

Trends in socioeconomic disparities in health care quality in four countries

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Abstract

Objective. To provide a targeted portrait of socioeconomic disparities in health care quality in four countries and how those disparities have changed over time.

Design. Within each country, comparisons between the highest and lowest quintiles of socioeconomic status were made to determine if disparities exist and if any observed disparities have been decreasing over a 5-year period.

Setting. Small geographic areas in Canada, England, New Zealand and the United States.

Data sources. Data were obtained by working with national health statistics agencies in each country.

Results. There were socioeconomic disparities in health care quality and health status for most of the indicators studied in all four countries. The analysis included nine quality indicators in four countries, for a total of thirty-six observations. Twenty-six observations had a ratio of highest to lowest socioeconomic quintile of <0.95 or >1.05 . These disparities generally persisted over time. The relative difference between the highest and lowest quintile decreased over time in eight of the twenty-one observations with time-series data available.

Conclusion. The fact that disparities in a variety of indicators exist in four very different health systems underscores the importance of factors common to the four systems or factors outside the health system. Some successful strategies for reducing disparities could potentially be learned from the few examples of success in these countries.

Keywords: benchmarking, efficiency, health care financing, health care system, patient outcomes (health status, mortality quality of life), quality, quality measurement, quality indicators

Introduction

Disparities in the quality of health care delivered to different socioeconomic groups have been noted in studies and government reports in several countries [1–5]. Compared to disparities in health status, which are caused by a variety of social, economic, environmental and other factors, disparities in the quality of health care services are considered more amenable to changes in the health care delivery system [6]. Health care systems differ widely between countries; notably, the United States has approximately 47 million residents without health insurance coverage, while other high-income countries have universal insurance coverage in different forms [7]. The extent to which these differences in health care systems result in differing levels of disparity in health care quality is unknown.

Despite increased quality measurement activities in many countries, relatively little information on health care quality is

available for cross-national comparisons. The Organization for Economic Cooperation Development (OECD) and others have published data for selected quality indicators in multiple countries, showing that country-averages are not consistently higher or lower in any country [8, 9]. We have not identified any prior studies providing international data showing socioeconomic disparities in quality indicators.

This article provides a targeted portrait of socioeconomic disparities in the quality of health care in four countries – Canada, England, New Zealand and the United States – and how those disparities have changed over time. England was included instead of the entire United Kingdom because data are collected separately for Wales, Scotland and Northern Ireland. These four countries were chosen because they participated in an earlier quality comparison study [10] and because they convene annually at the Ministerial level to discuss health policy issues. We address the following questions: (1) Do

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socioeconomic disparities in health care quality exist in all four countries, despite differences in health care delivery systems? (2) Do disparities exist for all conditions with available quality indicators? (3) Have disparities in quality decreased over time in some or all of the four countries? The results could be used to ensure that lessons learned in addressing disparities in one country are shared internationally.

Methods

The nine quality indicators compared in this study are a subset of a broader indicator set that was published previously [8]. Eight of the nine indicators are also included on the list of quality indicators selected by the OECD as suitable for cross-national comparisons in the Health Care Quality Indicators project [9]. Suicide rates were included in our study but were not selected by the OECD; the OECD also selected five indicators that were not included in our study. The quality indicators included in this study were chosen using the following five criteria, derived from similar criteria developed by the Institute of Medicine [11]: (1) Feasibility: Only indicators that were already being collected by one or more countries were candidates. (2) Scientific soundness: Only indicators that were deemed valid and reliable were considered. Since all of the indicators considered were already in use, determination of scientific soundness relied on existing reviews of the scientific evidence and approval by a consensus process or similar method in one or more countries. (3) Interpretability: Only indicators that allowed a clear conclusion for policymakers were included. This meant that the indication had to have a clear direction (higher is either good or bad). (4) Actionability: Only measures of processes or outcomes of care that could be directly affected by health care policy or health care delivery system intervention were eligible. (5) Importance: Only indicators that reflected important health conditions accounting for a major share of the burden of disease, the cost of care or policymakers' priorities such as vulnerable populations were pursued. These criteria were applied in a five-step hierarchical indicator selection process, described elsewhere [8].

