

Potential Savings from Reducing Inequalities in Health

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ABSTRACT

Background: Numerous studies have established that socio-economic position is positively related to health status, but we know little about the real costs of these differences across an entire population. This paper estimates the potential savings in morbidity and dollars from reducing the inequalities in health among Winnipeg residents.

Methods: We measure excess morbidity by examining rates of premature death, hip fracture, and heart attack according to the relative affluence of the Winnipeg neighbourhood. We also assess the total expenditures on physician and hospital care by neighbourhood of residence. We then estimate the savings that could have been achieved if 1) the health of the two poorest quintiles had been raised to the level of the middle quintile, and 2) the health of the poorest four quintiles had been raised to the level of the top quintile.

Results: Thirty-seven percent of Winnipeg's premature deaths, 22% of the heart attacks, 20% of the hip fractures and 15% of total expenditures on hospitals and physicians (\$62 million in 1999 dollars) could have been avoided if residents of the less wealthy 80% of neighbourhoods enjoyed health similar to those in the wealthiest neighbourhoods.

Conclusion: The potential savings from reducing the socio-economic-related differences in health are high, whether they are measured in terms of morbidity or dollars. Research is needed to determine the extent to which these potential savings are achievable.

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

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A large body of research documents a positive correlation between the health of an individual and the individual's income and other measures of the individual's socio-economic position.¹⁻⁶ The correlation between socio-economic position and health is found not only when low-income groups are compared with high-income groups, but when the poor are compared with middle-income individuals and when middle-income groups are compared with high-income groups. For this reason, the correlation is often called a "gradient."

Although the gradient in socio-economic position has been studied extensively, the potential savings from reducing this gradient, whether measured in terms of avoidable illness or avoidable health care expenditures, have been the subject of relatively little research. This paper fills that gap by estimating the potential savings both in illness and expenditures from reducing inequalities in health among the residents of Winnipeg. Since Canada's recent Health Accord and America's Institute of Medicine⁷ have both called for a reduction in health disparities, a focus on the scope of the costs associated with these disparities would seem timely.

METHODS

This analysis focusses on the population of Winnipeg, Manitoba, a city of 600,000, home to Manitoba's medical school and seven hospitals. The data for the analyses were provided by the Manitoba Centre for Health Policy's Population Health Research Data Repository. The project was approved by the University Research Ethics Board.

We present data on the premature mortality rate (PMR), an age- and sex-standardized rate of deaths of all types for those aged 0-74, and a recognized measure of population health.⁸⁻¹¹

We chose hip fractures and AMIs because of the serious nature of these conditions, and because the relatively high level of consensus among physicians about how to treat these conditions has led Wennberg et al.^{12,13} to suggest these are good measures of morbidity in a population. Five years of data (1995-1999) were used to calculate the rates for premature deaths, hip fractures, and AMIs. The five-year totals were divided by five to derive annualized rates.

All physician payments (1999/2000), including office, hospital and emergency room visits as well as dollars associated with surgical fees, are included. Hospital expenditures were estimated using the Case Mix Group and Day Procedure Group methodologies, associated resource intensity weights,¹⁴ and Manitoba hospital cost data.¹⁵

Hospital and physician expenditures were attributed to a Winnipeg resident regardless of where the resident was hospitalized or where the physician contact was made. Costs were summed by income quintile as described below. Hospitalizations for non-Winnipeg residents are excluded from the analysis. The hospital and physician data have been found to be reliable for research purposes.¹⁶⁻¹⁸

Using 1996 Canadian public use census data, the wealthiest 20% of Winnipeg residents, when ranked by mean household income of the enumeration area (approximately 700 individuals) in which they lived, were identified as quintile 5 (125,612 individuals), and the poorest 20% as quintile 1 (125,783 individuals). Mean household income across the five quintiles ranged in gradient fashion from \$79,570 (Q5) to \$24,952 (Q1).

