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Dying at Home: A Privilege for Those with Time and Money

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C'est un fait bien documenté que les gens préfèrent mourir à la maison, plutôt qu'à l'hôpital ou dans un autre établissement. Les économies dont profitent les gouvernements provinciaux dans ce cas sont elles aussi solidement documentées. Or, malgré ces objectifs concordants, de nombreuses personnes qui pourraient et préfèreraient mourir à la maison s'éteignent à l'hôpital. Dans cet article, nous examinons le lien qui existe entre le cout en temps et en argent et les résultats des décès à la maison, en nous servant des décès rapportés de 2007 à 2019 dans la Base canadienne de données sur l'état civil. Nous nous concentrons sur les décès liés au cancer, pour lesquels les gens, le plus souvent, ont le temps de choisir le lieu où il se produira.

Mots clés : lieu du décès, soins de fin de vie, conjoncture macroéconomique, actes de décès, décès par cancer

The preference for dying at home, as opposed to in a hospital or other facility, is well established. So too are the cost savings for provincial governments from home deaths. Despite these aligned objectives, many individuals who could and would prefer to die at home find themselves dying in a hospital. In this article, we examine how time and money costs are associated with the home death outcome using Canadian Vital Statistics death records from 2007 to 2019. The focus is on cancer-related deaths, for which patients often have the time to think about and plan the location of death.

Keywords: location of death, end-of-life care, macroeconomic conditions, death records, cancer deaths

Introduction

End-of-life (EOL) care is expensive for families and for governments. In Ontario, some $4.7 billion per year, or 10 percent of the province's health care expenditures, are devoted to EOL care; in the last year of life, the average public health care cost per decedent amounts to $53,661, with inpatient hospital services making up 43 percent of these costs (Tanuseputro et al. 2015).

Many articles point to the cost savings associated with moving EOL care out of acute care hospitals. For example, Isenberg et al. (2020) use linked administrative databases to examine older individuals who died between 2011 and 2015, comparing individuals who received EOL home care with those who did not. A careful propensity score matching process constructed a comparison group. Home care costs were higher for the EOL home care group, as were hospital emergency room costs; however, acute care hospital costs were lower for the group receiving EOL home care. Overall, EOL home care was cheaper largely because it facilitated dying at home rather than in a hospital.

Moving care out of hospitals is not only optimal for governments but would align with the well-established preferences of most people for dying at home. Gomes et al. (2013), in a systematic review of 210 studies, conclude that most people prefer a home death; the systematic review in Costa et al. (2016) and other more recent articles corroborate this conclusion (e.g., Isenberg et al. 2020; Schou-Andersen et al. 2015). Of course, home is not always the preferred location, especially when pain management is a concern (e.g., Johnston 2015), and it may in fact not be an inherently a good outcome if the needs of either the decedent or the caregivers are not sufficiently met.

Despite these aligned objectives, many individuals who could and would prefer to die at home find themselves dying in a hospital. To die at home, help is almost always needed. Provincially funded home care is limited and varies considerably with location, with families providing most of the unpaid care, often while engaged in paid work. In addition to the time costs of providing a loved one home care, there can be significant

out-of-pocket costs, including those associated with private assisted living arrangements, private home support services, and drugs and devices not covered by government programs.[1]

The report of the Commission on the Future of Health Care in Canada (2002), known as the Romanow Report, called for more support of caregivers and for alternative arrangements for Canadians near the EOL. In response, the federal government entered into agreements with the provinces to provide enhanced EOL home care. In 2004, it also created the Compassionate Care Benefit (CCB) policy to help support family members caring for a gravely ill family member by partially compensating them for their time off work. Ten years after the Romanow Report, the Canadian Hospice Palliative Care Association (CHPCA; 2012) reiterated the shortage of EOL care, with particular attention to geographic disparities in this regard. Now, 20 years later, the lack of EOL care arrangements is still being talked about (e.g., Quinn, Isenberg, and Downar 2021), and most Canadians continue to pass away in hospitals.

