

Exploring the Ecology of Canada's Publicly Funded Residential Long-Term Care Bed Supply*

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RÉSUMÉ

Malgré l'augmentation de la population des personnes âgées au Canada, et la variation de stratégies de soins de longue durée (SLD) que les provinces ont mis en place, peu de recherches ont porté sur la compréhension de la mesure dans laquelle l'approvisionnement de lits des SLD résidentiels financés par l'État varient parmi les provinces, ou les facteurs influençant cette variation. Notre étude a porté sur une analyse dans laquelle nous avons examiné l'association de trois caractéristiques juridictionnelles sélectionnés avec la fourniture des lits LTC: la démographie de l'âge de la population, les ressources économiques des provinces, et les investissements provinciaux dans les soins à domicile. On n'a pas trouvé de l'écologie interjuridictionnelle importante ni d'interrelation entre la variation de l'approvisionnement de lits des SLD avec aucune des variables étudiées. La variation entre les provinces pour le disponibilité de lits n'a également pas influencé statistiquement du jour à l'autre le niveau de soins spécifiques pour l'attente des SLD, ce qui suggère que ces jours ne sont pas influencés simplement par des différences dans l'approvisionnement de lits des SLD, et que d'autres facteurs au niveau provincial étaient en jeu.

ABSTRACT

Despite Canada's increasing population of seniors and the varying long-term care (LTC) strategies that provinces have implemented, little research has focused on understanding the extent to which publicly funded residential LTC bed supply varies across provinces, or the factors influencing this variation. Our study involved an analysis in which we examined the association of three select jurisdictional characteristics with LTC bed supply: population age demographics, provincial wealth, and provincial investments in home care. No significant cross-jurisdictional "ecology" or inter-relatedness was found between the variation in LTC bed supply and any of the examined variables. Interprovincial variation in bed supply also did not statistically influence alternate level of care days specific to LTC waits, suggesting that these days were not influenced simply by differences in LTC bed supply and that other provincial-level factors were in play.

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* We thank those who provided useful feedback on an earlier version of the study: Hugh Armstrong, Professor Emeritus of Social Work and Political Economy at Carlton University; Martha MacDonald, Professor of Economics at St. Mary's University; and Evelyn Forget, Professor of Community Health Sciences at the University of Manitoba. This research was supported by the Social Sciences and Humanities Research Council, as part of the Major Collaborative Research Initiative "Re-imagining Long-term Residential Care: An International Study of Promising Practices" with Principal Investigator Pat Armstrong, Professor of Sociology at York University.

Manuscript received: / manuscrit reçu : 16/08/13

Manuscript accepted: / manuscrit accepté : 11/03/14

Mots clés : vieillissement, autre niveau de soins, services de santé pour les personnes âgées, soins de longue durée, variation

Keywords: aging, alternate level of care, health services for the aged, long-term care, variation

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Over the next two decades, seniors will comprise a growing proportion of the Canadian population. Between 2011 and 2031, all of the baby boomer generation (born between 1946 and 1965) – Canada’s largest birth cohort – will turn 65 years of age (Canadian Institute for Health Information, 2011). As a result, both the number and proportion of seniors in the population will increase. The number of very old seniors (aged 85 or older) in particular is expected to increase sharply over the next few decades (Statistics Canada, 2005), and by 2052 the very old will account for 24 per cent of all seniors and 6 per cent of the total population. Whereas a similar proportion of young seniors (aged 65–74) and people aged 45–64 reported having challenges with activities of daily living (ADLs), one-quarter of people aged 85 and older reported having moderate to severe challenges completing ADL tasks (Canadian Institute for Health Information). The prevalence of age-related disability is therefore likely to increase as the baby boom population ages.

In addition, while residential long-term care (LTC) (i.e., nursing home) use rates have decreased in most Canadian provinces (Ariste & Rondeau, 2007; Canadian Institute for Health Information, 2010), overall LTC use continues to increase (Doupe et al., 2011), and this form of care still remains the primary option for the most frail and disabled individuals (Jansen, 2009). Recent evidence shows that across Canada, 60 per cent of LTC residents now have dementia and 56 per cent have arthritis and other musculoskeletal conditions (Canadian Institute for Health Information, 2013).

LTC provision in Canada is beyond the purview of the Canada Health Act and for the most part also falls outside federal jurisdiction (Banerjee, 2009; Merlis, 2000). Provincial stakeholders have therefore implemented various LTC strategies leading to considerable interprovincial variation in the supply of publicly funded residential LTC care beds (Armstrong & Armstrong, 1999; Banerjee, 2009; Chan & Kenny, 2001; McGregor & Ronald, 2011). Given the expected increase in the number of seniors, the literature projecting the need for additional LTC residential beds in Canada has also grown considerably (Chateau et al., 2012; De Coster, Frohlich, & Dik, 2005; Kinoshian, Stallard, & Wieland, 2007; Schulz, Leidl, & König, 2004; Spillman & Lubitz, 2002). Collectively, however, this literature has focused on institutional bed projections and, to a lesser extent, on the potential for community-based programs to offset current and future demand. Missing from this knowledge base are (a) an understanding of the extent that publicly funded residential LTC bed supply varies across Canadian provinces and (b) an analysis of the factors influencing these differences. This article describes our study of the extent to which

interprovincial variation in publicly funded LTC beds is based on a predictable “ecology” or inter-relatedness of select jurisdictional characteristics.

As a first step in understanding this gap in knowledge, we undertook a study that examined differences we found in the supply of publicly funded residential LTC beds across Canadian provinces. Second, our study explored how interprovincial variations in key related factors helped to explain these bed supply differences. Within this latter analysis, we first explored the relationship between provincial LTC bed supply and population age demographics. We recognized the association between the very old (defined as those adults aged 85 or older), disability, and LTC use (Collard, Boter, Schoevers, & Oude Voshaar, 2012; Rockwood et al., 2005); therefore, interprovincial variation in LTC bed supply may simply be related to the number of very old people living in each province, resulting in differences in economy of scale. In addition, variation in publicly funded LTC bed supply may also be associated with provincial differences in wealth due to the greater “buying power” of richer provinces, and therefore we also analysed this relationship. Third, our study explored the extent to which provincial investment in home care is related to publicly funded LTC bed supply. Greater provincial expenditures on home and community care may result in greater access to home care as a substitute for institutional care, thereby reducing the need for residential LTC beds.