The set of quality indicators presented here comprises the nine indicators from an initial set of more than 1000 which could feasibly be compared between socioeconomic subgroups of the populations in the four countries. The quality indicators are mostly outcomes measures, since data for most process measures of quality are generally not available according to similar specifications in these four countries. All of the indicators were age-standardized. The outcome measures fall into two groups: four indicators of the effectiveness of health care interventions (breast, cervical and colorectal cancer relative survival rates; acute myocardial infarction case-fatality rate) and three outcomes that are considered preventable given appropriate and timely delivery of health care (asthma mortality rate; suicide rate; smoking rate). Two process measures, the screening rates for breast and cervical cancer, were also included. The guidelines for the age groups that should be screened for cervical and breast cancer differ

between countries. The ages used in the definitions of these indicators vary to match each country's guidelines.

In addition, four health status measures were chosen. These include two mortality-based indicators (overall life expectancy and infant mortality) and two lifestyle-related indicators (obesity and physical activity rates). These health status measures were added to broaden the understanding of the quality measures and allow for some presentation of related background factors.

Socioeconomic status was measured using indices of deprivation in England and New Zealand and income per capita in Canada and the United States. England and New Zealand use different indices of deprivation. The English Index of Multiple Deprivation comprises variables covering the domains of income; employment; health and disability; education, skills and training; housing and geographical access to services [12]. The New Zealand index includes variables in an overlapping set of domains: means-tested benefits; unemployment; income; telephone access; automobile access; single-parent households; skills and housing [13]. The United States and Canada do not routinely report a broad measure of socioeconomic status in their official national statistics; per-capita income was used instead.

Small geographic areas were used as the unit of analysis. Small-area analysis was used since data linkage of socioeconomic status and quality indicators was not feasible at the individual level for most quality indicators. All geographic areas in each country were ranked based on their mean socioeconomic status. They were then aggregated in ascending order until they represented 20% of the total population of the country. The areas in each quintile were not necessarily geographically contiguous. The mean values of the quality and health status indicators in the highest-socioeconomic status quintile were compared to the values in the lowest-socioeconomic status quintile as a measure of dispersion.

Two common approaches to measuring the magnitude of disparities are the relative and absolute differences between population quintiles [14]. The absolute difference is calculated by subtracting the mean indicator value in the lowest quintile of socioeconomic status from the mean value in the highest quintile. The analytic problem with the absolute difference is that it does not reflect differences in the scale of the indicators (e.g. values for infant mortality rates are much lower than breast cancer mortality rates, so absolute differences between groups would be smaller) [15]. The relative difference is calculated as a ratio of the mean value in the top quintile of socioeconomic status to the mean value in the bottom quintile. A value of 1.0 would represent equality between the top and bottom quintiles. We elected to use relative differences in order to account for the different scales of the indicators examined.

For this analysis, we define a 'disparity' as a relative difference between the top and bottom quintiles of socioeconomic status outside the range 0.95–1.05. There is little consensus in the literature or government reports as to what level of difference constitutes a 'disparity' and the level used in this study is somewhat arbitrary. In the time-series analysis, we define a disparity as having decreased if the relative difference is at least 0.05 closer to 1.0 in the second time period

Table 1 Sources and geographic areas for comparisons of disparities in quality and health status indicators in four countries

