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EQUITY IN HEALTH AND HEALTH CARE IN A DECENTRALISED CONTEXT: EVIDENCE FROM CANADA

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SUMMARY

The impact of administrative decentralisation on equity in health and health care is an important unresolved issue in the health policy debate. Predictions from the limited theoretical literature and the relevant empirical research are both insufficient to draw any firm conclusions. Many countries are nevertheless experimenting with decentralisation policies in the absence of research evidence. This paper presents an exploratory empirical analysis of decentralisation by investigating the spatial dimensions of health-related equity in Canada, a highly decentralised setting. Using data from the 2001 *Canadian Community Health Survey*, we apply a decomposition method of the Concentration Index to explore whether income-related inequalities in health and inequities in the use of health care are more likely to be due to gaps between rich and poor Canadian provinces rather than to differences between rich and poor individuals within them. The results show that *within* area variation is the most important source of income-related health inequality, while income-related inequities in health care use are mostly driven by differences *between* provinces. Copyright © 2007 John Wiley & Sons, Ltd.

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INTRODUCTION

Policymakers in many health systems regard the pursuit of equity in health and in health-care finance and delivery as a central policy objective. Although the precise notion of equity in use often remains somewhat elusive, researchers have made major efforts to clarify the concept (Williams and Cookson, 2000; Wagstaff and Van Doorslaer, 2000). The commitment to improving equity in health is also reflected in large number of empirical studies aimed at cross-national comparisons (e.g. Van Doorslaer *et al.*, 1993, 1997, 2004a,b; Van Doorslaer and Koolman, 2004).

The most appropriate decentralisation of policy-making powers is moreover an important policy question for health systems that to date has remained largely unresolved. At one extreme lies the English National Health Service (NHS), in which the central authority sets most policies, and lower levels have little room for manoeuvre regarding the nature or financing of services. At the other extreme lies the United States, with a pluralistic web of purchasers and providers, and little central policy of any effectiveness.

The difficulty of commanding a health system from the centre has led some nations to explore the potential for decentralising powers to lower levels of government. Traditional NHS-type systems such as Italy and Spain have devolved health system policy making and finance to regions covering populations of about three million people (Reverte-Cejudo and Sanchez-Bayle, 1999). In the United

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Kingdom, the systems of Wales, Scotland and Northern Ireland are beginning to diverge following the introduction of devolution (Pollock, 1999). In contrast, countries such as Norway and Portugal are moving towards more centralisation of powers (World Health Organization, 2003). Decentralisation has also been an important unresolved element of health system design in many developing countries (Mills, 1994; World Bank, 2003).

Many health systems have traditionally delegated substantial powers. In Scandinavian countries, a large degree of responsibility for the health system has historically been vested in local government (Koivusalo, 1999). Federal countries, such as Canada and Australia, have made provinces or states the principal locus of health policy-making (Armstrong and Armstrong, 1999). Yet, it is worth noting that – even in these well-established decentralised systems – the national government often retains considerable powers of oversight and regulation, and there remain important tensions about where the balance of responsibility for the health system should lie (Lazar *et al.*, 2002).

Most of the relevant economic literature on decentralisation comes from the theory of fiscal federalism. This theory is ambiguous about which level of government should perform the redistribution function. The traditional position is represented by Oates (1972), for whom redistribution is a 'national' public good and may therefore be more efficiently allocated by a central government. Alternative views on this issue are given by Pauly (1973), who regards redistribution as a 'local' public good, and by Tresch (2002), for whom optimality could be achieved by a dual income redistribution framework in which the central government redistributes among jurisdictions, and the local governments redistribute among individuals.

Economic models of decentralisation of the redistribution function lead to different predictions regarding equity. They all predict that, unless a strong redistribution policy is put in place by the central government, decentralisation exacerbates inequalities across jurisdictions with different tax bases (e.g. Tresch, 2002). However, the conclusions are not so clear-cut for intra-jurisdictional inequalities. Because decentralisation allows redistributing according to local circumstances and preferences, inequalities among individuals located in the same jurisdiction might be reduced if one assumes no mobility between jurisdictions. This is likely to be appropriate for much of the health-care field. Migration of citizens to areas that provide their preferred health system (high-quality services or low levels of user charges) is likely to be limited to a small proportion of citizens with chronic conditions (HIV, diabetes) or very old people with high level of health-care needs (Levaggi and Smith, 2005).

If, on the other hand, one assumes significant individual mobility, models predict a reduction in the level of redistribution, in order to discourage migration from poorer (and sicker) individuals (Brown and Oates, 1987). Under these circumstances, decentralised redistribution is expected to give rise to large differences across individuals and jurisdictions, and consequently, high levels of inequalities both within and between jurisdictions. Consistent with his view of redistribution as a local public good, and in contrast to Oates' position (1972), Pauly (1973) would regard these differences as a superior alternative to a centralised uniform level of redistribution.

A specific issue in health care is the distinction between equity in health and equity in health care. It is in general likely that models of fiscal federalism are more relevant to questions of redistribution in health care rather than redistribution in health, as many factors other than health care are likely to influence on health status (see e.g. Hauck *et al.*, 2003).

The issue of whether decentralisation enhances equity in health and health care is a central policy question. However, there has been little theoretical research that has explored this subject in any depth. Moreover, the limited empirical research has hitherto suffered from technical and data limitations and yielded few firm conclusions. In the first place, it is often the case that the specific definition of equity is unclear. While theory suggests that decentralisation might have an effect on intra-jurisdictional equity, empirical studies have mainly studied the effect of decentralisation on equity across jurisdictions.