Finally, as this article explains, our study examined one possible consequence of interprovincial variation in LTC beds – the extent to which this is related inversely to the volume of acute hospital days designated as alternate level of care (ALC). ALC days are denoted in acute care hospitals when patients no longer require the level and intensity of services provided in this setting, but for various reasons (e.g., waiting for an LTC bed) they are not allowed to leave (Canadian Institute for Health Information, 2009). Our analyses focused on the subset of ALC days where occupants are specifically designated as needing alternate level of care while waiting for a residential LTC bed. This analysis was conducted from the perspective that, all other things being equal, provinces with a greater supply of residential LTC beds may have lower rates of these ALC days. Among other challenges, provinces with more ALC days may face greater difficulties in providing timely, acute care services to some individuals in need, such as hospital admissions from emergency departments. Furthermore, while residential long-term care is more expensive than home-based services, it is still far cheaper than the cost of providing these services in an acute care setting (Busby & Robson, 2013; Cohen, Murphy, Nutland, Ostry, & Care, 2005).

Methods

Data Definitions and Data Sources

As a first step in this study, we searched academic and all publicly accessible grey literature as well as federal and provincial documents, looking for nationally comparable data on residential LTC use and related factors. Our search was confined to data sources that provided the most recent years of information at the time of this research (2008–2011), and these sources were examined to determine gaps in measures and national comparability. Table 1 provides a summary of these data sources, including the advantages and potential challenges of each. Based on this information, the following text explains and provides a rationale for the various sources of data used in this study.

Publicly Funded Residential LTC Beds

Residential long-term care is defined as licensed facilities that provide 24/7 care and accommodation primarily to older people who are unable to live independently in the community for medical and/or frailty reasons. Publicly funded residential LTC beds are government-funded facilities that provide end-of-life, respite, flex, convalescent, temporary, and interim care (Jansen, 2009). Delivery of this care in publicly funded beds may occur in facilities of different ownership types (i.e., for-profit, non-profit, or government/public ownership). Until recently, provincial counts of publicly funded LTC bed numbers were available through Statistics Canada's Residential Care Facilities Survey, Table 107-5509 (Statistics Canada, 2012a). However, these data excluded hospital-based LTC beds. Since hospital-based LTC beds contribute significantly to the supply of overall publicly funded LTC beds in some provinces and not others, the absence of these data preclude reasonable cross-provincial comparisons. We therefore selected an alternate dataset generated by the Canadian Union of Public Employees (CUPE). CUPE data were gathered by an independent researcher who directly contacted the relevant Ministries in each province (Jansen, 2009) which we validated through comparison with other published research or personal communication with researchers.

Population Age Demographics

One factor potentially influencing LTC bed supply was the size of the adult population needing the beds, so we measured the number of very old seniors residing in each province at the time of this study. This measure was selected because the prevalence of frailty is highest among this group versus other subgroups of older adults; we selected it also because people aged 85 and older comprise at least two-thirds of all LTC users and account for days of use (Doupe et al., 2011).

Provincial differences in the number of very old residents are therefore most likely to influence variation in publicly funded bed supply. Data for this variable were extracted from Statistics Canada's (2005) Census survey.

Publicly Funded Residential LTC Bed Supply

LTC bed density was used as our measure of publicly funded LTC bed supply. This is defined as the number of publicly funded LTC beds relative to the number of very old seniors (x 1,000) in each province. This was a composite variable (# of publicly funded LTC beds divided by # seniors aged 85 and older/1,000) derived from two data sources, described later. We conducted a sensitivity analysis using several definitions of LTC bed supply with similar results; we therefore chose to use bed supply per 1,000 population aged 85 and older.

Provincial Wealth

The annual gross domestic product (GDP) of each province is designed explicitly to measure the value of a province's total production of goods and services (at basic price in current dollars by the North American Industry Classification System) (Statistics Canada, 2012b). We used GDP per capita as a measure of the overall wealth of a given jurisdiction. The GDP numerator and total population denominator were extracted from Statistics Canada's (2012b) Gross Domestic Product at Basic Prices and Census survey respectively (Statistics Canada, 2005). We conducted sensitivity analyses by using a second measure of provincial wealth – "consolidated total provincial and territorial government expenditure per capita" – also extracted from Statistics Canada data. We used this measure as it is possible that some provinces receive equalization payments, reflected in GDP, which would increase the capacity of some provinces to pay, for which this measure corrects. However, since both measures showed no association with LTC bed supply, we chose to present our results using GDP as it has been more commonly used in the literature.

Publicly Funded Homecare Expenditure per Capita

This variable is defined as each province's per capita (i.e., for the total population) expenditure of publicly funded home care services. Home care in Canada encompasses a wide range of health and social services that allow clients disabled in whole or in part to remain at home for as long as possible. The full basket of services (administrative, direct, unlicensed, and licensed service provision) provided under this umbrella term includes home health, home care, and home support services (Ariste & Rondeau, 2007; McGrail et al., 2008). Data for this variable were extracted from the Canadian Institute for Health Information's report *Public Sector Expenditures and Utilizations of Home Care*