	Canada	England	New Zealand	United States
<i>Quality indicators</i>				
Breast cancer 5-year relative survival rate				
Source	Statistics Canada	Office for National Statistics	New Zealand Cancer Registry	–
Unit of analysis	Census enumeration area	Health Authority	Aggregated Census Area Units	–
Breast cancer screening rate				
Source	Canadian Community Health Survey	Department of Health	National Screening Unit	BRFSS
Unit of analysis	Individual	Primary Care Trust	Aggregated Census Area Units	County
Cervical cancer 5-year relative survival rate				
Source	Statistics Canada	Office for National Statistics	New Zealand Cancer Registry	–
Unit of analysis	Census Enumeration Area	Health Authority	Aggregated Census Area Units	–
Cervical cancer screening rate				
Source	Canadian Community Health Survey	Department of Health	National Cervical Screening Register	BRFSS
Unit of analysis	Individual	Primary Care Trust	Aggregated Census Area Units	County
Colorectal cancer 5-year survival rate				
Source	Statistics Canada	Office for National Statistics	New Zealand Cancer Registry	–
Unit of analysis	Census Enumeration Area	Health Authority	Aggregated Census Area Units	–
Asthma mortality rate, age 5–39				
Source	–	Office for National Statistics Mortality Extract	NZHIS Mortality Data	National Vital Statistics System
Unit of analysis	–	Census Area Ward	Aggregated Census Area Units	County
Suicide rate, all ages (Deaths per 100 000)				
Source	Canada Mortality Data Base	Office for National Statistics Mortality Extract	NZHIS Mortality Data	National Vital Statistics System
Unit of analysis	Census Tract	Census Area Ward	Aggregated Census Area Units	County
Smoking rate (%)				
Source	Canadian Community Health Survey	Health Development Agency	New Zealand Health Survey	BRFSS
Unit of analysis	Individual	Primary Care Trust	Individual	County
AMI 30-day case-fatality rate				
Source	Hospital Morbidity Database	Hospital Episode Statistics	National Minimum Dataset	HCUP
Unit of analysis	Census Enumeration Area	Census Area Ward	Aggregated Census Area Units	Zip Code

(continued)

Table 1 *Continued*

	Canada	England	New Zealand	United States
<i>Health status indicators</i>				
Life expectancy (Years)				
Source	Canada Mortality Data Base	Office for National Statistics Mortality Extract	Statistics New Zealand	National Vital Statistics System
Unit of analysis	Census Tract	Census Area Ward	NZDep deciles	County
Infant Mortality				
Source	Canada Mortality Data Base	Office for National Statistics	NZHIS Mortality Data	National Vital Statistics System
Unit of analysis	Census Tract	English Local Authorities	Aggregated Census Area Units	County
Obesity Rate				
Source	Canadian Community Health Survey	Health Survey for England	New Zealand Health Survey	National Health Interview Survey
Unit of analysis	Individual	Individual	Individual	County
Reduced physical activity rate				
Source	Canadian Community Health Survey	Health Survey for England	New Zealand Health Survey	BRFSS
Unit of analysis	Individual	Individual	Individual	County

compared to the first. Data for the quality indicators were collected from a variety of national administrative databases and surveys, listed in Table 1.

Results

The ratio of mean values for the top to bottom socioeconomic quintile was outside of the range 0.95–1.05 for most of the quality indicators in most countries in the most recent year of available data, indicating that disparities in quality were widespread (Table 2). The analysis included nine quality indicators in four countries, for a total of thirty-six observations. Four observations were missing data. Of the 32 remaining observations, 26 were outside the range 0.95 to 1.05. Four of the nine indicators, the colorectal cancer survival rate, asthma mortality rate, suicide rate and smoking rate, were outside that range in all of the countries with available data. The highest quintile of socioeconomic status consistently performed better than the lowest quintile. Confidence intervals were obtained for most of the indicators. In almost all of the cases, the disparities reported here were statistically significant. The exceptions were several of the indicators involving rare events, such as asthma mortality, in New Zealand, which has a much smaller population than the other three countries.

For policymakers, the six observations where the differences between socioeconomic quintiles were smallest may be the areas of greatest interest. There were four indicators with relative differences within the range 0.95–1.05 in one country but outside that range in the other countries. The

four indicators (and specific country) with a relative inter-quintile difference between 0.95 and 1.05 were the breast cancer screening rate (United States), cervical cancer screening rate (United States), acute myocardial infarction case-fatality rate (United States) and breast cancer survival rate (Canada). There was one indicator, the cervical cancer relative survival rate, with a relative difference in the range 0.95 to 1.05 in two countries, Canada and England.

The relative difference in mean values of three health status indicators (life expectancy, infant mortality rate and the obesity rate) between top and bottom quintiles was outside the range 0.95 to 1.05 in all four countries (Table 3). The relative difference between quintiles in the physical activity rate was between 0.95 and 1.05 in England, but outside that range in the other four countries.

