RESEARCH PAPER

Ranked Performance of Canada's Health System on the International Stage: A Scoping Review

Classement du rendement du système de santé canadien sur la scène internationale : un examen de la portée

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Appendix 1. Articles included in the scoping review

Author(s)	Year	Source type	Focus country	Main objective/ topic	Key findings
The Conference Board of Canada	2015	Grey literature	Multiple – Canada	Benchmarking Canada against other countries	Canada and its peer countries have all reduced their premature mortality rates over the past five decades. Canada maintains its "B" grade and tenth-place ranking among the 17 peer countries. As the population ages, chronic diseases will place an increasing burden on Canadian society
Davis et al.	2014	Grey literature	Multiple – US	Provides rankings based on indicators while examining US underperformance relative to other countries	Although responses for all countries indicate room for improvement, they spend considerably less on healthcare per person and as a percent of gross domestic product than the US. From the perspectives of both physicians and patients, the US healthcare system could do much better in achieving value for the nation's substantial investment in health. Findings confirm many of those in the earlier four editions of *Mirror, Mirror*, with the US still ranking last on indicators of efficiency, equity and outcomes
Forde et al.	2013	Journal (commentary)	Multiple	Explores methodological challenges associated with international HS comparisons	HSP studies must consider assessing legitimacy of the coordinating centres, validity of indicators, flexibility of data collection and technical support for data correspondents. They must focus on one of the two following choices: depth versus breadth, aggregation versus granularity and flexibility versus consistency

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Gerring et al.	2013	Journal	Multiple (190)	Assesses HSP using a model-based approach	Best performers are Syria, Vietnam, Bangladesh, Nepal, Malaysia and Singapore. Worst performers are Swaziland, South Africa, Sierra Leone, Angola, Lebanon and the US
Heijink et al.	2013	Journal	Multiple (14 Western countries – Canada not included)	Examines relationship between avoidable mortality and healthcare spending	Greatest part of the total avoidable mortality reduction in all countries is because of falling mortality from circulatory system diseases. In general, with few exceptions, countries with an above average rise in healthcare expenditures most often experience an above-average decline in avoidable mortality
Hewitt and Wolfson	2013	Journal	Multiple	Describes health rankings and how to interpret them	To rank HSs is to condense a complicated array of statistics into a relatively simple number; rankings of HS are not yet standardized or well understood. It explains how rankings are created and why rankings can be difficult to interpret
Papanicolas et al.	2013	Journal (editorial)	–	Suggests comparisons are only valuable if they attract merited attention from policy makers and prompt appropriate policy responses	Studies comparing and ranking HSP often include the following themes: (1) comparison frameworks; (2) performance metrics; (3) analytic techniques; and (4) policy inferences
Reibling	2013	Journal (methodological and empirical)	Multiple (21 countries)	Use of cross-sectional time series methodology for international comparison of HSP in population health. It looked at infant mortality over some time in OECD countries	A 1% increase in total health expenditure reduces infant mortality by approximately 0.07% within the same year. Even after controlling for GDP, sugar and alcohol consumption and public financing, healthcare spending is associated with reduced infant mortality in the long run
Veillard et al.	2013	Journal	Canada	Discusses normalization, standardization of scales and methods used by the CIHI to present international HSP comparisons	CIHI compares Canada and its jurisdiction with other OECD countries based on individual health outcome indicators representing specific dimensions of the HS. Canada performs well on some indicators and needs improvement on others
Verguet and Jamison	2013	Journal	Multiple (22 OECD countries)	Used adult mortality (per time period and their change in performance from one-time period to the next) to rank OECD countries over time in OECD countries	Little correlation between performance in levels and in rates of decline but high correlation between performances in rates of decline of female adult mortality and male adult mortality. While Australia relatively stayed in upper position, the US and Japan fell in rank and Sweden and Netherlands rose in rank