Table 1: Description of available data sources, advantages, and limitations

Data source	Source Year	Variable	Descriptor	Use in Analysis
Canadian Union of Public Employees – Report on residential long-term care in Canada	Updated in 2011	LTC Beds	<ul style="list-style-type: none"> Includes publicly funded (for-profit and non-profit) beds only Appears consistent with administrative data Does not account for rural-based hospital beds doubling as nursing home beds Does not include occupancy rates Prince Edward Island beds excludes institutional respite care beds and under 60 cognitively impaired beds 	Included
Statistics Canada – Annual Residential Care Facilities survey, Table 107-5509	Available until 2009–2010	LTC Beds	<ul style="list-style-type: none"> Includes all public and private beds in facilities with 4 beds or more Occupancy rates are available Excludes hospital-based LTC beds which varies considerably by province Does not make a distinction between public and privately funded beds/facilities. Facilities self-define as private for-profit vs. non-profit vs. government Does not account for rural-based hospital beds doubling as nursing home beds 	Excluded
Statistics Canada – Census survey, Table 051-0001	Available until 2012	Population numbers	<ul style="list-style-type: none"> Post-censal estimates based on 2006 Census counts Data included in analysis were for 2011 estimates 	Included
Statistics Canada – Annual Residential Care Facilities survey, Table 107-5504	Available until 2009–2010	Public LTC Resident numbers	<ul style="list-style-type: none"> Available by sex and age categories for all public and private facilities for residents on books at year end Excludes hospital-based facilities 	Excluded
Statistics Canada – Gross Domestic Product at Basic Prices, Table 379-0025	Available until 2011	Gross Domestic Product	<ul style="list-style-type: none"> Chained to 2002 dollar values Based on the North American Industry Classification System for all industries 	Included
Canadian Institute for Health Information – Report on Public Sector Home Care Expenditures	Available until 2003–2004	Public home care expenditures per capita	<ul style="list-style-type: none"> Includes the full basket of home care services Chained to 1997 dollar values Province-wide data not available for Newfoundland and Labrador Not age- or sex-adjusted 	Included
Canadian Institute for Health Information – Report on inpatient hospitalizations	2008–2009	Acute inpatient hospitalizations	<ul style="list-style-type: none"> CIHI data sources include the Discharge Abstract Database, Hospital Morbidity Database, and Ontario Mental Health Reporting System Includes all age groups 	Excluded
Canadian Institute for Health Information	2010–2011	ALC days with LTC admissions	<ul style="list-style-type: none"> Total ALC days with admission to residential LTC facility indicator for all ages Data not available for Quebec and Nova Scotia 	Included
Canadian Institute for Health Information	2010–2011	Acute inpatient hospitalizations length of stay	<ul style="list-style-type: none"> Total acute inpatient hospital days only Excludes newborns, stillborns, obstetrical cases, cadaveric donation records, pediatric cases 0–18 years Data not available for Quebec and Nova Scotia 	Included

ALC = alternate level of care

CIHI = Canadian Institute for Health Information

LTC = long-term care

Services in Canada: Exploring the Data (Ariste & Rondeau). Home care expenditures in this report were collected from several data sources for selected jurisdictions as listed in the report's appendix. Since home

care expenditure data are not available by age and sex, we did not standardize them, which is a limitation when making comparisons in jurisdictions with younger populations such as Alberta and Saskatchewan.

The report also does not include data on Newfoundland and Labrador as province-wide home care data were not available in these areas for the purposes of the original CIHI report (only partial information was available for two of four regional community health boards in these provinces over a limited number of years).

Alternate Level of Care (ALC) Days while Waiting for LTC Admission

ALC days are defined as the number of days that a patient no longer requires the level and intensity of services or resources provided in an acute care setting (such as acute, complex continuing care, mental health, or rehabilitation), but for various reasons cannot be discharged or transferred (Cancer Care of Ontario, 2009). For the study described in this article, we examined the subset of ALC beds for which hospitalized patients were subsequently admitted to a residential LTC facility. For each province, this subset of ALC days (ending with LTC admission) was expressed as a percentage of total hospital days, to account for provincial differences in the number of acute care beds. Data for the numerator (ALC days ending in residential LTC admission) and the denominator (total hospital days) were purchased from CIHI through direct request. These data were unavailable for Quebec and Nova Scotia.

Approach and Design

Our study describes variation in the previously mentioned factors relative to LTC use across all 10 Canadian provinces. In addition to providing this descriptive analysis, we conducted simple ordinary least-squares regression between each factor and LTC bed supply, testing for the presence of statistical relation across provincial jurisdictions. From this linear analysis, R^2 and p values show the strength of the relationship in each comparison. In addition, as per the approach used by others (Marin, Leichsenring, Rodrigues, & Huber, 2009), we used this line of best fit to denote provinces with higher and lower LTC bed supply, according to the relationship reported between each of population age, GDP and home care expenditure, and this outcome variable. ALC days were considered as a consequent predictor (versus a potential predictor, as in the case of our other factors) of LTC bed supply, and so were excluded from this summary result.

Results

Descriptive Analyses

Currently, just under five million ($n = 4,983,362$) seniors live in Canada (see Table 2). Almost 54 per cent are aged 65–74, while 33 per cent are aged 75–84 and

14 per cent are aged 85 and older (data not shown). Two per cent of Canadians are aged 85 or older. The majority of these seniors reside in Ontario (39% of Canadians aged 85 and older live in this province), Quebec (~24%), and British Columbia (~15%), whereas the eastern provinces of New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island house less than 10 per cent of seniors collectively.

A similar pattern emerged when we compared the number of publicly funded residential LTC beds across Canada (see Table 2). Overall, Canada houses 197,624 publicly funded LTC beds with the majority located in Ontario (39.4%) and Quebec (23.2%). Some differences did emerge, however, when we compared the distribution of LTC beds to people aged 85 and older across provinces. For example, the proportion of publicly funded LTC beds in British Columbia and Alberta (13.3% and 7.3% respectively) was slightly less than the proportion of adults aged 85 and older (14.8%, 8.1%) living in each of these provinces. Conversely, the proportion of publicly funded LTC beds in each of Manitoba (4.9%), Saskatchewan (4.3%), Nova Scotia (3.5%), and Prince Edward Island (0.5%) was greater than the proportion of the population aged 85 and older living in each of these provinces (e.g., during the study period Manitoba had 4.9% of LTC beds and 4.3% of very old Canadians). These results are reflected in the pattern of LTC bed supply that we found. During our study period, Prince Edward Island had the highest publicly funded LTC bed supply (336.2 beds/1,000 population aged 85 and older) followed by Manitoba (338.3) and Saskatchewan (324.7), while LTC bed supply was lowest in New Brunswick (256.7), Alberta (267.2), and British Columbia (264.1) (see Table 2).

Factors Related to Publicly Funded LTC Bed Supply

Figure 1 shows the relationship between provincial populations of very old seniors (i.e., number of people aged 85 and older residing in each province) and bed supply. Provinces with the largest number of very old (i.e., Ontario, $n = 262,501$; Quebec, $n = 151,195$) tended to have mid-range LTC bed supply values (e.g., 297.2 and 287.9 beds/1,000 population aged 85 and older for Ontario and Quebec respectively), while several provinces with a similar bed supply (Newfoundland and Labrador, Nova Scotia, Saskatchewan, Manitoba, Prince Edward Island; all with more than 300 LTC beds/1,000 population aged 85 and older) varied considerably in terms of their number of very old (e.g., $n = 2,984$ in Prince Edward Island; $n = 28,619$ in Manitoba).