Data were available at two time points (the most recently available 5-year period) for 21 of the 36 observations (Table 2). The relative difference between top and bottom quintiles decreased in eight of the twenty-one observations (Tables 2 and 4). In one case, the acute myocardial infarction case-fatality rate in the United States, the relative difference was reduced to within the range 0.95–1.05. The relative difference remained at approximately the same level for six observations and widened for four of the observations. The final three observations had a relative difference in the range 0.95–1.05 in the first (earliest) time period, as well as the later period.

Although disparities did not decrease for the majority of indicators, there were improvements in many of the indicators in the lowest quintile of socioeconomic status as well as the highest. In eight of the ten observations where the

Table 2 Disparities in quality indicators between quintiles of socioeconomic status in four countries (Small-area analysis)

Indicator	Canada				England				New Zealand				United States			
	Year	Q1	Q5	Relative difference (Q1/Q5)	Year	Q1	Q5	Relative difference (Q1 /Q5)	Year	Q1	Q5	Relative difference (Q1 /Q5)	Year	Q1	Q5	Relative difference (Q1/Q5)
Breast cancer 5-year relative survival rate (%) >	1997–99	80	77	1.04*	2001	78	72	1.08	2002	86	79	1.09	–	–	–	–
	–	–	–	–	–	–	–	1997	76	72	1.06	–	–	–	–	
Breast cancer screening rate (%)	2003	78	62	1.26	2002–03	78	72	1.08	2001–03	71	67	1.06	2002	85	82	1.04*
	1994	68	52	1.32	–	–	–	–	–	–	–	–	1997	83	82	1.01*
Cervical cancer 5-year relative survival rate (%)	1997–99	73	72	1.01*	2001	64	63	1.02*	2002	79	71	1.11	–	–	–	–
	–	–	–	–	–	–	–	–	1997	74	69	1.07	–	–	–	–
Cervical cancer screening rate (%)	2003	85	66	1.29	2003–04	72	68	1.06	2001–03	71	54	1.31	2002	85	83	1.02*
	1994	82	68	1.21	–	–	–	–	1991–93	29	27	1.07	1997	87	86	1.01*
Colorectal cancer 5-year survival rate (%)	1997–99	61	56	1.09	2001	47	40	1.18	2002	68	57	1.19	–	–	–	–
	–	–	–	–	–	–	–	–	1997	57	49	1.16	–	–	–	–
Asthma mortality rate, age 5–39 (Deaths per 100, 000)	–	–	–	–	2001–02	0.4	0.6	0.67	2000	0.2	0.8	0.25	2001	0.5	0.4	1.25
	–	–	–	–	1996–97	0.4	0.7	0.57	1996	0.6	1.2	0.50	1996	0.7	0.4	1.75
Suicide rate, all ages (deaths per 100 000) (males/females)	1996	16/3	28/9	0.57/0.33	2001–02	5.6	11.6	0.48	2000	10.8	12.4	0.87	2001	8.5	12.5	0.68
	1991	14/3	25/9	0.56/0.33	1996–97	6.9	11.8	0.58	1996	11.4	18.3	0.62	1996	9.7	13.1	0.74
Smoking rate (%) (males/females)	2003	15/12	28/24	0.54/0.50	1998–01	24	34	0.71	2002–03	16/15	35/35	0.46/0.43	2002	21	23	0.91
	1994	19/17	37/33	0.51/0.52	–	–	–	–	–	–	–	–	1997	22	23	0.96*
AMI 30-day case-fatality rate (%)	2001	3.7	4.2	0.88	2002–03	5.4	7.0	0.77	2002–03	2.8	4.9	0.57	2002	7.5	7.9	0.95*
	1996	4.5	5.6	0.80	1998–99	7.3	9.0	0.81	1997–98	5.7	6.8	0.84	1997	7.8	9.1	0.86

SES is Socioeconomic status. Q1 is quintile 1 (highest SES) and Q5 is quintile 5 (lowest SES).

*Relative difference is in the range 0.95–1.05. Country averages for all variables available in [10].