This article contributes to the limited literature that empirically examines the determinants of location of death in Canada. It is the first to examine the role played by time and money costs in influencing the home death outcome. We focus on the most common cause of death in Canada, cancer, which usually allows patients the time to think about and plan the location of death. Canadian Vital Statistics death records from 2007 to 2019 not only provide the needed demographic information on the population of all decedents in Canada but also report the date, cause, and, more important, the location of death.

We find compelling evidence that time and money costs matter. Consistent with young and married decedents being more likely to have available caregivers and thus lower time costs, these groups are more likely to die at home. We proxy for money costs using decedents' neighbourhood income quintiles. We find a very clear income gradient: decedents from the highest quintile neighbourhoods are significantly more likely to pass away at home than those in the lowest quintile neighbourhoods. We explore the relationship between home death and economic conditions. When economic conditions worsen, the opportunity cost of time falls: time becomes relatively cheaper, and money becomes relatively expensive. We find a robustly negative relationship between the unemployment rate and home death. Our estimates suggest that in a recession the probability of home death would fall by 6 percent. From this, we draw two conclusions: first, that time and money inputs are not easily substitutable—the same quantity of home deaths is not achievable by substituting the relatively cheaper input (here, time) when relative prices change—and second, that money inputs are crucial in the production of home deaths and present a real barrier for some families.

We contribute to the paucity of work on the impact of economic factors on the decision of where to die. The aging population along with the attendant reduction in available (family) caregivers exacerbate the home death challenge and render this topic of particular importance. On the face of it, the solution seems almost trivial: take the savings from reduced acute care use, and apply it to the costs of home care for dying patients. We discuss the challenges associated with implementing this solution.

Location of Death: Literature on Determinants and Correlates

There is a very large literature on palliative and EOL care, mostly by health care professionals and health researchers (indeed, the list of academic journals devoted to this subject is long and includes the *Journal of Palliative Medicine, Journal of Palliative Care, Journal of Hospice and Palliative Nursing*, and *BMJ Supportive and Palliative Care*). A much smaller but still significant number of articles discuss the location of death, usually comparing acute care hospitals with other arrangements (e.g., the reviews in Gomes et al. 2013; Gomes and Higginson 2006). Overall, economists have not featured much in either area. The discussion on location of death centres almost exclusively on the availability of options—the dearth of hospice, non–acute care institutional environments—and how that exacerbates the use of acute care hospitals. Aside from the almost universal acknowledgement that the supply of alternative options is an issue, few researchers mention the economic factors influencing the location-of-death decision.

A much smaller body of work uses data and statistical techniques to discern the factors influencing where to die. Wilson et al. (2001) is one of the first Canadian studies to use vital statistics to focus on hospital versus non-hospital deaths. They use a painstakingly curated data set that includes age, sex, marital status, whether the decedent was born in Canada, and cause of death. Simple statistical comparisons of the characteristics of those who died in a hospital versus a non-hospital highlight some trends. By and large, dying in a hospital was increasingly the norm from 1950 to 1994, with some drop-off over the last three years of study (1995–1997). Wilson et al. (2009) continue this work for the 1994–2004 period and find that, although still the norm, the percentage of hospital deaths declined from 77.7 percent in 1994 to 60.6 percent in 2004.

Several international studies focus on place of death; none include economic variables, although education level did feature in a few of them. Cohen et al. (2006) incorporated education level into their analysis of location of deaths in Flanders, Belgium, and found that the probability of a home death depended on the region of residence and whether it was urban or rural, the availability of hospital beds, and level of education, with the likelihood of a home death falling for those with lower education. A cross-country study of the location of cancer deaths in six

European countries by Cohen et al. (2010) found differences in the impact of cultural, social, and health care factors influencing this decision. In the three countries with information on educational attainment (Belgium, Italy, and Norway), higher education was associated with an increased likelihood of a home death. Houttekier et al. (2011) also use the Belgium data set and highlight education as a factor shifting deaths from hospitals to care homes.