RESULTS

Table I displays four rows of data for each of the three measures of morbidity (premature death, AMI, and hip fracture). The first row presents the rate of the morbidity measure per 1,000 residents, the second row presents the annualized number of events (deaths, hip fractures, or AMIs), and the third and fourth rows present the age-sex adjusted number of events that would be expected if excess morbidity were reduced (row 3) or eliminated (row 4). The data have been age- and sex-standardized across the income quintiles.

For example, residents of the poorest neighbourhoods of Winnipeg (the 125,783 people in Q1) had an annual premature mortality rate of 5.25 deaths per 1,000 residents compared with a rate of 2.05 deaths per 1,000 among residents of Winnipeg's wealthiest neighbourhoods. This translates to 591 premature deaths among the residents of the poorest neighbourhoods compared with 232 among residents of the wealthiest neighbourhoods.

TABLE I
Estimates of Excess Morbidity

	Q1 Poorest	Q2	Q3	Q4	Q5 Wealthiest	Potential That Could be Saved N	%
Premature deaths/1000*	5.25	3.67	3.03	2.42	2.05		
Observed deaths	591	448	387	271	232		
Expected deaths if Q3 rate	344	372	n/a	n/a	n/a	323	17
Expected deaths if Q5 rate	232	251	261	231	n/a	722	37
Acute myocardial infarction/1000*	1.83	1.79	1.69	1.54	1.28		
Observed AMI	255	250	222	165	136		
Expected AMI if Q3 rate	236	237	222	n/a	n/a	32	3
Expected AMI if Q5 rate	181	180	168	136	n/a	227	22
Hip fracture rate/1000*	1.01	0.75	0.72	0.65	0.61		
Observed hip fractures	164	112	88	60	48		
Expected if Q3 rate	125	108	88	n/a	n/a	43	9
Expected if Q5 rate	110	93	73	54	n/a	94	20

* Rates have been age- and sex-adjusted across the neighbourhoods. Each figure represents a one-year average for events calculated over the 5-year period 1995-1999.

TABLE II
Causes of Premature Mortality by Income Quintile: Proportion of Deaths by Cause

Cause of Premature Death	Q1 Poorest	Q2	Q3	Q4	Q5 Wealthiest
Cancer	30.8%	40.2%	42.1%	44.9%	49.1%
Cerebrovascular, diseases of heart & arteries	28.7	27.2	28.7	27.0	22.8
Accidents	6.8	5.3	5.4	5.1	4.3
Homicide & suicide	5.0	4.0	2.8	3.6	3.6
Infections, flu & pneumonia	3.2	2.1	1.6	1.9	2.6
HIV	1.0	0.6	0.5	0.2	0.1
All other causes	24.5	20.5	18.8	17.2	17.5
Number of deaths*	591 (100%)	448 (100%)	387 (100%)	271 (100%)	232 (100%)

* Figures represent a one-year average for events calculated over the 5-year period 1995-1999.

TABLE III
Estimates of Economic Costs of Inequalities: 1999 Physician and Hospital Expenditures

	Q1 Poorest	Q2	Q3	Q4	Q5 Wealthiest	Potential That Could be Saved \$	%
Expenditures per person*	\$822	\$685	\$640	\$606	\$567		
Observed expenditures (000,000)†	\$108.6	\$91.5	\$82.5	\$70.9	\$64.6		
Expected expenditures if Q3 rate (000,000)	\$85.6	\$85.7	n/a	n/a	n/a	\$28.8	7%
Expected expenditures if Q5 rate (000,000)	\$76.4	\$76.3	\$73.0	\$66.0	n/a	\$61.8	15%
Population (1999) (000)	126	126	126	126	126		

* Rates have been age- and sex-adjusted across the neighbourhoods.

† Calculated by multiplying expenditures per person times the population of residents in this quintile.

Row 3 (of the PMR rows) indicates that, if premature mortality among the residents of the lowest two income quintiles were reduced to that of Q3 (i.e., to that of residents of the middle-income Winnipeg neighbourhoods), a total of 323 deaths would be avoided. These 323 deaths equal 17% of the total premature deaths that occurred among Winnipeg residents in one year. Row 4 indicates that fully 37% of Winnipeg premature deaths would have been avoided if residents of all neighbourhoods were able to achieve the PMR of residents of the highest-income neighbourhoods.