Table 3 Disparities in health status indicators between quintiles of socioeconomic status in four countries (small-area analysis)

Indicator	Canada				England				New Zealand				United States			
	Year	Q1	Q5	Relative difference (Q1/Q5)	Year	Q1	Q5	Relative difference (Q1/Q5)	Year	Q1	Q5	Relative difference (Q1/Q5)	Year	Q1	Q5	Relative difference (Q1/Q5)
Life expectancy (years) (males/females)	1996	78.1/82.3	73.1/80.7	1.07/1.02*	2001–02	80.7	75.3	1.07	2000–2002	79.7/83.6	72.3/78.0	1.10/1.07	–	–	–	–
	1991	77.6/82.0	72.0/80.4	1.08/1.02*	1996–97	80.1	74.2	1.08	1995–97	77.8/81.8	70.2/76.5	1.11/1.07	–	–	–	–
Infant mortality rate (deaths per 1,000 live births)	1996	4.0	6.4	0.63	2003	4.3	6.9	0.62	2000	4.2	9.6	0.44	1998–2000	5.7	7.6	0.75
	1991	4.5	7.5	0.60	1998	3.6	7.1	0.50	1996	5.4	10.2	0.53	1992–1994	7.5	8.7	0.86
Obesity rate (%) (males/females)	2003	15/11	16/18	0.94/0.61	2001	16	27	0.76	2002–2003	13/13	28/27	0.46/0.48	2002	20	27	0.74
	1994	12/8	14/18	0.86/0.44	–	–	–	–	–	–	–	–	1997	15	23	0.65
Reduced physical activity rate (%) (males/females)	2003	4/4	15/16	0.27/0.25	1998	35	35	1.00*	2002–03	22	31	0.71	2002	23	25	0.92
	1994	8/6	15/14	0.53/0.43	–	–	–	–	–	–	–	–	1997	31	34	0.91

SES is socioeconomic status. Q1 is quintile 1 (highest SES) and Q5, is quintile 5 (lowest SES).

*Relative difference is in the range 0.95–1.05.

Table 4 Trends over time in disparities in health care quality and health status in four countries

Indicator	Country			
	Canada	England	New Zealand	United States
<i>Quality indicators</i>				
Breast cancer 5-year relative survival rate	..	..	O	..
Breast cancer screening rate	-	..	..	X
Cervical cancer 5-year relative survival rate	..	..	O	..
Cervical cancer screening rate	+	..	+	X
Colorectal cancer 5-year survival rate	..	..	O	..
Asthma mortality rate, age 5–39	..	-	-	-
Suicide rate, all ages	O	+	-	+
Smoking rate	O	..	..	X
AMI 30-day case-fatality rate	-	O	-	-*
<i>Health status indicators</i>				
Life expectancy	O	O	O	..
Infant mortality	O	-	+	+
Obesity rate	O	-	+	+
Reduced physical activity rate	+	..	..	O

-, relative disparity reduced by more than 5% points; -*, relative difference reduced by >0.05 and relative difference in most recent year is in the range 0.95 to 1.05; o, relative disparity changed by less than 5% points; x, no disparity in earlier year; + relative disparity increased by more than 5% points; .., not available.

relative difference did not decrease, there were improvements in both the top and bottom quintiles of socioeconomic status. There were also improvements in both the highest and lowest quintile for five of the six indicators where the relative difference decreased. In these cases, the gains were greater in the lowest quintile. For example, suicide rates decreased in both New Zealand and the United States. In New Zealand, the rates decreased by 0.6 deaths per 100 000 in the highest quintile compared to 5.9 deaths per 100 000 in the lowest quintile. In the United States, the rate decreased by 1.2 deaths per 100 000 in the highest quintile compared to 0.6 deaths per 100 000 in the lowest quintile. As a result, the relative difference decreased in New Zealand and increased in the United States.

For the health status indicators, there were eleven observations with observations at two time points (Table 2). The relative difference decreased in three observations, persisted at approximately the same level in five observations, and increased in three observations (Tables 2 and 4). As with the quality indicators, many of the indicators showed

improvements in both the highest and lowest quintiles of socioeconomic status but disparities persisted. In six of the eight observations where the relative difference stayed the same or increased, there were improvements in the indicators in both the highest and lowest quintiles of socioeconomic status.