GDP expressed per capita varied across Canada (see Table 2), ranging from \$40,000 or less in each of

Table 2: Factors associated with bed supply variation, distribution by province

Province	Population 85+ (n)	Distribution of population 85+ across Canada (%)	# Public Residential LTC beds ^a	Distribution of LTC Beds across Canada (%)	Bed Supply/1,000 pop. 85+	GDP Per Capita (\$) ^b	Home Care Expenditures Per Capita (\$) ^c	% Acute Hospital Days with ALC Days Ending in LTC Admission ^d
British Columbia	99,175	14.8%	26,193	13.3%	264.1 [9]	\$44,388	\$86.81 [6]	4.7% [6]
Alberta	54,135	8.1%	14,463	7.3%	267.2 [8]	\$69,754	\$91.01 [5]	3.4% [8]
Manitoba	28,619	4.3%	9,682	4.9%	338.3 [2]	\$43,347	\$142.21 [2]	11.9% [2]
Saskatchewan	26,409	3.9%	8,574	4.3%	324.7 [3]	\$60,084	\$81.98 [7]	6.0% [4]
Ontario	262,051	39.0%	77,873	39.4%	297.2 [6]	\$45,824	\$99.82 [4]	5.1% [5]
Quebec	159,195	23.7%	45,839	23.2%	287.9 [7]	\$40,029	\$79.86 [8]	N/A
New Brunswick	17,247	2.6%	4,427	2.2%	256.7 [10]	\$38,987	\$163.35 [1]	12.4% [1]
Newfoundland and Labrador	8,719	1.3%	2,650	1.3%	303.9 [5]	\$54,966	N/A	4.5% [7]
Nova Scotia	21,492	3.2%	6,872	3.5%	319.7 [4]	\$38,327	\$116.74 [3]	N/A
Prince Edward Island	2,894	0.4%	1,051	0.5%	363.2 [1]	\$34,387	\$55.49 [9]	6.8% [3]
Canada	672,245		197,624		294.0	\$47,112	\$93.59	5.7%

Note: Data excludes Nunavut, the Northwest Territories, and the Yukon Territory.

ALC = alternate level of care

LTC = long-term care

N/A: Factor not measured for this province.

[] indicates ranking of provinces from highest [1] to lowest [10] for that factor.

^a Publicly funded for-profit and non-profit beds excluding rural hospital beds doubling as LTC beds; data 2010–2011.

^b Chained to 2002 dollar values, per capita includes entire population; data 2011.

^c Chained to 1997 dollar values, includes all homecare services for all ages and sex, per capita includes entire population; data 2003–2004.

^d ALC days ending in an LTC admission expressed as percentage of all acute inpatient hospital days for ages 19+; data 2010–2011.

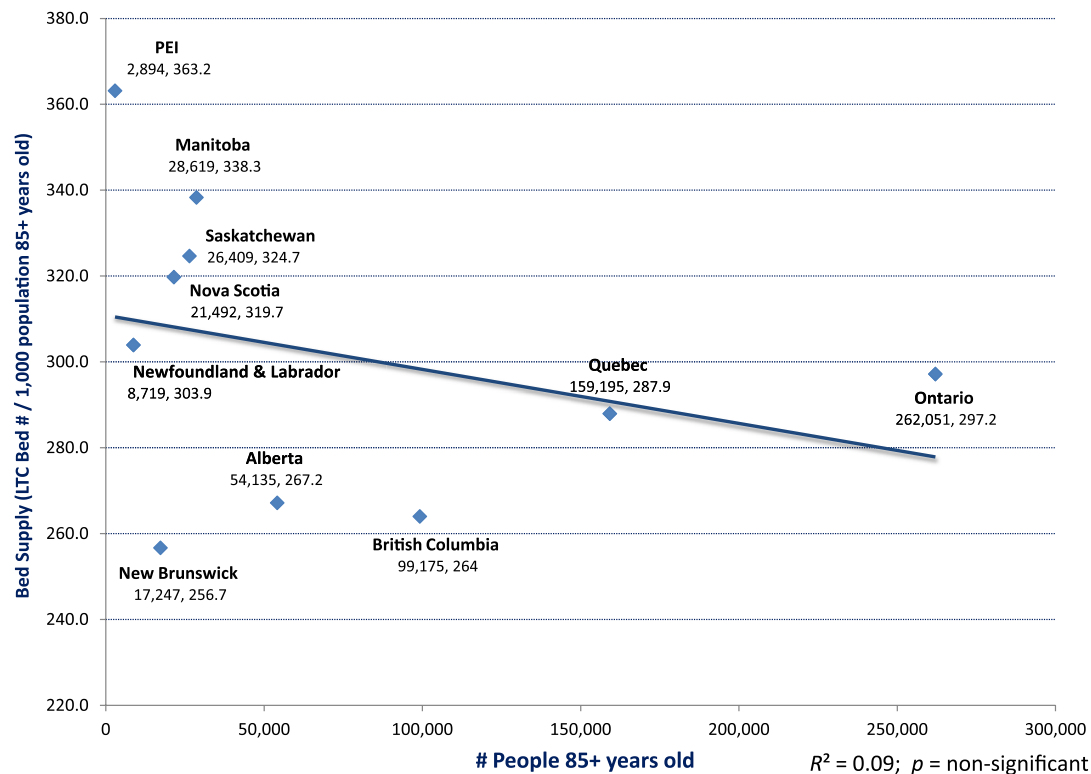


Figure 1: Relationship of population size with LTC bed supply

Prince Edward Island (\$34,387), Nova Scotia (\$38,327), New Brunswick (\$38,987), and Quebec (\$40,029) to a high of more than \$60,000 in Saskatchewan (\$60,087) and Alberta (\$69,754). One of the wealthiest provinces (Alberta) had one of the lowest bed supplies, and one of the poorest provinces (Prince Edward Island) had one of the highest bed supplies. Across all provinces, however, our regression statistic showed no relationship between these variables (see Figure 2; $R^2 = 0.08$, NS). This was supported by our raw data, where, for example, provinces with a similar per capita GDP (British Columbia, \$44,388; Manitoba, \$43,347) had very different LTC bed supply (264 and 338.3 beds/1,000 population aged 85 and older in British Columbia and Manitoba respectively) (see Table 2 and Figure 2). A similar pattern of results occurred when comparing LTC bed supply to consolidated total provincial and territorial government expenditure per capita ($R^2 = 0.0099$; NS; data not shown).