Kalseth and Theisen (2017) study place of deaths in Norway from 1987 to 2011, linking age, sex, and cause of death to the likelihood of dying at home, in a hospital or nursing home, or other care arrangement. They found an increased likelihood of dying in a nursing home rather than in a hospital or home setting. Changes in the cause of death, from circulatory diseases to cancers and mental health (dementia), coupled with an aging population, contribute to this shift. Cross and Warraich (2019) provide a statistical analysis of place of death in the United States. As in the Norwegian study, they too found that the proportion of deaths in hospitals has fallen (from 2003 to 2017), but unlike that study, Americans were also less likely to die in a nursing home over time, with the increase in place of death occurring for homes (from 23.8 percent to 30.7 percent) and hospices (from 0.2 percent to 8.3 percent). Older patients, male patients, and White patients were more likely to die at home (compared with younger, female, and racialized patients). Health conditions also affected place of death.

Canadian studies reinforce the importance of demographics and geography when it comes to place of death. Jayaraman and Joseph (2013) use data on deaths in British Columbia between 2004 and 2008 to examine the association between sex, marital status, rural or urban, and country of birth (China vs. Canada) and location of death. Another study focuses on the determinants of place of death for patients receiving palliative home care in Toronto from 2005 to 2015 (Sun et al. 2020). The likelihood of dying at home among this group was higher over the period 2006–2015 relative to 2005. The predictors of a home death were caregiver age, sex, spousal relationship, retirement status, number of support hours, and nursing hours. As in Jayaraman and Joseph (2013), those with a partner were more likely to die at home relative to single people, and women were more likely to die at home than men. Sun et al. (2020) note that earlier referrals for home care were not associated with more home deaths. Burge et al. (2015) analyze the importance of chronic diseases and environmental factors in home deaths in Nova Scotia, highlighting the crucial role played by home visits by health care professionals. The pivotal role played by physician home visits in influencing home deaths is further addressed by Tanuseputro et al. (2018).

Aside from education level, we found no empirical studies that incorporate economic factors directly into the location-of-death decision. Burge et al. (2005) focus on the determinants of physician home care visits for EOL cancer patients in Nova Scotia from 1992 to 1997 and include the median household income by enumeration area (neighbourhood) in their analysis, as well as sex, age, region of residency, and type of cancer. Neighbourhood income quintile predicted physician home visits when the patient lived outside of the most populous Halifax region, suggesting that household (neighbourhood) economic factors affected the quality (availability) of home care (and, presumably then, the likelihood of a home death, as found, for instance, in McEwen et al. 2018).

Data

The main source of data for this article is the Canadian Vital Statistics Death Database (CVSD), which contains administrative death records. The data capture all deaths occurring in Canada going back to 1974.[2] Each record contains basic demographic information about each decedent (e.g., sex, age, marital status, residential postal code, neighbourhood income quintile) as well as the date, location, and cause of death. The second data source used in our analysis is the province–year unemployment rates obtained from Statistics Canada (Table 12-10-0327-01).

Because death records are first captured by the provinces and territories before being sent to Statistics Canada, the information collected is not always comparable across regions or over time. Location of death, the main outcome variable in this study, is categorized in the CVSD as having occurred in (a) a hospital, (b) a private home, (c) another health care facility, (d) another specified locality, or (e) an unknown locality.[3] Unfortunately, the categorization for hospital and home death is not consistent across provinces and years. In Quebec, deaths occurring in residential and long-term-care centers are categorized together with hospital deaths; home deaths in that province were inconsistently reported before 2013. In 2006, Manitoba began coding deaths in other health care facilities as deaths in hospitals. Then in August 2018, it began categorizing deaths occurring in personal care homes as having occurred in other health care facilities instead of in hospitals. The category of hospital deaths in Quebec and Manitoba captures different things over time and is not comparable with hospital deaths recorded in other provinces. As of 2014, Saskatchewan stopped recording deaths in private homes. Our analysis excludes deaths from Quebec, Manitoba, and Saskatchewan.

Other changes in the definition of location of death occurred within provinces over time. British Columbia had problems with the location-of-death variable for 2005 and 2006 (all deaths are listed as having occurred in an unknown locality), and Ontario adopted a new coding system for location of death in 2004. In the transition year, as compared with other years, a disproportionate number of deaths were coded as having occurred in an unknown locality. We thus use the period 2007–2019, the most recent years of consistently comparable data.