And secondly, most empirical studies have used rather rudimentary statistical tools to measure inequalities. For instance, Bossert *et al.* (2003) examined the evolution of national and local per capita

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expenditure and utilisation by municipal income deciles after decentralisation was implemented in Chile and Colombia. Similarly, Habibi *et al.* (2001) analysed health expenditures in high- and low-income Argentinean provinces before and after devolution. West and Wong (1995) examined the disparities across Chinese provinces in the provision of health services in the early 1990s. The only study that focuses on inequalities within jurisdictions (but not between them) is Joan Costa-i-Font (2005). This study used Concentration Indices (CIs) to compare the degree of health inequality in devolved versus non-devolved Spanish regions in 1997, before the decentralisation of the whole Spanish health system was completed. The analysis suggested that devolution may have encouraged pro-equity policies, but only in devolved regions with small private sectors.

This study addresses some of the limitations of previous empirical studies on decentralisation and health care in two ways. First, it employs the CI to measure income-related inequalities in health and inequities in health-care use. The CI combines a number of desirable properties for the measurement of socio-economic inequality[1] (Wagstaff *et al.*, 1991). Secondly, the overall CI is decomposed into inequalities both between and within socio-economic status (SES) groups. In this way, we take account of important dimensions of equity often ignored in the literature. The CI decomposition was originally developed by Rao (1969), and introduced to the health economics literature by Clarke *et al.* (2003), Wagstaff and Van Doorslaer (2004) and Wagstaff (2005a). We add to these studies by decomposing not only inequalities in health but also inequities in health-care use.[2] We also report standard errors for each CI.

This is a first attempt to analyse the relationship between decentralisation and equity in health in this way, and our objective is merely to describe the inequities as reflected in the Canadian context. Our intention is to examine to what extent the measured degree of inequity in a highly decentralised health system such as Canada is a result of intra-region as opposed to inter-region variation in health and the use of health services. From a policy perspective, this is not unimportant as it offers a first step towards gaining a better understanding of the role of decentralisation in influencing various aspects of health-related equity.

The remainder of the paper is organised in five sections. The next section provides an overview of the health-care system in Canada. The second section describes the methods used for the empirical analysis. The third section describes the data and the main variables used in the empirical analysis, and the fourth section presents the results from the provincial decomposition. The fifth section concludes with a discussion and interpretation.

DECENTRALISATION IN CANADA'S HEALTH-CARE SYSTEM

Canada is a confederation of 10 provinces[3] and 3 territories.[4] Health-care services are mostly publicly financed and they offer comprehensive and universal insurance to Canadian citizens. Provision is left to both private and public institutions (Romanow, 2002; Allin, 2006).

Since Canada became a nation, following the Constitution Act of 1867, provinces have borne the primary responsibility over health-care. Thus, among other functions, provinces regulate hospitals and other health institutions, they decide the financing schedules with health professionals, and they set global budgets for hospitals. Provincial governments are also responsible for the final health-care costs

[1] For simplicity, throughout this paper the CI is referred to as a measure of inequality. However, the CI can also be used for measuring the level of horizontal inequity. The CI of the actual medical care use/health status measures the degree of inequality in health-care use/health status and the CI of the need-standardised use measures the degree of horizontal inequity (Van Doorslaer *et al.*, 2004b).

[2] There is inequality in health when different individuals enjoy different levels of health. Inequity in health care, on the other hand, implies that individuals consume different amounts of health care than they need.

[3] Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia.

[4] Yukon, Northwest territories and Nunavut.

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Table I. Regionalisation in Canadian provinces 1989–2005

Province	Total population in thousands (2005)	Established/ changed (year)	Current number of RHAs	Population range of RHAs (2005)
Newfoundland	516	1994/2003–2004	6/4/2[a]	295 145–40 516
Prince Edward Island	138.1	1993–1994/2005	0	—
Nova Scotia	937.9	1996–2001	9	398 038–33 165
New Brunswick	752	1992/2002	8	18 115–2441
Quebec	7598.10	1989–1992/2003	18	1 782 835–9600
Ontario	12 541.40	2005	14	1 356 500–234 000
Manitoba	1177.60	1997–1998/2002	11	622 015–955
Saskatchewan	994.1	1992/2001–2002	13	272 195–2125
Alberta	3256.80	1994/2003	9	398 038–33 165
British Columbia	4254.50	1997/2001	5 (16)[b]	1 314 635–285 560

Source: World Health Organisation, 2005 and Statistics Canada CANSIM Table 051—0001.
[a] In 1994, the Government of Newfoundland introduced a parallel structure for institutional and community care through six institutional health boards, four health and community services boards and two integrated boards.
[b] In 2002, British Columbia was restructured into five regional health authorities that administer 16 health service delivery areas.

of their jurisdiction (Banting and Corbett, 2002). As for the Canadian territories, health services have been directly managed and delivered by the federal government until the beginning of the 1980s (Romanow, 2002). The territories also have constitutional arrangements, determined by the Parliament of Canada, that differ from those of the provinces.

The federal government's role in the system is limited to the direct provision of health services to specific sectors of the population,[5] and to the management of the activities of health protection, disease prevention and health promotion (World Health Organization, 2005). Federal influence has been mainly exercised through financial assistance to the provinces (Banting and Corbett, 2002). Adherence to some basic principles – Canada Health Act – in return from federal support has enabled the creation of a national plan for the health-care system. These principles are: universal coverage; public administration[6]; coverage of all 'medically necessary' services (comprehensiveness); portability of coverage outside the province; and prohibition of financial barriers to access health services, such as user fees or extra billing by physicians (accessibility). Within this broad framework, provinces have scope for determining the health policy of their insurance plans. In addition, the shift from conditional matching grants to a block funding grant for health and post-secondary services in 1977 – Established Program Financing (EPF) – gave provinces more autonomy in their health-related spending decisions. On the other hand, since the introduction of the block funding, the federal government has unilaterally reduced the amount of the transfer payments to the provinces (Armstrong and Armstrong, 1999). The most severe cutback to federal transfers took place in 1996 with the combination of funding for health care, post-secondary services and social services in a single block: the Canadian Health and Social Transfer (CHST).