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Murray et al.	2012	Journal	Multiple (worldwide)	Examines disability-adjusted life years for 291 diseases and injuries in 21 regions from 1990 to 2010	From 1990 to 2010, global DALYS remained stable whereas crude DALYS decreased. Contribution of deaths and disability among children to DALY declined globally. Global disease burden shifted away from communicable to non-communicable disease and from premature death to years lived with disability. Leading causes of DALYS worldwide in 2010 (from highest): ischemic heart disease, lower respiratory infections, stroke, diarrheal disease and HIV/AIDS
Squires	2012	Grey literature	Multiple (13 but focused on the US)	Compares healthcare spending, supply, utilization, prices and quality in 13 industrialized countries, not including Canada	The US spends far more on healthcare than any other country. This high spending is more likely because of higher prices and more readily accessible technology and greater obesity. Healthcare quality in the US varies and is not notably superior to the far less expensive systems. Japan has the lowest health spending, which it achieves primarily through aggressive price regulation
Tchouaket et al.	2012	Journal (empirical)	Multiple	OECD comparison based on multidimensional HSP	This study models different dimensions of HSs in many countries. Canada's performance is as follows: (1) lower resources; (2) lower effectiveness; (3) average outcome; (4) higher services; (5) higher efficiency; and (6) higher productivity
Nolte and McKee	2011	Journal (empirical)	Multiple (16 – Canada not included)	Compares countries by examining amenable (avoidable) mortality	Amenable mortality accounts for under a quarter of total mortality in 16 countries. Level of amenable mortality has dropped between 20% and 40% from 1997–1998 to 2006–2007
Bauer and Ameringer	2010	Journal (empirical)	Multiple (all WHO countries)	Discusses methodological issues and grouping "comparative" countries	The paper argues that clustering analysis provides better group of comparator countries than merely putting countries together based on their geography such as South Asia or Africa
Murray and Frenk	2010	Journal (commentary)	US	Replies to a correspondence that criticizes WHO report operationalization of its conceptual framework	Although the conceptual framework used in World Health Report 2000 may be problematic, the results of the report in general are consistent with other indicators, that is, the US ranked 37th in the World Health Report, 39th for infant mortality in 2006 and 43rd for adult female mortality, 42nd for adult male mortality and 36th for life expectancy in 2006. The important message from the WHO report was to learn lessons from one another. Proposals suggest that the US should extend insurance coverage, decrease cost and expand prevention programs
Musgrove	2010	Journal (commentary)	–	Debate between Murray and his critique	Ranking in WHR is meaningless because 61% of the numbers in the WHR were imputed from regression and the framework was not sound. Although examining the failings of healthcare systems is valuable, the use of untrue rankings is meaningless

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Statistics Canada	2009	Grey literature	Canada	A federal report on health indicators	Canadians life expectancy at birth has improved (LEB-M = 76.7 [2006] to 77.8 [2009] and LEB-F = 81.9 [2006] to 82.6 [2009])
Tang et al.	2009	Journal	Multiple (191 countries)	Applies a new technique (which can separate avoidable and unavoidable mortality risk) to measure health inequalities in various countries	Controlling for unavoidable mortality risks results in a lower estimate of health inequality, especially for developed countries. In general, countries that have a higher life expectancy at birth tend to have lower health inequality. However, there are significant variations in health inequalities across countries that have the same life expectancy. It is important to use health inequality (in addition to the overall level of health) to assess the performance of HSs
Kelley	2007	Journal (empirical)	Multiple (34 OECD countries)	Compares spending, life expectancy and quality of care among OECD countries	Health expenditure and life expectancy has increased in all countries over time although the rate of increase varies by country. While some quality indicators (such as immunization rate) are high in all OECD countries, some (like breast cancer) survival are good in some countries and could be improved in all, and finally, some (such as in-patient care for AMI) vary widely across OECD countries
Arah et al.	2006	Journal	–	Discusses a conceptual framework for quality of healthcare across OECD countries	It argues that health is the function of multiple factors other than just the HS. It presents an HSP model that encompasses the healthcare system along with non-medical determinants
Nolte et al.	2006	Journal (empirical)	Multiple (29)	Uses diabetes as an outcome to compare OECD countries	The incidence and mortality because of diabetes vary widely across countries. Diabetes incidence varies from <2 cases per 100,000 in Japan to >35 in Finland. Mortality because of diabetes (age 0–39) varies from 0.14 deaths per 100,000 in Greece to 1.25 in Russia
Arah et al.	2005	Journal	Multiple (18 OECD countries)	Time series analysis of factors associated with all-cause mortality and premature death in several OECD countries	From 1970 to 1999, all-cause mortality and PYLL decreased on average by approximately 27% and 37%, respectively, for the 18 countries. Tobacco, alcohol and fat intake were positively associated with overall mortality and premature death. Air pollution did not have significant effects on overall mortality but was sometimes related to PYLL
Commonwealth Fund	2004	Grey literature	Multiple (5)	Evaluating quality and HSP from an international perspective	All countries have areas of good performance and opportunities for improvement. There is a lack of indicators and a need to develop them. Long wait times for elective and non-emergency surgeries in Canada

