable to the fact that increasingly the US military has recruited racial minorities and people of low socioeconomic position for service, and these people may carry their pre-existing socioeconomic position and its attendant mortality risks with them to the location of their base in one of these towns. Again, like the university cities, in the scatterplot the majority but not all of the military towns highlighted were greater than 1.5 standard deviations from the regression line.

The outlier analysis in this section has taken a first step towards characterizing groups of cities in the overall population of US cities in a way that may have some bearing on understanding the relationship between income inequality and health. Although it is a far cry from providing an understanding of the unique circumstances underlying the mortality patterns in each of these cities, the commonality among university and military cities is striking and the explanation plausible.

Not only does this analysis unpack a layer of geography from the US relationship between metropolitan income inequality and population health, it also lends support to the robustness of that relationship in the United States. In other words, one could argue that both military and university cities are anomalies created

by the existence of large, economically dominant institutions in relatively small cities and that they are in some ways accidents of internal immigration. This lends support to an argument that they could be excluded from the metropolitan income inequality and population health analysis, which would make the observed relationship even more powerful.

CONCLUSIONS

In this paper, we have demonstrated how “placing” the study of income inequality and population health makes otherwise obscure patterns visible and opens up new questions and opportunities for investigating how unequal places may be less healthy than more egalitarian ones. To do this, we argued that recognizing the importance of a fundamental tension that arises in “explanation” in geography can be used as a guide for a more balanced approach to investigating place and health. The tension between nomothetic and idiographic approaches, or between effects of place that hold at all times and all places and effects of place arising from the unique social, historical, institutional, cultural and environmental features that constitute a given place, cannot ultimately be resolved, but an awareness of it allows for a more balanced approach to inquiry into place and health.

In the case of the income inequality and health issue, for example, rather than dismissing its importance because it does not appear to exist at all times and all places, it invites questions such as: Under what conditions does the relationship between income inequality and population health hold? and What, if anything, is similar about places where it does (or does not) hold? Subsequent research by Ross et al.³⁸ shows that the relationship between income inequality and population health holds for metropolitan areas in the United States and the United Kingdom in 1990, but not in Canada, Australia or Sweden, opening up even greater opportunities for studying income inequality, place and population health. Consequently we recommend that place and health studies seek this balance between the idiographic and nomothetic explanations in order to best understand the socio-geographic production of health.

Of course the interpretation we have offered of these patterns of income inequality and population health is partial and fallible. We have discussed some of the contingencies of place in order to identify similarities between places that do not fit the relationship between income inequality and health in the United States and Canada. Ours is a relatively narrow approach, and one that does not address all of the determinants of health of places. Moreover, as the analyses have shown, the results are not entirely consistent. Not all college towns, as we have called them, exhibit lower than expected mortality for their level of income inequality, and not all military towns exhibit higher than expected mortality for their level of income inequality. Our point in this paper has been to introduce some geographic concepts that allow us to get a stronger grasp on why, in many cases but not all, unequal places appear to have higher working-age mortality, and draw attention to some of the tensions involved in making inferences about the determinants of health in places.