Home care expenditures expressed per capita also varied substantially (almost threefold) across Canadian provinces during the period of measurement, from a low of \$55.50 in Prince Edward Island to a mid-range of about \$80 in each of Saskatchewan (\$82.00), Quebec (\$79.90), and British Columbia (\$86.80) to a high of \$142.20 in Manitoba and \$163.40 in New Brunswick (see Table 2). Looking at Figure 3, in some provinces there appears to be an inverse relation between per

capita home care expenditure and publicly funded LTC bed supply. For example, Prince Edward Island and Saskatchewan had lower per capita expenditures and higher publicly funded LTC bed supply while, conversely, New Brunswick had the highest per capita home care expenditure (\$163) and the lowest LTC bed supply (256.7 beds/1,000 population aged 85 and older). When considering all provinces combined, however, this inverse relationship between upstream (home care expenditure) and downstream (LTC bed supply) resources was not statistically significant (see Figure 3; $R^2 = 0.10$, NS). This result is once again borne out by looking at the raw data (see Table 2 and Figure 3) whereby, for example, Nova Scotia and Manitoba had among the highest per capita home care expenditures (\$117 and \$142 respectively) and the second and third highest LTC bed supply (319.7, 338.3) across all provinces.

Excluding Quebec and Nova Scotia, there were a total of 749,588 ALC days in 2011–2012 (i.e., 5.7% of 13,181, 310 total acute care hospital days in Table 2) where, upon discharge, patients were subsequently transferred to a residential LTC facility. The percentage of acute care hospital days that were designated alternate level of care (for those awaiting LTC admission) varied twofold across provinces, from less than five per cent of all hospital days in each of Newfoundland and Labrador, Ontario, Alberta, and British Columbia, to 11.9 per

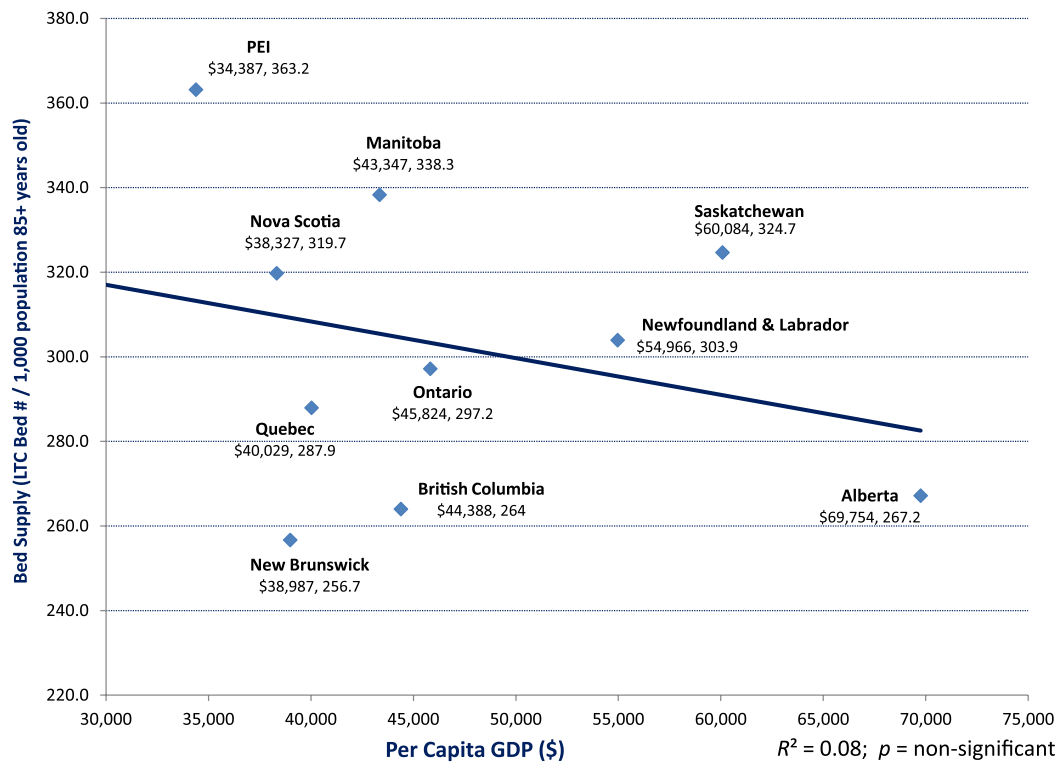


Figure 2: Relationship of provincial wealth with LTC bed supply

cent of all days in Manitoba and 12.4 per cent in New Brunswick (see Figure 4). With the exception of New Brunswick and Manitoba (i.e., excluding these provinces), our regression analyses showed a statistically significant positive relationship between the per cent of acute care ALC days and LTC bed supply, such that provinces with a greater LTC bed supply had more of their hospital days coded as ALC ending with LTC admission ($R^2 = 0.85$, $p < .01$; statistical results not shown in Figure 4).

New Brunswick and Manitoba, however, were outliers to this trend. For example, although New Brunswick had the lowest LTC bed supply in Canada, the proportion of acute care hospital days measured as alternate level of care pending LTC admission were highest in this province. Conversely, Manitoba had the second highest number of ALC days across these Canadian provinces, and also the second highest proportion of hospital days coded as ALC ending in LTC admission. As shown in Figure 4, when including these two provinces, the overall relationship between LTC bed supply and ALC days was not statistically significant ($R^2 = 0.03$; NS).

Provinces with Higher and Lower LTC Bed Supply

Based on the line of best fit developed for each of population age demographics, GDP, and home care

expenditures, Table 3 shows the pattern for provinces to have higher or lower than average publicly funded LTC bed supply. British Columbia, Alberta, Quebec, and New Brunswick consistently had a lower than average LTC bed supply. Conversely, Manitoba, Saskatchewan, Nova Scotia, and Prince Edward Island consistently showed a higher than average LTC bed supply. Results were mixed (higher than average bed supply for some factors, lower for others) for each of Ontario and Newfoundland and Labrador (see Table 3).