We apply several sample restrictions. We exclude decedents with unspecified age or sex, as well as records missing a valid postal code. Decedents whose usual place of residence is not Canada are automatically excluded because they have no Canadian postal code in the CVSD. We exclude decedents from the three territories, because unemployment rate data are unavailable for these regions. Finally, because deaths of Canadians occurring outside of Canada are as of 2010 no longer reported in the CVSD, for comparability we exclude Canadian decedents who died outside of Canada before 2010.

Table 1 summarizes the data for three samples, the full sample of decedents (N = 2,252,875), the sample of decedents whose official cause of death is reported as cancer (n = 659,130), and those who died of all causes other than cancer (n = 1,593,745). Most deaths in Canada occur in hospital, representing 56 percent of all deaths and 61 percent of cancer deaths. Home deaths are significantly less common, only 17 percent to 18 percent of deaths in

Table 1: Summary Statistics

Variable	Full Sample	Cancer	Non-Cancer
Home death	0.175	0.180	0.172
	(0.380)	(0.384)	(0.378)
Hospital death	0.556	0.609	0.533
	(0.497)	(0.488)	(0.499)
Cancer	0.293		
	(0.455)		
Cardiovascular disease	0.279		0.394
	(0.448)		(0.489)
Respiratory	0.088		0.124
	(0.283)		(0.330)
Other cause of death	0.341		0.482
	(0.474)		(0.500)
Female	0.490	0.472	0.497
	(0.500)	(0.499)	(0.500)
Marital status			
Single	0.120	0.087	0.134
	(0.325)	(0.281)	(0.341)
Married	0.404	0.528	0.353
	(0.491)	(0.499)	(0.478)
Widowed	0.357	0.255	0.400
	(0.479)	(0.436)	(0.490)
Divorced	0.086	0.092	0.084
	(0.280)	(0.289)	(0.277)
Separated	0.006	0.006	0.006
	(0.075)	(0.075)	(0.075)
Unknown marital status	0.027	0.033	0.024
	(0.161)	(0.178)	(0.153)
Income quintile			
1	0.242	0.220	0.251
	(0.428)	(0.414)	(0.434)
2	0.211	0.211	0.211
	(0.408)	(0.408)	(0.408)
3	0.192	0.195	0.190
	(0.394)	(0.396)	(0.392)
4	0.179	0.187	0.176
	(0.384)	(0.390)	(0.381)
5	0.165	0.176	0.160
	(0.371)	(0.381)	(0.367)
Missing income quintile	0.012	0.011	0.012
	(0.108)	(0.103)	(0.110)
Age, y			
0–64	0.213	0.257	0.195
	(0.409)	(0.437)	(0.396)
65–74	0.170	0.256	0.134
	(0.376)	(0.437)	(0.341)
≥ 75	0.617	0.486	0.671
	(0.486)	(0.500)	(0.470)
Urbanicity			
Rural	0.175	0.183	0.171
	(0.380)	(0.387)	(0.377)
Urban	0.825	0.817	0.829
	(0.380)	(0.387)	(0.377)
Province			
Newfoundland	0.028	0.028	0.028
	(0.164)	(0.166)	(0.164)
Prince Edward Island	0.007	0.007	0.007
	(0.085)	(0.084)	(0.085)
Nova Scotia	0.051	0.053	0.050
	(0.220)	(0.223)	(0.219)
New Brunswick	0.039	0.039	0.040
	(0.195)	(0.194)	(0.195)
Ontario	0.546	0.555	0.542
	(0.498)	(0.497)	(0.498)
Alberta	0.131	0.123	0.134
	(0.337)	(0.328)	(0.341)
British Columbia	0.197	0.195	0.199
	(0.398)	(0.396)	(0.399)
No. of observations	2,252,875	659,130	1,593,745