Bringing the health of those in the two lowest-income quintiles up to the middle-income group would reduce AMIs in the city by 3% and hip fractures by 9%; improving Winnipeggers' health to that of residents of the highest-income neighbourhoods would avoid 22% of the AMIs and 20% of the hip fractures.

Table II focusses on the causes of deaths that occur among each of the income groups, and hence the causes of deaths most likely to be avoided if the lower-income quintiles enjoyed the PMR rates of higher-income quintiles. Note that although the proportion of deaths from

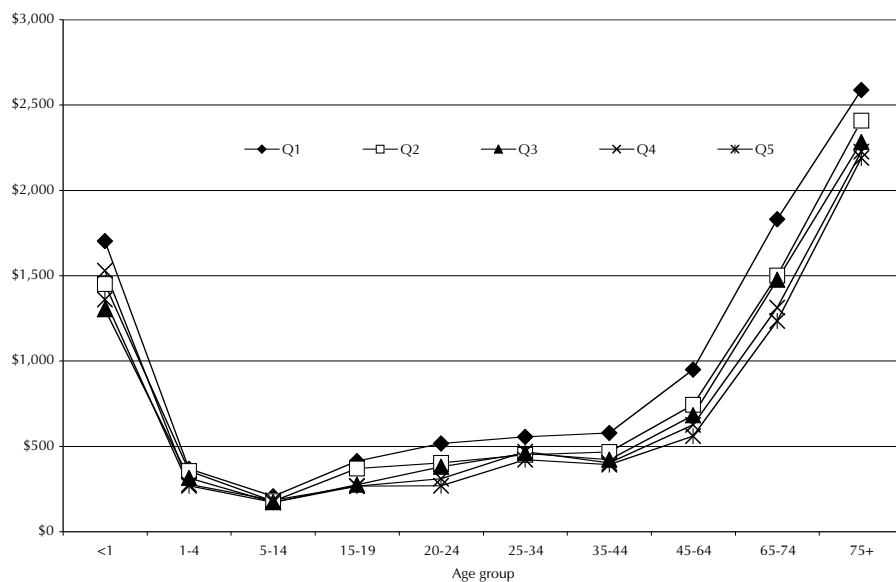


Figure 1. Mean physician and hospital costs per person in different age groups by neighbourhood of residence

cancer among wealthier Q5 residents is higher, they experienced fewer cancer deaths over the period than did residents of the poorest neighbourhoods. (Forty-nine percent of the 232 deaths among the Q5 residents (see Table I) is 113; that is considerably lower than 30.8% of 591 deaths among Q1 residents (see Table I), or 182 cancer deaths). The numbers of deaths are directly comparable because the number of residents in the wealthiest and poorest neighbourhoods is essentially the same.)

Table III presents estimates of the potential reduction in health care expenditures from eliminating income-related differences in health. For example, on average, \$822 was spent providing physician and hospital services to each individual in the lowest quintile, and \$567 on each individual in the highest quintile. The savings from improving the health status of those in the two lowest-income quintiles to that of residents of middle-income neighbourhoods totals \$28.8 million dollars, 7% of the total physician and hospital expenditures under review. If one adds up the potential savings from bringing the health status of all Winnipeg residents up to that of residents of the highest-income neighbourhoods, a savings of \$61.8 million would be expected, fully 15% of 1999 expenditures.

Figure 1 illustrates that income-related health care expenditure differences exist at every age except for children in the 5-14 year old group.

This study has limitations. Our analysis is based on use of physician and hospital services by residents of one Canadian city. However, hospital use patterns across socio-economic groups in Winnipeg are similar to those found in other areas.^{4,19-22,23-25} This paper also relies on an ecological- rather than an individual-based definition of socio-economic status. However, the ecological measures used track individual measures very closely (see Appendix).²⁵⁻²⁹ If anything, these data likely underestimate the potential savings from reducing inequalities in health.³⁰

This paper focusses on the potential savings from eliminating inequalities in health. It makes no attempt to measure the costs of doing so. While one might argue for investing in reducing inequalities on the basis of social justice considerations, the large potential savings in both health and health care dollars from reducing inequalities suggest a quite different case for investments. Why these investments have yet to be made is a focus of the discussion section below.