Provinces have faced the federal cutbacks by restricting coverage for new and existing treatments and services and by discharging responsibility for some services to municipalities, so far mostly in charge of public health. Provincial governments have also responded to restrictions in federal funds by devolving control of some aspects of the system to the recently created regional health authorities (RHAs). Table I shows the date in which the process known as regionalisation was established (and changed) in each province the number of RHAs per province and their population size. Both the specific nature of devolved authority and the implementation date of regionalisation diverge considerably among

[5] These include veterans, native Canadians living on reserves, military personnel, inmates of federal penitentiaries and the Royal Canadian Mounted Police.
[6] This principle implies the prohibition of private insurance of services already covered by provincial insurance. For-profit coverage is limited to supplementary services such as pharmaceuticals, vision care, dental care, and chiropractors' and podiatrists' services (World Health Organization, 2005).

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provinces (Lomas *et al*., 1997). While most provinces started the regionalisation process in the late 1980s or mid-1990s, Ontario is in the early phase of regionalisation. However, in all the cases the level of autonomy given to the RHAs is still highly restricted for two reasons. Firstly, health regions generally receive budgets determined by provinces on the basis of historical spending patterns and have no revenue raising powers. Secondly, regional decision-making is constrained by provincial guidelines and by provincial determination of key health services – physician services and drugs.

METHODS

Decomposition of the Concentration Index

The health concentration curve, $L(s)$, is formed by plotting the cumulative share of the population ranked by income s, against the cumulative share of some health variable (health status or health-care utilisation). The CI of a health variable is then twice the area between the diagonal and $L(s)$ (Wagstaff *et al*., 1991). This index ranges from -1 to $+1$,[7] with positive values indicating inequalities in favour of high-income groups. By analogy with the decomposition of the related Gini coefficient (Lambert and Aronson, 1993), and in a similar way to Clarke *et al*. (2003), Wagstaff and Van Doorslaer (2004) and Wagstaff (2005a), one can write

$$\mathrm{CI} = \mathrm{CI_B} + \alpha_j \mathrm{CI}_j + R \tag{1}$$

where $\mathrm{CI_B}$ is the between-area CI, α_j is a weight attached to the jth area (the product of its population share and health variable share), CI_j is the CI of the jth group and R is a residual term.[8]

Assuming we are examining inequalities in health, $\mathrm{CI_B}$ is computed by replacing individual health with the mean health of the area in which the individual lives and sorting areas by ascending order of the SES variable to compute the rank. $\mathrm{CI_B}$ therefore indicates whether poorer areas have smaller or larger values of the health variable than richer ones.

The within-area Concentration Index, $\mathrm{CI_W}$, is defined as the weighted sum of the CI_j of the J areas. $\mathrm{CI_W}$ is therefore the area between $L_{\mathrm{B}}(s)$, the concentration curve associated with $\mathrm{CI_B}$ and the concentration curve resulting from keeping the J areas arranged in ascending order of the SES variable, but allowing for within-area variation in health, $L_{\mathrm{w}}(s)$. $L_{\mathrm{w}}(s)$ necessarily lies underneath $L_{\mathrm{B}}(s)$.

R is a residual term that takes on a non-zero value when the SES ranges overlap (that is, if the higher SES individuals in area 1 have a greater SES than the lower SES individuals in area 2 and so on). Given that such overlap is common, $L(s)$ is expected to differ from $L_{\mathrm{w}}(s)$. R will be positive if (as is likely) individuals with high SES systematically report better values of the health variable than low SES individuals, regardless of where they live. In this case, $L(s)$ lies further away from the line of equality than $L_{\mathrm{w}}(s)$. The magnitude of R depends on the extent of the overlapping, leading to a 'reranking' as we move from $L_{\mathrm{w}}(s)$ to $L(s)$, and on the size of the covariance between the SES variable and the health variable. It therefore captures both between- and within-area SES-related health inequalities.

Estimation procedures

Our examination of inequalities in the use of health care is based on an analysis of horizontal inequities (Wagstaff and Van Doorslaer, 2000). The starting point is to calculate the need-standardised use for health care using a regression-based approach. This indirect standardisation (IS) compares the actual distribution of use with that expected on the basis of needs. For a linear model, IS can be calculated

[7] However, as for the HUI, the health status measure used in this study, when the variable of interest lies between 0 and 1 the bounds of the CI depend on the mean (μ): as the mean increases the range of the CI decreases. For large samples, the minimum value of the CI is given by $\mu-1$ and the maximum value is equal to $1-\mu$ (Wagstaff, 2005b).

[8] We use the convenient regression (Kakwani *et al*., 1997) to calculate CI, $\mathrm{CI_B}$, CI_j and their standard errors.

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straightforwardly as (e.g. Van Doorslaer *et al.*, 2004b)

$$\hat{y}_i^{\mathrm{IS}} = y_i + \hat{y}_i^x + \bar{y} \tag{2}$$

where y_i denotes the actual utilisation, $\bar{y}$ the sample mean and $\hat{y}_i^x$ the need (x)-expected utilisation. $\hat{y}_i^x$ is calculated in two steps, by first regressing medical care use (y_i) on (the logarithm of) income, a vector of k medical need indicator variables (x_k) and a set of p non-need variables (z_p) using the following equation:

$$y_i = \alpha + \beta \ln(\mathrm{inc}_i) + \sum_k \gamma_k x_{k,i} + \sum_p \delta_p z_{p,i} + \varepsilon_i \tag{3}$$