REFERENCES

- Kaplan GA, Pamuk ER, Lynch JW, et al. Inequality in income and mortality in the United States: analysis of mortality and potential pathways. *BMJ* 1996;312:999-1003.
- Kennedy BP, Kawachi I, Prothrow-Stith D. Income distribution and mortality: cross-sectional ecological study of the Robin Hood index in the United States. *BMJ* 1996;312:1004-7.
- Lynch JW, Kaplan GA, Pamuk ER, et al. Income inequality and mortality in metropolitan areas of the United States. *Am J Public Health* 1998;88:1074-85.
- Ben-Shlomo Y, White IR, Marmot M. Does the variation in the socioeconomic characteristics of an area affect mortality? *BMJ* 1996;312:1013-14.
- Mackenbach JP. Income inequality and population health: evidence favouring a negative correlation between income inequality and life expectancy has disappeared. *BMJ* 2002;324:1-2.
- Lynch J, Smith GD, Harper S, et al. Is income inequality a determinant of population health? Part 1. A systematic review. *Milbank Q* 2004;82(1):5-99.
- Lynch J, Harper S, Kaplan GA, Davey Smith G. Associations between income inequality and mortality among US states: the importance of time period and source of income data. *Am J Public Health* 2005;95(8):1424-30.
- Wilkinson RG, Pickett KE. Income inequality and population health: a review and explanation of the evidence. *Soc Sci Med* 2006; in press
- Ram, R. Income inequality, poverty, and population health: evidence from recent data for the United States. *Soc Sci Med* 2005;61:2568-76.
- Soja, E. *Postmodern Geographies: the Reassertion of Space in Critical Social Theory*. London: Verso, 1989.
- Ross NA, Wolfson MC, Dunn JR, et al. Relation between income inequality and mortality in Canada and in the United States: cross sectional assessment using census data and vital statistics. *BMJ* 2000;320:898-902.
- Wilkinson RG. Income distribution and life expectancy. *BMJ* 1992;304:165-68.
- Rodgers GB. Income and inequality as determinants of mortality: an international cross-section analysis. *Popul Studies* 1979;33:343-51.
- Lynch JW, Smith GD, Hillemeier M, et al. Income inequality, the psychosocial environment, and health: comparisons of wealthy nations. *Lancet* 2001;358:194-200.
- Wilkinson RG. *Unhealthy Societies: the Afflictions of Inequality*. London: Routledge, 1996.
- Waldmann RJ. Income distribution and infant mortality. *Q J Econom* 1992;107:1283-1302.
- Wilkinson RG. Income inequality and population health. *BMJ* 2002;324:978.
- Mellor JM, Milloy J. Reexamining the evidence of an ecological association between income inequality and health. *J Health Polit Policy Law* 2001;26(3):487-521.
- Soobader M-J, LeClere FB. Aggregation and the measurement of income inequality: effects on morbidity. *Soc Sci Med* 1999;48(6):733-44.
- Wagstaff A, van Doorslaer E. Income inequality and health: What does the literature tell us? *Ann Rev Public Health* 2000;21:543-67.
- Lynch J, Harper S, Davey Smith G. Commentary. Plugging leaks and repelling boarders—where to next for the SS income inequality? *Int J Epidemiol* 2003;32:1029-36.
- Ross NA, Lynch JW. Commentary. The contingencies of income inequality and health: reflections on the Canadian experience. *Int J Epidemiol* 2004;33:318-19.
- Duncan, JS. Place. In: Johnston RJ, Gregory D, Pratt G, Watts M, eds. *Dictionary of Human Geography*, 4th ed. London: Blackwell, 2000.
- Kawachi I, Kennedy BP. The relationship of income inequality to mortality: Does the choice of indicator matter? *Soc Sci Med* 1997;45(7):1121-27.
- Shibuya K, Hashimoto H, Yano E. Individual income, income distribution, and self rated health in Japan; cross sectional analysis of nationally representative sample. *BMJ* 2002;324:16.
- Osler M, Prescott E, Grønbaek M, et al. Income inequality, individual income, and mortality in Danish adults: analysis of pooled data from two cohort studies. *BMJ* 2002;324:13.
- Sayer A. *Method in Social Science: a Realist Approach*, 2nd ed. London: Routledge, 1992.
- Harvey D. From space to place and back again: reflections on the condition of postmodernity. In: Bird J, Curtis B, Putnam T, et al, eds. *Mapping the Futures*. New York: Routledge, 1992; 5.
- Dunn JR, Frohlich K, Ross NA, et al. Role of geography in inequalities in health and human development. In: Heymann J, Hertzman C, Barer M, Evans RG, eds. *Healthier Societies: From Analysis to Action*. New York: Oxford University Press, 2005.
- Lynch J, Smith GD, Harper S, Hillemeier M. Is income inequality a determinant of population health? Part 2. U.S. National and regional trends in income inequality and age- and cause-specific mortality. *Milbank Q* 2004;2(2):355-400.
- Abraido-Lanza AF, Dohrenwend BP, Ng-Mak DS, Turner JB. The Latino mortality paradox: a test of the "salmon bias" and healthy migrant hypotheses. *Am J Public Health* 1999;89(10):1543-48.
- Abraido-Lanza AF, Chao MT, Florez KR. Do healthy behaviors decline with greater acculturation? Implications for the Latino mortality paradox. *Soc Sci Med* 2005;61(6):1243-55.
- Statistics Canada. *Community Profile for Prince George Census Agglomeration*. Available at: www.statcan.ca. Accessed December 15, 2005.
- Gee EM, Kobayashi KM, Prus SG. Examining the healthy immigrant effect in mid- to later life: findings from the Canadian Community Health Survey. *Can J Aging* 2004;23(Suppl 1):s61-9.
- McDonald JT, Kennedy S. Insights into the "healthy immigrant effect": health status and health service use of immigrants to Canada. *Soc Sci Med* 2004;59(8):1613-27.
- Ali JS, McDermott S, Gravel RG. Recent research on immigrant health from Statistics Canada's population surveys. *Can J Public Health* 2004;95(3):I9-13.
- Chen J, Ng E, Wilkins R. The health of Canada's immigrants in 1994-95. *Health Rep* 1996;7(4):33-45, 37-50.
- Ross NA, Dorling D, Dunn JR, et al. Metropolitan income inequality and working age mortality: a cross-sectional analysis using comparable data from five countries. *J Urban Health* 2005;2(1):101-10.

RÉSUMÉ

Contexte : Depuis quelques années, des études toujours plus nombreuses portent sur la relation inverse entre l'inégalité des revenus et la santé des populations (à différentes échelles géographiques), mais cette relation ne semble pas universelle. Nous faisons valoir que les considérations géographiques brillent par leur absence dans les études des liens entre l'inégalité des revenus et la santé des populations, et que les explications des résultats mitigés de ces études souffrent du fait qu'on ne tient pas compte de la géographie.

Méthode : À l'aide de techniques de visualisation des structures spatiales, d'analyse des valeurs aberrantes et d'analyse comparative d'études de cas, nous avons étudié le rôle de la géographie comme moyen de « dégroupier » les liens entre l'inégalité des revenus et la santé au Canada et aux États-Unis.

Résultats : Notre analyse des études sur l'inégalité des revenus et la santé des populations dans le contexte du lieu a mis au jour des structures qui autrement seraient restées dans l'ombre et dégagé de nouvelles questions et de nouvelles pistes de recherche pour comprendre de quelle façon les lieux où les inégalités sont importantes peuvent être moins sains que les lieux égalitaires. Plutôt que de minimiser l'importance de l'inégalité des revenus pour la santé parce qu'un lien ne semble pas exister en tout temps et en tous lieux, nous sommes convaincus que certaines questions sont d'une importance cruciale et méritent une analyse différente de celle que l'on trouve dans les études sur le sujet. Ces questions sont les suivantes : Dans quelles conditions y a-t-il bel et bien un lien entre l'inégalité des revenus et la santé des populations? Et quelles sont les similitudes, le cas échéant, entre les lieux où un tel lien est présent (ou absent)?

Conclusion : Nous recommandons que les études sur le lieu et la santé cherchent à atteindre un équilibre entre les explications universelles et particulières des liens entre le lieu et la santé, afin d'accroître notre connaissance des mécanismes sociogéographiques de production de la santé.