Discussion

Despite the many important differences in health systems, health financing, insurance coverage, political systems and social contexts among the four countries and the policy initiatives designed to reduce disparities, each country has persisting socioeconomic disparities in health care quality. The causes of the disparities are largely not understood. Possible explanations include differential access to care; differential treatment by health care providers; and differences in behavior, social networks and environment that may make populations with lower socioeconomic status require more treatment or more difficult to treat [16–18].

The fact that disparities in a variety of indicators exist in four very different health systems underscores the importance of factors common to the four systems or factors outside the health system. In particular, in the United States, the large uninsured population is usually considered a leading contributor to disparities, but these comparisons show that there must be additional factors to consider. Despite universal coverage, access problems have been documented in England, New Zealand and Australia [19, 20].

Some successful strategies for reducing disparities could potentially be learned from successes in other countries. For example, suicide rates were an example of an indicator for which disparities narrowed sharply in New Zealand. This success may be due in part to the New Zealand Youth Suicide Prevention Strategy [21]. This effort, led by the Ministry of Youth Development, coordinates suicide prevention strategies across a range of agencies at the national, regional and local levels. Evaluations of this initiative have been very positive, and they may be responsible for the trend of narrowing disparities in suicide rates between socioeconomic groups in New Zealand.

The acute myocardial infarction case-fatality rate is also a strong candidate for further research, since disparities were reduced in three countries (Canada, New Zealand and the United States). The quality of care for acute myocardial infarction has been a leading subject of health care quality research, with focus on the intensity of care, the volume-outcome relationship for providers of cardiac services such as coronary artery bypass graft and angioplasty and the more complete delivery of low-cost but effective processes of care such as the provision of beta-blockers following heart attack [22–24]. Changing care patterns may be behind the decreasing disparity in the United States and Canada; national quality improvement efforts in the two countries, including studies of disparities in care delivery [e.g. 25] may also play a part. There have been improvements in acute myocardial infarction case-fatality in England despite

the lingering disparity. In England, the acute myocardial infarction case-fatality rate in the lowest quintile of socioeconomic status actually improved by more than it did in the lowest quintile in the United States (2.0 vs. 1.2% points). However, the rate also improved by more in the top quintile in England compared to the United States.

For most of the indicators examined in this study, both advantaged and disadvantaged groups of the population have experienced improvements. However, significant opportunities for improvement in overall performance and the reduction of disparities remain.

Limitations

The data used in this study have several important limitations. Socioeconomic status was not measured in same way in the four countries. An unknown bias may have been introduced as a result of using different measures of socioeconomic status, since scale of the relative difference between quintiles may differ across countries. The geographic areas in the analyses also varied between countries. The use of geographic areas of the unit of analysis raises the possibility of ecologic fallacy [26]. For these reasons, comparisons between countries, especially of the size of the observed disparities, may be misleading [27]. Thus, these data should be interpreted as four related case studies rather than a strict cross-national comparison. The quality measures used in this study are not comprehensive and there are clinically important conditions, such as diabetes, that are not represented. Several of the quality indicators that were available and were included are subject to threats such as confounding (e.g. suicide and smoking rates are amenable to factors outside the health care system) and measurement issues (e.g. coding of suicide deaths). The time period observed (5 years) may be too brief to observe changes in disparities.

Conclusion

Despite these caveats, the results point to three conclusions. First, there are socioeconomic disparities in health care quality and health status in all four countries. Second, these disparities generally have persisted over time. Despite the recognition of disparities among policymakers and active campaigns to reduce disparities, success in reducing disparities in health care quality has been uneven. These conclusions are shared by government reports on disparities in health care quality and health status [1, 4, 5, 28]. Third, there is a lack of agreement on the most appropriate methodology for measurement of disparities. There is also a need for more data that can be used to monitor and compare socioeconomic disparities. Further research with additional indicators should focus on programs that have reduced or eliminated disparities.

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