The coefficients from the OLS estimations are then combined with the actual values of the x_k variables – the need variables for which we want to standardize – and sample means of the income and z_p variables – the non-need variables for which we do not want to standardise but for which we want to control in the estimation of the coefficients – using the need-prediction equation

$$\hat{y}_i^x = \hat{\alpha} + \hat{\beta} \ln(\overline{\mathrm{inc}}) + \sum_k \hat{\gamma}_k x_{k,i} + \sum_p \hat{\delta}_p \bar{z}_p \tag{4}$$

where $\hat{y}_i^x$ indicates the amount of medical care an individual would have received if he had been treated as others with the same need characteristics, on average. The need variables are those that ought to affect the use of health-care, whereas non-need variables are those that ought not to affect the current health-care use. In spite of the considerable debate on the meaning of need and the value judgements involved in distinguishing between need and non-need variables, we follow the standard approach in the empirical literature and use morbidity variables (proxied by health status and health limitations) as need indicators, and variables such as income, education, and province of residence (as a proxy for availability of care) as non-need indicators (Gravelle *et al.*, 2006).

Given that the Canada Health Act provides national standards of access, coverage and quality across Canada (see the first section), we have estimated an average relationship between needs and utilisation for the country as a whole and use this as the (implicit) vertical equity 'norm' to generate need-predicted use and to measure inequities in the use of health care. We have then explored to what extent there are any systematic deviations from this norm by income level both within and between provinces.[9]

Our spatial decomposition of inequity in health-care use is then obtained by applying the techniques described in section 'Decentralisation in Canada's health-care system' to the need-standardised use for health care.[10]

Because health-care use variables are discrete and non-normally distributed, linear (OLS) estimation methods are in general not appropriate for the regression specified in Equation (3). For this reason, we have used a generalised negative binomial model for standardising health-care use for need using the above two-step approach (Jones, 2000; Van Doorslaer *et al.*, 2004a). The general functional form G of a non-linear model can be written as

$$y_i = G\left(\alpha + \beta \ln(\mathrm{inc}_i) + \sum_k \gamma_k x_{k,i} + \sum_p \delta_p z_{p,i}\right) + \varepsilon_i \tag{5}$$

A linear approximation of this function is given by

$$y_i = \alpha^{\mathrm{m}} + \beta^{\mathrm{m}} \ln(\mathrm{inc}_i) + \sum_k \gamma_k^{\mathrm{m}} x_{k,i} + \sum_p \delta_p^{\mathrm{m}} z_{p,i} + \mu_i \tag{6}$$

[9] If a certain degree of variation in health-care use by province was considered as legitimate following decentralisation, we could use a different estimation of (3) for each province. For the Canadian case, both the national and the provincial standardisation of health care by need give very similar results.

[10] The CI of the need-standardised use for health care measures the degree of horizontal inequity (Van Doorslaer *et al.*, 2004b).

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where α^m, β^m, γ^m and δ^m are the marginal or average effects of each independent variable treated as fixed parameters and evaluated at the mean (or some other parameter), and u_i is the implied error term which includes approximation errors. Since Equation (6) is a linear approximation of Equation (5), it can be used in the same way as Equation (2) to generate need-expected and need-standardised health-care use. The only difference is that in Equation (2) the actual sample mean, $\bar{y}$, has to be replaced by the mean of the predictions, $\bar{\hat{y}}$, as the standardisation does not guarantee that the predicted mean equals the sample mean. The disadvantage of this procedure is that the standardisation holds only approximately, and is contingent on the values used for the evaluation.

We base the analysis of income-related inequalities in health status on potentially avoidable inequality, removing the contribution of age and gender to health inequality by standardising for age and sex. For health inequalities, we have also calculated Wagstaff's (2002) Health Achievement Index, defined as $(1 - \text{CI}) * \mu$, with μ denoting the mean of the health variable. This index combines the level and the degree of inequality in health, indicating the extent to which provinces with better health also have lower inequality.

DATA AND VARIABLES

Our data are taken from the 2001 *Canadian Community Health Survey* (CCHS), the first wave of a nationally representative health survey of individuals aged 12 years and over living in Canada. The CCHS provides detailed data on health status, health-care utilisation and other personal characteristics for a sample of 130 880 respondents (Statistics Canada, 2003).

Individual weights (provided by the CCHS) were applied in all computations in order to make the results representative of the Canadian population. Throughout, given their special status, we have excluded from our analysis the Canadian territories, and instead restrict attention to the 10 Canadian provinces.

Income, our SES ranking variable, is measured as a continuous variable that provides an estimate of the aggregate income, before taxes and deductions, of all household members from all sources during the 12 months previous to the survey.[11] Equivalent household income was obtained using the modified OECD scale[12] to take into account differences in the size and composition of the families.

The measurement of the utilisation of the general practitioner (GP) and medical specialist services is based on the question: 'During the past 12 months, about how many times have you seen or talked on the phone about your physical, emotional or mental health with: (a) a family doctor or general practitioner and (b) a medical specialist?'. Hospital utilisation is measured on the basis of the question: 'For how many nights in the past 12 months have you been a patient overnight in a hospital, nursing home or convalescent home?'.

The CCHS measures health status using the *McMaster* HUI. The HUI provides a comprehensive description of an individual's overall functional health on the basis of eight attributes: vision, hearing, speech, ambulation (ability to get around), dexterity (use of hands and fingers), cognition (memory and thinking), emotion (feelings) and pain and discomfort (Furlong *et al.*, 1998). It assigns a single numerical value, between −0.360 and 1, for all possible combinations of levels of these attributes. A score of 1 indicates perfect health, while a score of 0 indicates a state valued the same as death.[13]

[11] We obtained this measure of income from the 2001 CCHS Masterfile by working via remote access with Statistics Canada. The measure of income included in the Public Use Microdata File is categorical and therefore less adequate for the (ranking) purposes of our study.