DISCUSSION

The potential savings from reducing health disparities are high in both human and economic terms. We have documented a remarkable number of excess deaths, excess heart attacks and excess hip fractures, and we have shown that the money spent treat-

ing the excess ill health of all types associated with these disparities amounts to as much as 15% of total spending for physician and hospital services. Manitoba, with its Population Health Research Data Repository, is one of the few jurisdictions where such a comprehensive analysis is possible. However, because we limited our analyses to physician and hospital expenditures, we have underestimated the direct economic savings from reducing income inequalities. Had we added the expenditures on pharmaceuticals and on health care services other than physician and hospital care, the absolute cost of treating these forms of excess morbidity would have been much higher than the \$29 to 62 million we report here. In other analyses, we have shown that residents of low-income neighbourhoods enter nursing homes³¹ and use home care³² at a higher rate than do residents of upper-income areas, and that expenditures on pharmaceuticals are higher for residents of lower-income than for residents of higher-income neighbourhoods.³³ We have also ignored costs due to lost productivity, and costs incurred outside the health care sector.

This paper quantifies the costs in health and health care expenditures that are associated with social disparities. We do not assume that designing policies to take health and income away from the high-income groups is the obvious path to pursue. The fact that we document greater disparities in health than in health care expenditures suggests that these groups use the health care system differently. Certainly increasing the uptake of prevention services among the poor³⁴ would be a step in the right direction.

While it is unclear which of the income-related factors (education, age of mother, safety of neighbourhood, lifestyle, use of preventive health care, etc.) produces these dramatic health differences, surely these variables are as amenable to research as the variables traditionally studied by medical researchers. It is important to speculate why policy-makers are less likely to support research on reducing the impact of socio-economic factors on health than they are on traditional disease-focussed medical research. There appear to be two reasons for this – the association of policies designed to reduce the health impact of income-related factors with political ideologies,³⁵ and the paucity of empirical evi-

dence demonstrating the potential savings from reducing disparities in health across socio-economic groups.

The question, "Should we finance research to reduce the impact that differences in income, education and occupation have on health?" is more controversial than the question, "Should we finance research to cure disease?" The response to the former question is influenced by political ideology. Those who are left-leaning are more inclined to support tax systems that reduce income inequality, and programs that reduce disparities in access to jobs, housing, education or medical care. Those who are right-leaning place a higher priority on keeping taxes low to improve business conditions and employment opportunities, even if this means reducing services on which middle- and low-income groups depend. In short, the debate over whether to reduce the impact of socio-economic status on health is closely related to the long-running political debate about how and to what extent society has an obligation to help its less fortunate members.

If research on inequalities in health across socio-economic groups demonstrates, for example, that reading ability in tenth graders is related to morbidity in adulthood, the debate about how society should respond to that finding will inevitably raise all the issues raised now by the debate about how to improve low-performing schools and equalize educational opportunity. Should class sizes be reduced in low-achievement schools? Should teachers, to be promoted, be required to spend at least two years in a low-performing school? Should schools be funded by property taxes or by more progressive taxes administered at the state or provincial level? If parents of poor readers aren't doing enough to encourage their children to do their homework, should policy alternatives for achieving this be developed and tested?

On the other hand, the debate about whether to finance disease-based research is a lot less controversial. Most people, and most policy-makers, think of illness and injury as afflictions that may strike them personally. Thus, the question of whether society should seek to find a cure, better diagnostic tools, or better treatments for disease is rarely divisive. The answer is nearly always a resounding yes.

Appendix

Individual-based analyses relating self-reported household income from the 1996 National Population Health Survey (Manitoba respondents, n=9,431) to health expenditures on hospitals and physicians were also undertaken. As these analyses were consistent with the neighbourhood analyses regarding costs, but did not provide as large a sample for the health indicators, our analyses have focussed on the neighbourhood-based data.