Discussion

The federal policy gap in residential LTC and the current nature of province-led initiatives provides a naturally occurring experiment in which to examine differences in provincial supply of publicly funded residential LTC beds and potential drivers of that variation. Our study found that publicly funded LTC bed supply, defined as the number of publicly funded LTC beds/1,000 seniors aged 85 and older across provinces, varied from 257 to 338 – a difference of 40 per cent. We were unable to demonstrate any significant cross-jurisdictional “ecology” or inter-relatedness between this variation and our examined variables.

Although publicly funded LTC bed numbers are correlated with age distribution, the 40 per cent variation is not explained by differences in population age.

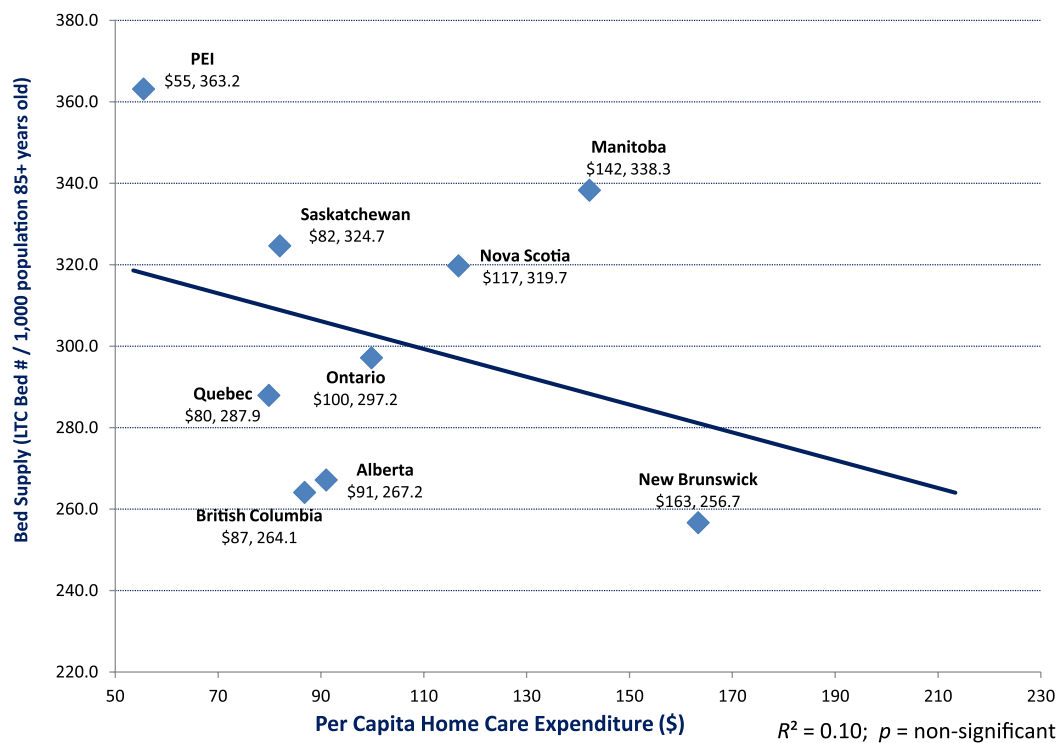


Figure 3: Relationship of per capita home care expenditures with LTC bed supply

Indeed, if all provinces were building the same number of beds for their respective population of very old seniors, the publicly funded bed supply/1,000 seniors aged 85 and older across all the provinces should be approximately the same. Instead, current differences in LTC bed numbers highlight substantial interprovincial differences in LTC bed supply, with significant policy and financial implications. This variation in publicly funded LTC supply was also found to be unrelated to a province's ability to spend, as measured by two different metrics of provincial wealth.

Similarly, we found no consistent association between provincial per capita home care expenditures and publicly funded LTC bed supply. We had hypothesized that per capita expenditures on home care, an indication of a province's investment in home and community care supply, would be inversely related to LTC bed supply. Our rationale for this was that provinces with larger investments in home care would invest less in residential LTC, instead using greater intensity and duration of the former to substitute for institutional care. This is especially surprising given that most provincial-led strategies have focused heavily on upstream care and home care in particular (Ariste & Rondeau, 2007; Department of Finance, 2003).

The three fold variation in per capita home care expenditures across the country is consistent with

a previously conducted study which noted a similar interprovincial variation in home care expenditures per capita even after adjusting for population structure (Coyte & McKeever, 2001). Those authors also found that New Brunswick, Manitoba, Nova Scotia, Newfoundland and Labrador, and Ontario spent higher than the national average on home care expenditures per capita and allocated a larger share of their public health expenditures to home care (Coyte & McKeever, 2001). However, besides spending more on home care, these provinces demonstrate remarkable differences in publicly funded LTC bed supply.

Our study was unable to measure the extent to which home care expenditures were used for short-term post-operative care versus long-term services to support frail seniors at home. If primarily used for the former, this would be expected to have little impact on publicly funded LTC bed supply for very old seniors. In fact, until the past five years, British Columbia has had a strategy of increasing home care expenditures on short-term post-operative home care to enable early post-operative discharge from hospital, while at the same time decreasing their investment in long-term home care (McGrail et al., 2008). The lack of a significant inverse relationship between provincial public home care expenditures and LTC bed supply in our study may, therefore, be due to our inability to distinguish the types and duration of home care services provided in each province.