[12] The modified OECD equivalence scale assigns a weight of 1.0 to the first adult household member, 0.5 to the second adult household member and 0.3 to children as follows:

$$\text{equivalent income} = (\text{income}/(1 + 0.5 * (\text{householdsize} - 1 - \text{number of children}) + 0.3 * \text{children}))$$

[13] For analytic convenience, the (small number of) observations with negative scores have been excluded from our sample.

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The variables used as a proxy for need in our analysis are: age, sex, self-assessed health, health limitations and number of chronic conditions. Age is captured by the following five dummy variables: 12–34, 35–44, 45–64, 65–74 and over 75 years. We allow for interaction between age and sex. Twelve- to thirty-four-year-old male individuals are the reference category. The measurement of health as a proxy for health-care need is based on three questions in the CCHS. The first refers to the self-perceived health status of an individual: 'In general, would you say your health is: Excellent, very good, good, fair, poor?'. Based on these five categories, we construct four dummy variables, keeping very good health as the reference category. The second health-related question is: 'Are you limited in your daily activities by mental or physical health problems?' (sometimes, often, never). We create two dummy variables for the variable health limitation. No health problem in daily activities is used as the baseline category. The last health-related question refers to long-term chronic conditions diagnosed by a health professional. On the basis of the number of chronic conditions reported by the survey respondents, we have created six categories ranging from no chronic conditions, the reference category, to five or more chronic conditions.

The other (non-need) variables used in the analysis are: province of residence, economic status and education. We include a dummy variable for each of the provinces of Canada, except for our base category: Ontario. For education, we use four levels: less than secondary school graduation, secondary school graduation, some post-secondary studies and post-secondary graduation (reference category). Economic status is measured by six dummy variables derived from different variables that describe the activity status of the respondents: employed (base category), self-employed, inactive, retired, unemployed and student.

RESULTS

Table II summarises the descriptive statistics for income and the four health-related variables used in this paper. For visits to the GP there is slightly more variation across Canada, with Newfoundland reporting the highest number of visits (4 visits), and Quebec the lowest one (2.5 visits). The number of nights spent in hospital range from 0.65 in British Columbia to 1.14 in New Brunswick, and the number of visits to the specialist range from 1.10 in Newfoundland to 1.58 in Ontario. The highest HUI scores are found in Newfoundland and Quebec, while the lowest HUI score is found in Nova Scotia. Finally, the income variable shows quite a lot of variation across Canada, ranging from 24 397.7 Canadian dollars in Newfoundland to 35 662.19 in Ontario.

Table II. Descriptive statistics

Province	Observations	GP visits	Hospital nights	Specialist visits	HUI	Income	Income: ratio of poorest to richest quartile
Newfoundland	2866	4.06	0.78	1.10	0.90	24 397.7	0.37
Prince Edward Island	2553	3.37	0.83	1.33	0.88	26 287.4	0.45
Nova Scotia	4147	3.95	0.77	1.38	0.86	27 389.9	0.42
New Brunswick	3655	3.53	1.14	1.23	0.88	25 799.3	0.40
Quebec	18 267	2.48	0.84	1.46	0.90	29 525.9	0.40
Ontario	29 826	3.49	0.67	1.58	0.88	35 662.2	0.41
Manitoba	6086	3.41	0.75	1.34	0.88	30 010.3	0.43
Saskatchewan	5555	3.88	0.94	1.42	0.87	29 703.0	0.41
Alberta	10 477	3.70	0.69	1.29	0.88	34 501.7	0.42
British Columbia	13 563	3.97	0.65	1.34	0.88	33 489.0	0.39
Canada	96 995	3.35	0.74	1.46	0.88	32 622.8	0.40

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Table III. Decomposition results of the CI in Canadian provinces[a]

Component of CI	GP visits	Hospital nights	Specialist visits	HUI
CI	−0.026 [−5.2]	−0.117 [−4.7]	0.063 [8.5]	0.019 [35.7]
CI_B	0.036 [96.6]	−0.039 [−132.6]	0.015 [43.2]	−0.005 [−117.3]
CI_W	−0.005	−0.018	0.010	0.004
R	−0.057	−0.060	0.038	0.020

Note: The CI components for the HUI and the health-care use variables have been calculated using different standardisation procedures.
[a] Newey West-based t-statistics are given in brackets.

Overall, the regression results show a reasonable fit to the data, with regressors always jointly statistically significant.[14]

Income-related inequity in health-care use

Table III reports the decomposition results for the health-related variables used in this study. The results indicate that the poor use more GP services than the rich even after need differences have been taken into account (CI of the need-standardised distribution of visits to GP is significantly negative, $CI = -0.026$). The distribution of the number of nights in hospital also favours the poor ($CI = -0.117$), while the distribution of medical specialist visits is significantly pro-rich ($CI = 0.063$). These results are very similar to those reported for Canada in the comparative study by Van Doorslaer *et al*. (2004b) using the 2001 CCHS.

The results of the decomposition show that the overall measured degree of inequity in the utilisation of health-care services is mostly explained by variations across provinces in Canada (C_B) and the overlapping term (R). In addition, the contribution of variations across provinces tends to be higher (i.e. more pro-rich) than the contribution of differences between rich and poor individuals within provinces.

For both visits to GP and hospital nights, the negative value of the residual term R indicates that the richest individuals in the poorest areas that overlap with the poorest individuals in the richest areas spend less nights in hospital and visit the GP less even after need differences have been taken into consideration. The positive value of R in the decomposition of the medical specialist visits indicates that income and the number of specialist visits are positively correlated when areas' income ranges overlap: higher income individuals in the poorest areas that overlap with the richest areas tend to visit a medical specialist more often.