We also examined potential savings from reducing inequalities using this individual-based survey data. The data are not directly comparable since the self-reported household income was only provided in five categories. However, mean expenditures on physicians and hospitals for individuals with the top 13% of household incomes was \$572 (compared with \$567 using the lowest quintile neighbourhood data in Table I). Mean expenditures for individuals with the lowest 13% of household incomes was \$1,229 (compared with \$822 in Table I which reports on 20% of Winnipeg residents, those living in the lowest-income neighbourhoods). Since we know health care expenditures are concentrated in a small group, and that individuals with poorer socio-economic status are over-represented in this group,⁴⁰ these results are also consistent with what is reported in this paper. If anything, the potential savings from improving health status are likely underestimated using neighbourhood-based data.

A second and related reason why policy-makers may have been less likely to support research on the socio-economic-based interventions for curing ill health is that the health gains and, in particular, the health care savings that potentially could be achieved by socio-economic-related research have gone largely unmeasured.

This paper demonstrates that 80% of the population could benefit from socio-economic-based interventions that improve health, not just the poor. In fact, as has been shown earlier,³⁶ if Winnipeg residents of middle-income neighbourhoods could achieve the life expectancy of those living in the highest-income neighbourhoods, this would represent a greater gain in life expectancy (3.8 years for males and 2.6 for females) than could be achieved by eliminating cancer (estimated to be 2.8 years by Manton³⁷). The war on cancer, which began under Richard Nixon, has contributed few health gains,³⁸ yet the research and treatment expenditures devoted to fighting cancer have been enormous. In 2002, the research budget of the National Cancer Institute was approximately \$4.2 billion and that of the American Cancer Society \$800 million. Estimates of the gains to life expectancy from the elimination of the other major disease killer, coronary heart disease, are similarly modest (estimated to be a little over 3 years by Tsevat).³⁹

The potential health gains to those in the lowest-income neighbourhoods (if they could achieve the health status of residents of high-income neighbourhoods) are dramatically higher (11.3 years for males and 7.7 for females). The interventions that could produce these health gains would focus on a variety of factors, including education, income, housing, and smoking and

other lifestyles. These interventions designed to reduce health disparities not only have the potential for markedly improving health, but also for significantly reducing health care expenditures. In these days of continuing inflation in healthcare costs, this alone makes a shift in focus a very attractive alternative.

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RÉSUMÉ

Contexte : De nombreuses études ont confirmé l'existence d'un lien positif entre le statut socio-économique et l'état de santé, mais on sait très peu de choses sur les coûts réels des écarts socio-économiques à l'échelle d'une population. Nous avons voulu évaluer les économies possibles, en morbidité et en argent, d'une réduction des inégalités sur le plan de la santé dans la population de Winnipeg.

Méthode : Nous avons mesuré la surmortalité en examinant les taux de décès prématurés, de fractures de la hanche et de crises cardiaques selon l'aisance relative des quartiers de Winnipeg. Nous avons aussi analysé les dépenses totales en soins médicaux et hospitaliers selon le quartier de résidence. Enfin, nous avons évalué les économies qui auraient pu être réalisées : 1) si la santé dans les deux quintiles les plus pauvres était haussée au niveau de celle du quintile intermédiaire et 2) si la santé dans les quatre quintiles les plus pauvres était haussée au niveau de celle du quintile supérieur.

Résultats : À Winnipeg, 37 % des décès prématurés, 22 % des crises cardiaques, 20 % des fractures de la hanche et 15 % des dépenses totales en soins hospitaliers et médicaux (62 millions, en dollars de 1999) auraient pu être évités si l'état de santé des résidents des quartiers les moins aisés (80 %) était le même que dans les quartiers les plus aisés.

Conclusion : Il serait possible de réaliser d'importantes économies (qu'elles soient mesurées en morbidité ou en argent) en réduisant les écarts sur le plan de la santé liés au statut socio-économique. Il faudrait pousser la recherche pour déterminer la mesure dans laquelle de telles économies seraient réalisables.