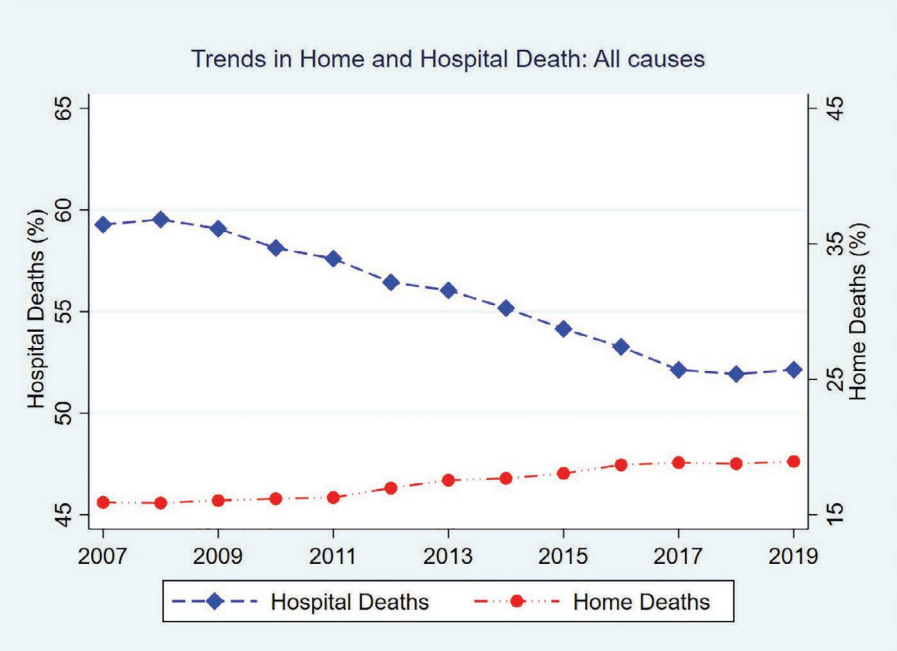
Notes: The data are unweighted and rounded to the nearest 5. Standard deviations are in parentheses.

Source: Authors' tabulations based on the Canadian Vital Statistics death records.

all samples. Cancer is the leading cause of death (29 percent), just ahead of cardiovascular disease (28 percent). Decedents from cancer are more likely to be married (53 percent vs. 35 percent) and younger (26 percent of cancer decedents are aged younger than 64 years, compared with 20 percent of non-cancer decedents; 49 percent of cancer decedents are aged older than 75 years, compared with 67 percent of all decedents). The income distribution of cancer decedents is slightly skewed toward higher income: 22 percent of cancer decedents lived in the lowest income quintile neighborhoods versus 25 percent of non-cancer decedents, and 18 percent of cancer decedents lived in the highest income quintile neighborhoods versus 16 percent of all decedents.

A series of figures helps to illustrate some key trends in the data. Figures 1a and 1b present the trends in home and

(a)



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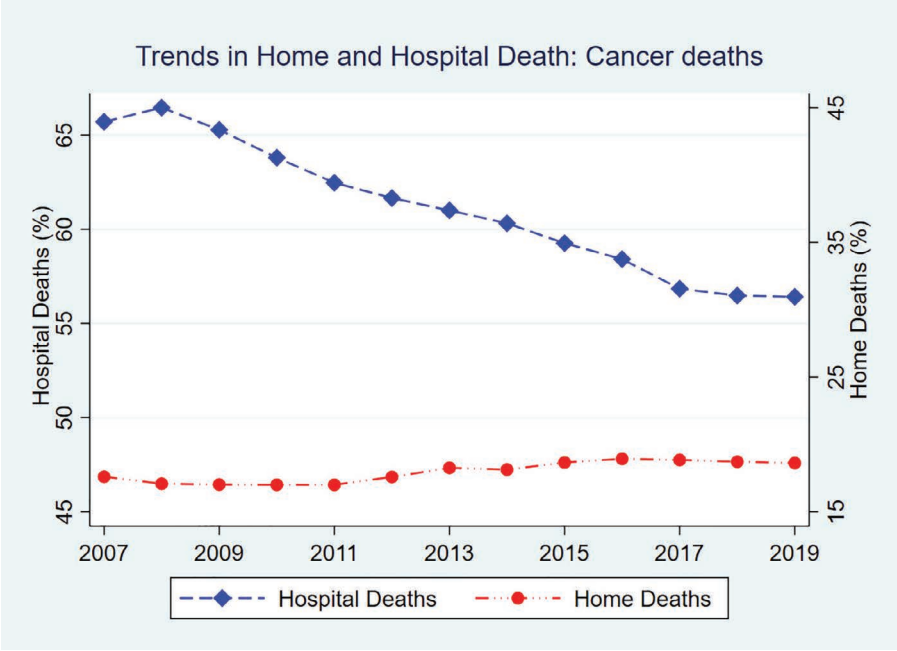