A striking result from the decompositions reported in Table III is that the distribution of visits to the GP between provinces is significantly pro-rich, while for hospital nights it is significantly pro-poor. This may be because poorer provinces may rely on hospital services for medical conditions that in other provinces are treated in primary care. However, the results of a province-specific analysis reported in Table IV reveal that Quebec contributes most to the observed pro-poor inequities in inpatient stays as well as to the pro-rich inequities in visits to the GP across Canadian provinces (exclusion of Quebec leads to pro-poor CI_B for GP visits and a substantial reduction in the pro-poor CI_B found for hospital nights). Since Quebec income is below the Canadian average (see Table II), this result suggests that – compared with richer provinces – people in Quebec visit the GP less and spend more days in hospital. These interesting findings for Quebec have been acknowledged in the literature, and are generally attributed to the lack of a family physician and the use of hospital services instead (CHSRF, 2005, p. 3; Statistics Canada, 2003).

[14] Regression results are not reported here for brevity, but are available upon request from the authors.

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Figures 1 to 4 presents the province-specific CI_j (with 95% confidence intervals) used for calculating the CI_w element of the decomposition for the four health-related variables, ranked in ascending order. The results reported in Table IV and Figure 1 imply that visits to the GP in Quebec are not only less frequent relative to other provinces, but also less pro-poor. For hospital nights, the results illustrated in Figure 2 suggest that even within Quebec the distribution of nights spent in hospital is highly concentrated among the poor.

As for the specialist visits, the province-specific results reported in Table IV reveal that Ontario is contributing largely to the observed pro-rich inequities between provinces. Since Ontario is the wealthiest province in Canada (see Table II), this result indicates that in the remaining, poorer provinces, visits to a specialist doctor are less common. In spite of this, Figure 3 suggests that the distribution of specialist visits within Ontario is, however, less pro-rich than in the remaining provinces.

Table IV. Province-specific decomposition results of the CI[a]

Variable	Province excluded	CI	t	CI_B	t_b	CI_W	R
GP visits	Quebec	−0.034	−7.6	−0.011	−63.3	−0.007	−0.016
	None	−0.026	−5.2	0.036	96.6	−0.005	−0.056
Hospital nights	Quebec	−0.121	−4.5	−0.015	−36.5	−0.021	−0.086
	None	−0.119	−4.7	−0.039	−132.6	−0.018	−0.062
Specialist visits	Ontario	0.066	8.0	−0.012	−35.1	0.010	0.068
	None	0.063	8.5	0.015	43.2	0.010	0.038
HUI	Quebec	0.021	34.4	0.001	19.6	0.005	0.015
	None	0.019	35.7	−0.005	−117.3	0.004	0.020

Note: To determine the province-specific contributions in the decomposition of the CI, one province has been excluded from the analysis at a time. For simplicity, only the results that differed the most with the general case in which no province is excluded are shown in the above table.
[a] Newey West-based t-statistics.