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Hussey et al.	2004	Journal (empirical)	Multiple (5)	Compares medical health indicators across developed countries (including Canada)	Canada has the highest AMI case fatalities (worst for 65–74 and 75–84 age groups). Canada, Australia and the US have similar suicide rates. Smoking rates were lowest in Canada and the US
Kaltenthaler et al.	2004	Journal (systematic review)	Multiple (UK, US, Canada and Europe)	A systematic review of papers that describe the development and use of multidimensional population-based health indexes in the UK, US, Canada and Europe	Problems associated with the construction of a health index, a composite of several health indicators, include defining health, clarifying the purpose of health indicators, validity, reliability, data sources and cost. One also has to decide which of the many possible indicators to choose and which method to use to assign relative importance to each single indicator in the computation of the index
Richardson et al.	2003	Grey literature	WHR – Countries	A critique of WHO World Health Report 2000	Despite criticisms, the WHO report is the most sophisticated cross-national assessment of system performance to date. The choice of objectives is contestable. There is a particularly strong case for omitting the equity of financing from the list and replacing it with an index of access, both financial and geographical. The weights attached to the system objectives have not been validated
Nord	2002	Journal (commentary)	WHR – Countries	A critique of WHO World Health Report 2000	The WHO needs to add an indicator of equality in access to its present indicator of fairness in financing
Smith	2002	Journal (editorial)	–	Four key factors influencing effectiveness of performance measurement systems in developed nations	Although the optimal design of performance measurement systems depends heavily on local factors, they are likely to offer a highly cost-effective instrument for securing major improvements in system performance, if properly deployed
Starfield and Shi	2002	Journal	Multiple (13 countries)	Comparison of 13 countries – determinants of country health levels	The stronger the primary care, the lower the total health costs (even after removing the US from analysis which has very high costs). Countries with very weak primary care infrastructure have poorer performance on major aspects of health. Countries that are intermediate in their strength of primary care generally have levels of health at least as good as those with high levels of primary care. The impact of a strong primary care is the greatest in early life

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Wagstaff	2002	Journal (methodological and empirical)	Vietnam	Critique of WHR 2000 examines the index of fairness of financial contribution proposed in the World Health Report 2000	Financial fairness contribution index of the WHR does not help policy makers understand whether the index deviates from complete fairness because households on similar income pay different amounts towards healthcare (horizontal inequity) or because households on different income pay different proportions of their income on healthcare (vertical inequity). The index treats progressivity as similar to regressivity
Anderson and Hussey	2001	Journal (empirical)	Multiple – US	Comparison of OECD countries in 1998	Outcome indicators to compare performance are sparse. There is a need to increase comparable indicators and pay attention to quality of care indicators. Policy makers are interested in value for money
Bhargava	2001	Journal (commentary)	–	Major report by WHO on international health comparison	The WHR 2000 points to major differences between the rich and the poor countries. All western Europe countries are in the top quintile of DALY and 36 of 38 countries in Sub-Sahara Africa are in the bottom. Western Europe needs to take the lead in contributing to bring change in those countries. There is also a need to include more indicators in the analysis
Blendon et al.	2001	Journal (empirical)	Europe and North America	Looks at the association between WHR's country rankings and the satisfaction of the citizens who experience these HSs	Although Italy was ranked second by the WHO, 20% of its citizens said they were satisfied with their HS. On the other hand, Denmark ranked 16, and Finland ranked 15 while 91% and 81% of their citizens were satisfied, respectively. France ranked 1, while 65% were satisfied. Canada ranked 14, while 46% were satisfied. Overall, there was no relationship between the WHO ranking and satisfaction of citizens with their HS
Handler et al.	2001	Journal	–	Framework to measure public HSP	A guiding framework for assessing HSP with five components related to each other: macro context, mission, structural capacity, processes and outcomes. Finding indicators for each component of a framework is a major task as availability varies. Analyzing the relationship between components of framework is important
Navarro	2001	Journal	–	Examines the concepts, assumptions made and methods used in the WHR 2000	Medicine is very effective in reducing morbidity and mortality, but the WHR does not take into account that socio-economic conditions are most effective. Responsiveness is measured by "experts of healthcare system" who represent the perception of established wisdom. The ideology behind the indicator is that client demand is valued more than patient's need. Measurement of fairness does not account for redistributive effect of funding – progressivity of funding