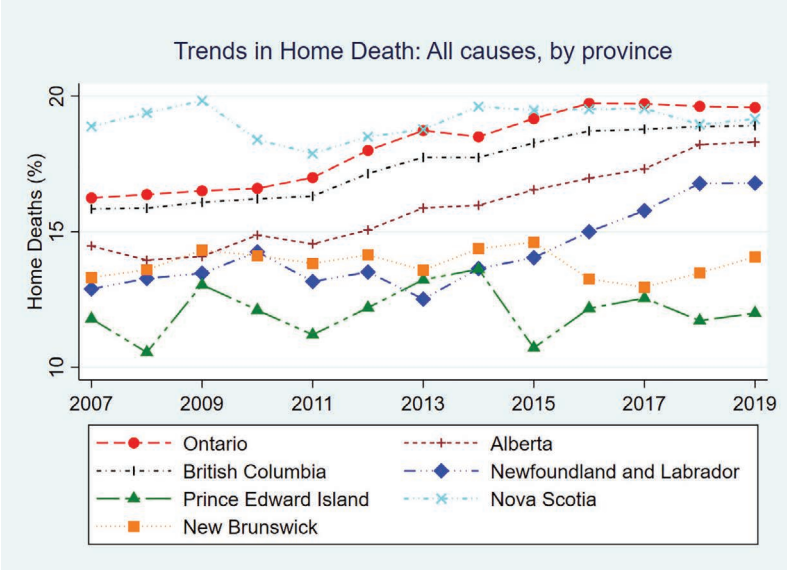
Figure 1: Trends in Home and Hospital Death: (a) All Causes and (b) Cancer
Source: Authors' tabulations using Canadian Vital Statistics death records.

hospital death for the full sample of deaths and the cancer sub-sample. A clear decreasing trend in hospital deaths appears over most of the sample period, continuing the trend documented in Wilson et al. (2009). In 2007, almost 60 percent of deaths occurred in a hospital. Through 2017, hospital deaths continued to decrease, but the last three years of our sample displays a levelling off of this trend, in contrast to the pattern documented in earlier studies. The decrease in hospital deaths occurred alongside an increase in home deaths, which similarly levelled off in 2017. Although not the focus of this article, this end to a decades-long decrease in the proportion of deaths in hospital is a curious observation that warrants further study.

Very similar patterns are present for the cancer sub-sample, as shown in Figure 1b, with a clear downward trend in hospital deaths that levels off in the last few years. The decrease in hospital deaths is not driven to the same extent by an increase in home deaths in the cancer sample. Home deaths increased ever so slightly, from 18 percent in 2007 to a fairly consistent 19 percent over the last five years of our sample.

These trends mask significant variation across provinces. In Figure 2, we plot trends over the sample period in home death for (a) all decedents and (b) cancer decedents, by province. Home deaths generally increase in most provinces over time for all decedents but are quite stable over time when only cancer decedents are considered.