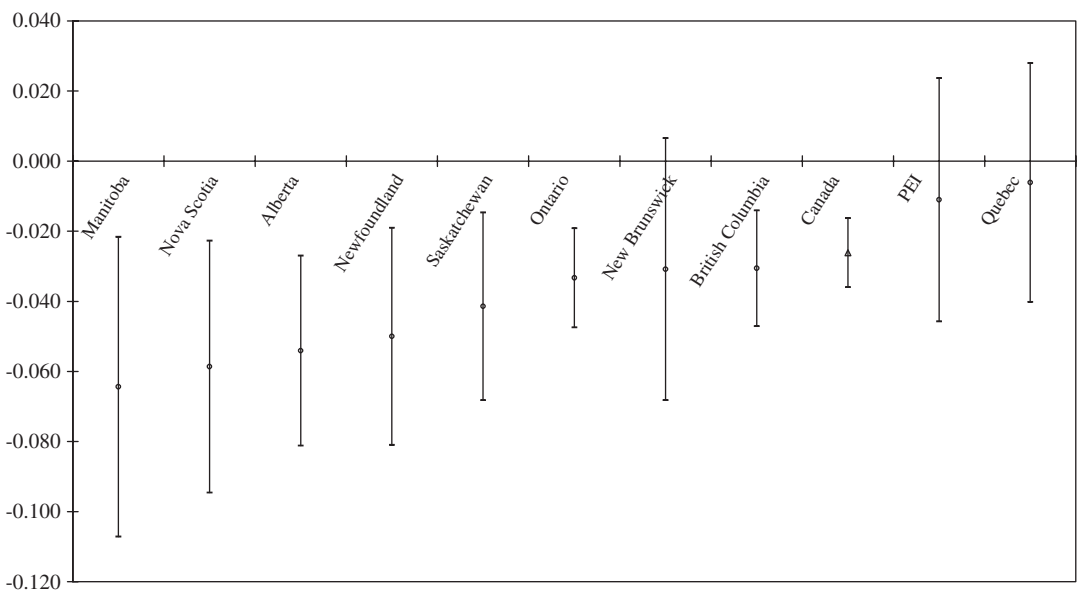

Figure 1. Income-related inequities in GP visits in Canada

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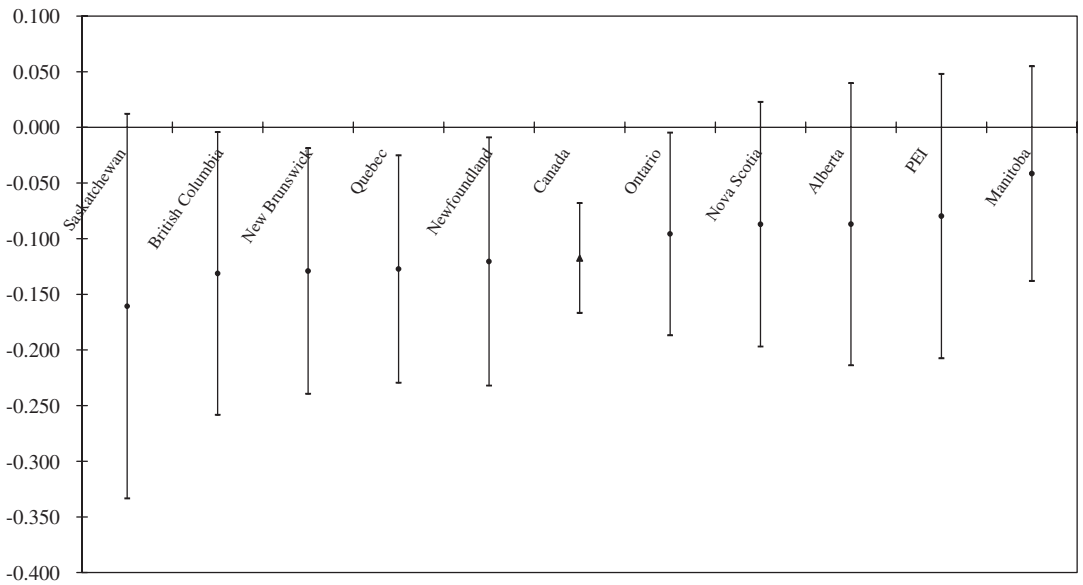

Figure 2. Income-related inequities in hospital nights in Canada

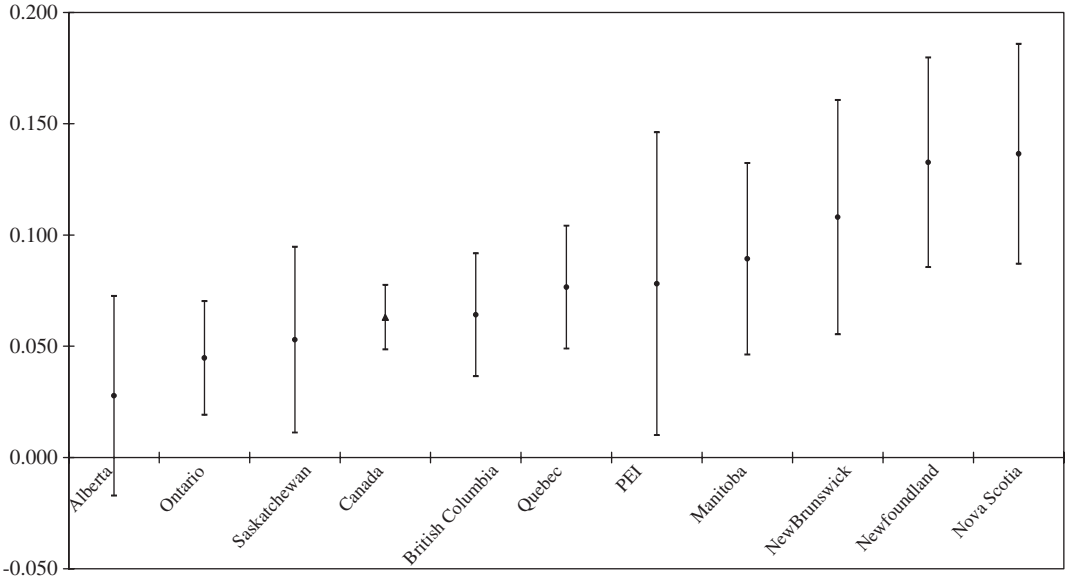

Figure 3. Income-related inequities in specialist services in Canada

To summarise, our findings suggest that income-related inequities in the use of health care in Canada seem to be driven more by between-jurisdictional differences in use than by within-jurisdictional differences. The interpretation of this result as evidence of inequity depends on the equity view taken. On the basis of the arguments of the decentralisation debate set out in the Introduction, Pauly (1973) would regard these differences as acceptable, being a consequence of redistributing according to local

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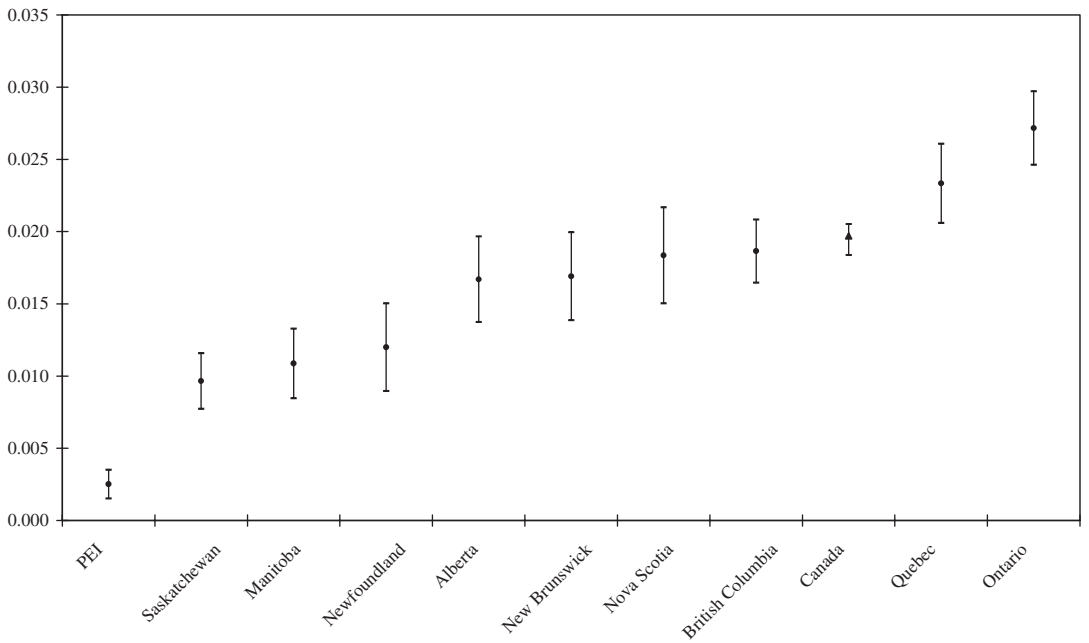

Figure 4. Income-related inequalities in health status in Canada

circumstances, i.e. local income and preferences for redistribution. In contrast, Brown and Oates (1987) might consider these differences as the cost of devolving to local governments a good that in their own view should be placed in the hands of the central government, while Tresch (2002) might interpret them as an indication of central government's failure to achieve inter-territorial equity.