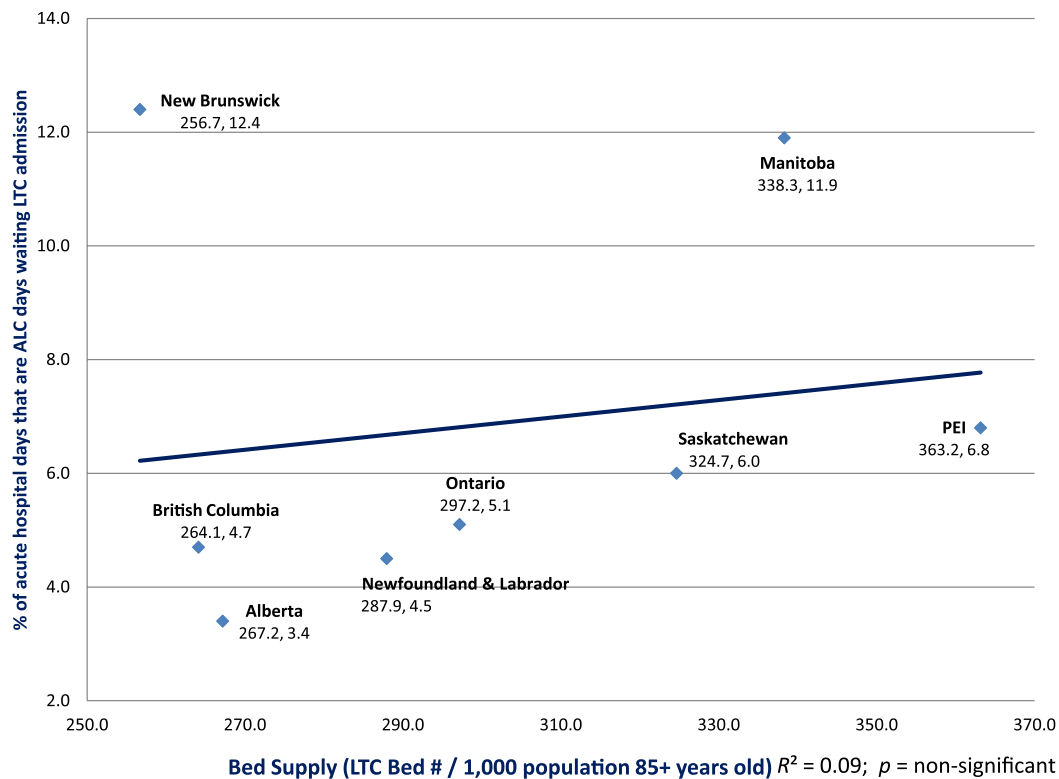


Figure 4: Impact of LTC bed supply on ALC days

If not related to our measured variables, what other factors might be driving the variation in publicly funded bed LTC supply? One factor might be the social care policies of the provincial parties in power, their length of governance, and their platform on care for vulnerable seniors. For example, Saskatchewan and Manitoba, both provinces with longstanding social democratic governments that were the first to regulate care homes and the rights of seniors, have two of the highest LTC bed densities in both the 75-to-85 and 85-and-older age groups (BC Ombudsperson, 2009). Internationally, social democratic governments have historically tended to invest more in home care and residential care services as a policy direction of social solidarity with vulnerable populations. This has been illustrated by Denmark, Norway, and the Netherlands, which all have longstanding social democracies and spend above average amounts on both home and residential long-term care relative to other OECD countries (British Columbia Medical Association Council on Health Economics and Policy, 2008; Marin et al., 2009). Precisely because long-term care is not part of the Canada Health Act and health is a provincial jurisdiction in Canada, provincial political differences may play a considerable role in driving variation in publicly funded bed supply.

A second potential source of unexplained variation is provincial difference in the deployment of alternative

seniors' congregate housing. In some provinces, less regulated institutional services are offered as a middle ground between home-based and residential LTC. In British Columbia, for example, the province made significant efforts to expand publicly subsidized assisted living units in 2004 (McGrail et al., 2008); however, this was at the cost of reductions in publicly funded LTC beds (Cohen, Tate, & Baumbusch, 2009). Ontario's "retirement homes" and Alberta's "supportive living" facilities (Armstrong & Deber, 2006; Banerjee, 2009) are other examples of this housing for older adults, with "limited care". Although these forms of seniors' housing are meant for less disabled seniors, they often end up housing much frailer individuals (Cohen et al., 2005; Jansen, 2009). Provincial variation in the number and range of services offered in these models may therefore contribute to some of the provincial variation in publicly funded LTC bed supply. A study of the bed number and types of, in many cases, privately financed services in these facilities is beyond the scope of the current study, but would be an important future line of research to understand provincial differences in seniors' care.

A third potential source of publicly funded LTC bed supply variation, not measured by this study, is provincial variation in privately financed LTC beds. These data are difficult to obtain and are not routinely collected by current national data systems.

Table 3: Summary of factor association with LTC bed supply distributed by province

Province	# of People 85+ years old	Per Capita GDP	Per Capita Home Care Expenditure
British Columbia	↓	↓	↓
Alberta	↓	↓	↓
Manitoba	↑	↑	↑
Saskatchewan	↑	↑	↑
Ontario	↑	↓	↓
Quebec	↓	↓	↓
New Brunswick	↓	↓	↓
Newfoundland and Labrador	↓	↑	N/A
Nova Scotia	↑	↑	↑
Prince Edward Island	↑	↑	↑

Note: Data excludes Nunavut, the Northwest Territories, and the Yukon Territory.

N/A: Factor not measured for this province.

↑ denotes higher than average LTC bed supply based on line of best fit.

↓ denotes lower than average LTC bed supply based on line of best fit.

While the former Statistics Canada Residential Care Facilities survey collected data on private for-profit ownership, no clear distinction has been made between the ownership, financing, and delivery of services so that “private for-profit” facilities receiving public funding beds were grouped with facilities whose residents were paying out of pocket (Statistics Canada, 2012a).

We were unable to measure factors such as personal wealth, family structure, and informal care which may influence demand for LTC. Informal care in particular is largely unaccounted for but makes up a significant proportion of care for seniors. This includes a full range from basic help with housekeeping to personal and medical care with reports of caregivers providing as much as 70 hours of unpaid care a week (Dang, Badiye, & Kelkar, 2008; Gitlin, Hodgson, Jutkowitz, & Pizzi, 2010). The imputed cost of caregiving (i.e., the cost of care if a paid caregiver provided the care that an unpaid caregiver gives on an hour-for-hour substitution basis) estimates an economic cost of \$25 billion to \$26 billion in Canada (Hollander, Liu, & Chappell, 2009). A major predictor of LTC placement is availability and health of an informal caregiver (Tsuji, Walen, & Finucane, 1995). Studies on family structure have found that married older individuals or those with a daughter or sibling have a lower risk of LTC admission (Freedman, 1996).