(a)



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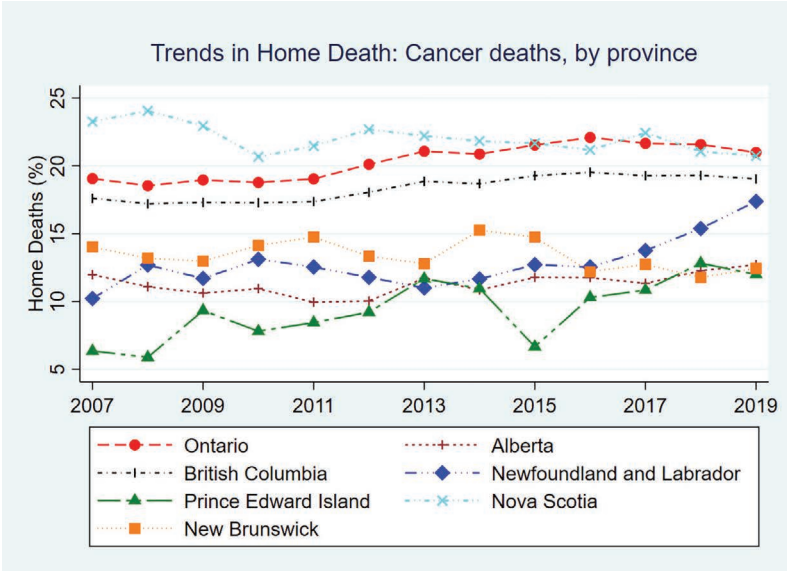

Figure 2: Trends in Home Death by Province: (a) All Deaths and (b) Cancer Deaths
Source: Authors' tabulations using Canadian Vital Statistics death records.

Significant differences across provinces are found—home deaths are more likely in Nova Scotia, Ontario, and British Columbia and are least likely in the smaller East Coast provinces of Prince Edward Island, Newfoundland and Labrador, and New Brunswick. There is an approximately 7 percentage point difference in the proportion of home deaths in the provinces with the most (Nova Scotia) and least (Prince Edward Island) home deaths for the full sample of decedents, and a 9 percentage point difference in these provinces for cancer decedents in 2019, the most recent year of our sample, representing differences of 39 percent and 50 percent, respectively. These differences are statistically significant at the 1 percent level, both on average and for each year in our sample.

Home deaths by cause of death are plotted in Figure 3. The increasing trend in home deaths described earlier is clearly driven by increases in home deaths for non-cancer reasons. In all years, home deaths are highest for deaths due to cardiovascular causes and lowest for deaths due to respiratory causes. Although partly due to the sudden nature of many cardiovascular events, this group still displays a significant increase over the period, from 18 percent in 2007 to 23 percent in 2019. Respiratory death is least likely to occur at home, likely because of the need for breathing equipment that is more readily available at a hospital. This group also shows a marked increase in home deaths, from 9 percent in 2007 to 15 percent in 2019.

In the remainder of this article, we focus on home deaths and the cancer sub-sample. Given disease trajectories, decedents from cancer are likely to have had more time for EOL planning than decedents from non-malignant disease.

Methods

We use a two-pronged approach to investigate how time and money affect home deaths, starting with a graphical depiction of the data parsed in revealing ways and followed by a regression-based analysis. The CVSD provides three variables that we use to proxy for the time input: sex, age, and marital status. Because caregivers are disproportionately female (Schrank et al. 2016), male decedents are more likely to have a caregiver. The ability to care for others decreases in old age, so younger decedents are more likely to have able caregivers. Finally, the presence of a spouse of any age or sex increases the likelihood of a caregiver. An ideal measure of the time input would not just pick up the availability of a caregiver but also proxy for the opportunity cost of their time: the earnings, human capital accumulation, investments in health, or other activities that are forgone to care for their dying family member. Although the proxies used here arguably capture the availability of caregivers, we maintain that they also pick up some components of the opportunity cost of their time. For example, being married lowers the time cost of helping because travel costs are zero if the caregiver and care recipient share the same address. To the extent that women are less attached to the labour force, and on average earn less, their opportunity cost of time is lower. Money costs are proxied using the income quintile of the decedent's neighbourhood. We then plot and compare