Income-related inequalities in health

The last column of Table III presents the results of the decomposition of income-related inequalities in the HUI in Canada. It indicates small but statistically significantly pro-rich distribution of HUI among individuals in Canada (CI = 0.019). Following Wagstaff (2005b), since the HUI ranges between 0 and 1 with a mean of 0.88, and the sample size is sufficiently large, the CI must lie between −0.12 and 0.12 (see footnote 7).

However, are these income-related inequalities in health due to richer provinces in Canada being more likely to have healthier individuals or to richer individuals within provinces more likely to be healthier than poorer individuals? The decomposition results suggest that the lower level of health status among the poor comprises some within-province inequalities ($CI_W = 0.004$) with most inequality associated with the overlapping of the provinces' income ranges ($R = 0.02$). The positive R suggests that richer individuals in the poorer provinces that overlap with the poorer individuals from richer provinces have comparatively better levels of health. The distribution of HUI across provinces is, in contrast, significantly pro-poor ($CI_B = -0.005$), suggesting that poorer provinces seem to have slightly better average levels of self-reported health than richer ones. These results indicate that poor individuals in the poorer provinces may be better off in terms of health than the poorer individuals in the richer provinces.

Table V shows the Health Achievement Index in Canadian provinces ranked from highest to lowest. Newfoundland ranks first in the Achievement Index, given the relatively high mean health and

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Table V. Health Achievement Index in Canadian provinces (ranked by health achievement)

Province	Observed	Mean	CI_j	Achievement
Newfoundland	2866	0.895	0.012	0.885
Prince Edward Island	2553	0.883	0.003	0.881
Quebec	18 267	0.900	0.023	0.879
Manitoba	6086	0.880	0.011	0.871
Saskatchewan	5555	0.876	0.010	0.867
New Brunswick	3655	0.879	0.017	0.864
British Columbia	13 563	0.878	0.019	0.861
Alberta	10 477	0.876	0.017	0.861
Ontario	29 826	0.878	0.027	0.855
Nova Scotia	4147	0.866	0.018	0.850

low-income-related health inequalities. Quebec ranks third in the Achievement Index despite the relatively high-income-related inequalities. This can be explained by the high level of health status reported by people in Quebec. The province-specific analysis on the decomposition exercise reported in Table IV corroborates this result as Quebec stands out as the province that contributes most to the pro-poor income-related inequality in health between the Canadian provinces. When Quebec is excluded, the CI_B increases considerably (from -0.005 to 0.001) and becomes slightly pro-rich. Since Quebec is a low-income province relative to the other provinces (see Table II), the province-specific analysis indicates that compared with richer provinces the population in Quebec reports better health. Figure 4, however, suggests that the HUI is more unequally distributed within Quebec than within the remaining provinces, with the exception of Ontario.

CONCLUSIONS

In this paper, we have explored the spatial dimension of equity in health in highly decentralised Canada. We have decomposed the nationwide Concentration Index into a between-area and a within-area component, with the areas denoting Canadian provinces. The decomposition includes a residual term that takes a non-zero value whenever income ranges of the various provinces overlap. This leads to an element of ambiguity in the decomposition of the CI, but is an unavoidable cost of incorporating the socio-economic dimension into the distribution of the health variable.

For health-care use (as measured by GP visits, specialist visits and inpatient stays) we find that inequities in access to GP visits, hospital nights and specialist care appear to be mainly driven by variations in use *between* provinces. This suggests that policies aimed at reducing income-related inequities in access to health-care should focus on central government measures to equalise health-care access between poorer and richer provinces rather than on provincial measures to equalise access for individuals with different levels of income. Our results indicate differences in the use of health care that favour the better-off provinces in Canada. In particular, our results suggest that people in Quebec visit the GP less and spend more days in hospital than in other richer provinces. In addition, our findings indicate a significantly high number of visits to a specialist doctor in Ontario relative to the remaining, poorer provinces. While proponents of centralisation of the redistribution function would regard these differences as an indication of inequity, advocates of local redistribution might consider these differences as the legitimate result of redistributing according to local needs and circumstances.

The decomposition analysis of income-related health inequality in Canada shows quite opposite results: the pro-rich distribution of self-reported health (as measured by the HUI) is mostly due to

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health differences between higher and lower income individuals *within* provinces rather than to health gaps between the provinces with unequal average incomes. Quebec contributes substantially to the pro-rich distribution of health status within provinces despite ranking first in the health status variable. This finding suggests that policies aimed at reducing income-related inequalities in health at the provincial government level may be more effective than central government measures aimed at spatial redistribution. Some caution is, however, required when interpreting these results given the large magnitude of the residual term.

Our finding of important inter-provincial differences in health care favouring mainly the richer provinces suggests that the redistributive powers from the federal government in Canada may be insufficient to secure important equity objectives. The qualitatively very different results for health status relative to health care suggest that health determinants other than health-care access play a more important role here. We therefore feel that our results suggest a potentially important, though not straightforward, link between decentralisation policy and health-related equity. Given that our decomposition approach is purely descriptive and restricted to Canadian data, these findings need to be corroborated by international comparisons. One particularly useful direction for future research might therefore be to explore how the outcomes from the inequality decompositions identified in this study compare with those experienced in a more centralised country.

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