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Rosen	2001	Journal (commentary)	–	Appraisal of WHO World Health Report 2000	WHO report had problems at many levels. DALE may be simply a measure of aggregate social resources rather than just the outcome of only the HS. Weightings of different health components are not free of value and combining measures are problematic. Methods to measure quality of life/functional ability are ambiguous. Time lag indicates it assesses yesterday's performance
Wibulpolprasert and Tangcharoensathien	2001	Journal (commentary)	Multiple (191)	A critique of WHO World Health Report 2000	The measurement has to be valid, reliable, sensitive and specific. There are many constraints to operationalize conceptual frameworks (issue of giving weight to indicators or responsiveness). Secondary data can be unreliable and primary data collection is expensive and time-consuming
Mulligan et al.	2000	Journal (commentary)	Multiple – UK	A commentary on WHR 2000: Included to understand critiques of WHR 2000, and a report produced by England Department of Health	There is variation in health and healthcare services within countries. Averaging all the variations as a single entity for a country is problematic. For example, department of health in England published performance indicators for 99 health authorities and 275 NHS hospital trusts
WHO	2000	Grey literature	Multiple	The landmark World Health Report 2000	The HS has four functions: (1) service provision; (2) resource creation; (3) financing; and (4) stewardship. It has three objectives: (1) health; (2) responsiveness; and (3) fairness. Canada ranked 30th for overall HSP, way ahead of the US. The reasons may be Canada's (1) coherent decentralisation compared to the US, (2) mandatory services and multiple incentives for northern regions, (3) health laws to protect patient rights in New Brunswick 1992 and Ontario 1996, and (4) powerful consumer groups
The Conference Board of Canada	2006	Grey literature	Multiple – Canada	Benchmarking Canada against other countries	No province or nation has it all. Each one has room for improvement and lessons to learn from
Murray et al.	2013	Journal (empirical)	Multiple – UK	The landmark Murray paper on UK's burden of disease	In Canada, IHD, trachea, bronchus, lung cancer and stroke are the highest-ranking causes of YLLs in 2010. The leading risk factor is dietary risks
CIHI	2011	Grey literature	Multiple – Canada	Focuses on Canada's results in four of the seven dimensions from Health at a Glance 2011	Canada performs well on some indicators and needs improvement on others. Although Canada's life expectancy at birth has increased since 1961 and premature mortality decreased since 1970, Canada has not kept pace with others
CIHI	2013	Grey literature	Multiple – Canada	Examines Canada's results for selected OECD indicators	Canada performs well on some indicators and needs improvement on others

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Deber	2004	Journal	Canada	Review of the WHO report to examine how Canada's ranking was derived	The WHO 2000 rankings are not helpful guides to measure or evaluate the performance of any HS, including Canada's
CIHI	2015	Grey literature	Canada	Examines Canada's performance on risk factors and management of type 2 diabetes	There was no consistent pattern to Canada's results; for many indicators, Canada is an average performer (between 25th and 75th percentile), and for some, Canada underperforms. No country outperforms Canada across all indicators. Canada's obesity has not changed much between 2000 and 2010
OECD	2009, 2011, 2015	Grey literature	Multiple – Canada	Examines comparable data on the HSP in OECD countries	Canada did very well compared to its peer countries in 2009 (data from 2006 to 2007), but the 2015 report refers to Canada's average performance and implies that other countries are performing better
Gay et al.	2011	Grey literature	Multiple	Examines "mortality amenable to healthcare" as an indicator of outcome for healthcare systems, its advantages and limitations, and estimates of mortality amenable to healthcare in 31 OECD countries	Nolte and McKee (2008) and Tobias and Yeh (2009) have developed separate lists of disease categories treatable by healthcare intervention. Amenable mortality has decreased in all OECD countries with some countries having better rates than others. Both lists produced the usual top performers (France, Iceland, Italy, Japan, Sweden) and the suspected bottom performers (Estonia, Hungary, Poland, Mexico). Gender difference in amenable mortality (males have higher amenable mortality than females – at best, 6 years in France; at worst, 133 years in Estonia)

AMI = acute myocardial infarction; CIHI = Canadian Institute for Health Information; DALY = disability-adjusted life year; GDP = gross domestic product; HS = health system; HSP = HS performance; IHD = ischemic heart disease; LEB = life expectancy at birth; LEB-F = LEB-female; LEB-M = LEB-male; NHS = UK National Health Service; OECD = Organisation for Economic Co-operation and Development; PYLL = potential YLL; WHO = World Health Organization; WHR = World Health Report; YLL = years of life lost.