Our study also found that publicly funded LTC bed supply does not seem to have impacted the percentage of ALC days spent awaiting admission to an LTC facility. This reduction in use of acute care hospital beds has been of high priority for most provincial health systems for some time (Canadian Institute for Health Information, 2009; 2010; Friedman & Kalant, 1998). Most of these patients are seniors waiting to be discharged

to a residential LTC facility (Canadian Institute for Health Information, 2009), and are too frail and disabled to return to independent living even with the current level of home-based supports. The “supply-sensitive” nature of residential long-term care means that senior patients often have long waits in acute care beds since they have nowhere else to be discharged to while waiting for access to residential long-term care (Sutherland, 2011). Therefore, one could speculate that provinces with a greater LTC bed supply would be expected to have fewer ALC days because of less “system backup”. Indeed two recent national reports both call on the federal government to build new LTC facilities and upgrade current ones as a strategy for reducing hospital ALC days (The Canadian Medical Association, 2013; Wait Time Alliance, 2013). The lack of an inverse association in our results suggests that increasing LTC bed supply by itself may not be a solution to reducing ALC days.

This argument that “more LTC beds are not necessarily better” is strengthened by the positive association between publicly funded LTC bed supply and ALC days when outlier provinces (Manitoba, New Brunswick) are removed. As one interpretation, this result could be spurious given that data are lacking for four Canadian provinces (i.e., Quebec and Nova Scotia without ALC data; Manitoba and New Brunswick as outliers). However, as a second explanation, Canadians’ use of our health care system may also simply be a reflection of the various interprovincial systems we have built. In other words, the greater the number of LTC beds in a given province, the greater the demand to fill these beds, resulting in more ALC days. Support for this argument has been offered by others in Canada (Canadian Institute for Health Information, 2010), who report that the number of people requesting

LTC beds increased when more of these beds were built.

It is important to note that our findings hold true when ALC days are expressed using different metrics (e.g., as a proportion of the total population and of the population aged 85 and older versus as a proportion of all hospital days), strengthening at least somewhat this latter argument. Finally, this result could also be due to additional unmeasured yet important policy levers. For example, provinces differ with respect to how much leeway they give publicly funded facilities to refuse difficult-to-manage residents (Mitka, 2011). Hospital payment models (Sutherland, Repin, & Crump, 2012), LTC facility funding models – facility reimbursement rates, case mix adjustment, prospective, and block funding mechanisms – (Arling & Daneman, 2002; Intrator et al., 2007; Intrator & Mor, 2004), and the time period for which beds are held when a resident is admitted to hospital (bed hold policies) (Intrator et al., 2007), have also all been shown to influence the flow of residents to and from hospital (Grabowski, Stewart, Broderick, & Coats, 2008), and thus may be related to the number of ALC days. Further study on provincial differences in these policies, and their impact on ALC days and publicly funded LTC bed supply is an important future line of research.

Finally, it is also noteworthy that there is no “right” supply of publicly funded LTC beds. Indeed, the ideal supply is likely related to many factors including provinces’ perceived need, and the presence or absence of other formal and informal options for supporting very frail seniors. Furthermore, our failure to demonstrate any cross-provincial ecology of publicly funded bed supply with our variables of interest in no way means that, within provinces, these factors are unrelated.

Limitations

Beyond those constraints already discussed, this study is subject to a number of additional limitations. The data for publicly funded beds were extracted from a Canadian Union of Public Employees (CUPE) report (Jansen, 2009) in which Ministry representatives were requested to identify licensed, government-funded residential LTC beds excluding private pay or assisted living beds. There is the possibility of reporting bias given that each province has its own reporting and classification system despite efforts to maintain a consistent definition. This challenge is mitigated somewhat, however, as members of our research team obtained counts of publicly funded LTC beds from selected provinces directly, which aligned closely with CUPE data. Similarly, the ALC measure is one that is

still relatively new and the consistency of how patients are identified as needing alternate level of care may differ between provinces. Additionally, we were unable to measure provincial differences in the number of individuals receiving home care or informal care. Informal care plays a significant role in the burden of meeting needs felt by residential LTC facilities, and jurisdictional differences in informal care may contribute to further explaining the variation in publicly funded LTC bed supply (Dang et al., 2008; Gitlin et al., 2010; Hutchinson, Hawes, & Williams, 2010).

We recognize that Canadian provinces differ broadly in geographic area, population density, and rural/urban differences. These factors, also beyond the scope of our study, are known to contribute to regional resource allocation differences (Berta, Laporte, Zarnett, Valdmanis, & Anderson, 2006; Fisher et al., 2003; Koller et al., 2010; Sibley & Weiner, 2011). Finally, we acknowledge the ecological nature of our study where we explored plausible, theoretical links between LTC bed supply and other factors. An analysis of individual-level data from different provinces is necessary to test our hypotheses more rigorously but was beyond the scope of this study. There are also potentially other system levers and other factors beyond the scope of this article that may explain this variation such as family structure and employment which need further exploration.

To the best of our knowledge, we are among the first to have explored present-day differences in publicly funded LTC bed supply and its relation to select key system-level factors. While there have been several peer-reviewed, region-specific research publications on LTC facilities (BC Ombudsperson, 2009; Bronskill et al., 2010; Canadian Health Services Research Foundation, 2010; Cohen et al., 2005; Doupe et al., 2011; Le Goff, 2002), few studies have taken a pan-Canadian approach (Berta et al., 2006; Chan & Kenny, 2001; Fernandes & Spencer, 2010; Hirdes, 2008), including one that examined variation in LTC bed supply (Berta et al., 2006). However, many of these previous studies are limited in their interpretation of results due to challenges with the data used, particularly with regard to LTC bed counts. To avoid this, our study selected variables from national datasets that were collected with sufficient rigour and were sufficiently inclusive so as to allow equitable comparisons across provinces.

Conclusion

There is a 40 per cent difference in publicly funded LTC bed supply per 1,000 seniors aged 85 and older across Canadian provinces. Our study found no significant “ecology” or interrelatedness of publicly funded

LTC bed supply, with provincial distributions of very old seniors, wealth, or investment in home care. Also, we found no relationship between the supply of publicly funded LTC beds and several metrics of ALC days adjusted for provincial-level differences in population size, suggesting that policy makers should adopt a cautious approach to building more LTC beds (or other downstream strategies) without better evidence on the key levers that influence patient flow and defining the relationship between a hospital's alternate level care and residential long-term care.

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