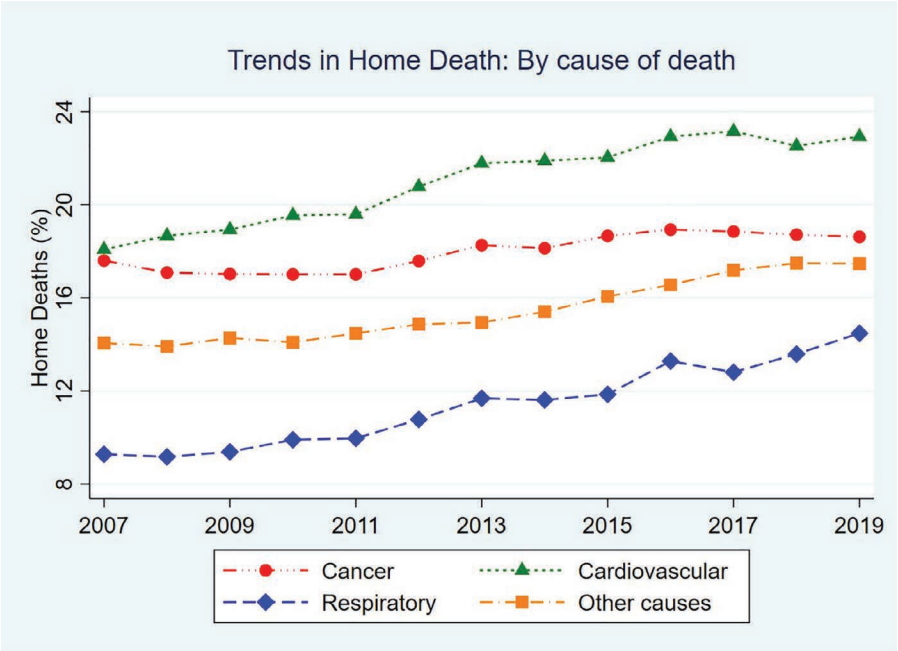

Figure 3: Trends in Home Death by Cause of Death

Source: Authors' tabulations using the Canadian Vital Statistics death records.

home deaths over time for decedents selected on these characteristics.

After the graphical analysis, regressions are used to further examine the relationship between economic conditions and home death. Fluctuations in economic conditions affect the relative costs of time and money inputs, the key factors explored in this article. We are motivated by the literature on how health behaviours change over the business cycle. A number of articles examine whether changes in the opportunity cost of time affect lifestyles choices, in particular activities that are time intensive but health enhancing. Recessionary periods have been found to be associated with decreased heavy alcohol consumption (Ruhm 1995), smoking, and physical inactivity (Ruhm 2005) and increased sleep (Brochu, Deri Armstrong, and Morin 2012).[4] We postulate that home death is "produced" using inputs of time and money and seek to better understand the relative importance, and substitutability, of these inputs.

Consider a worsening of economic conditions. As the unemployment rate rises, the opportunity cost of time decreases: time inputs become relatively cheaper and money inputs relatively more expensive. Three possible scenarios ensue: home deaths decrease, remain unchanged, or increase. If we observe a decrease in home deaths, this means that when economic conditions worsen (time is relatively cheap, and money inputs are relatively more expensive), individuals are less able to provide the resources required for a home death. This result would suggest that money inputs are significant in the production of home deaths and that time and money inputs not are easily substitutable. If we observe no change in home deaths, we would conclude that variations in the relative cost of these inputs do not measurably affect the ability of families to produce a home death for a loved one. This would be the case if either (a) neither input is a significant determinant of a home death or (b) the inputs are easily substitutable, that is, home death could be produced using a different combination of time and money inputs. Finally, an increase in home deaths would mean that the additional home deaths found in periods of higher unemployment are produced using more of the cheaper inputs, time. This would highlight the importance of time inputs for caregivers (friends and family) helping to support a home death. It would further point to the need for policy to provide the right conditions (time) for caregivers.

There is another pathway through which economic conditions could affect home death. Stevens et al. (2015) find that staffing in health care occupations in general, and nursing homes in particular, move counter-cyclically in the United States. When the economy thrives, staffing shortages in health care occupations become more severe. To the extent that this relationship also holds in Canada, we would expect fewer home deaths in times with relatively higher unemployment rates because more patients could be accommodated in health care facilities. We use sub-sample analysis to assess the importance of this particular channel.

We exploit exogenous variations in provincial unemployment rates over time to assess their importance in predicting home deaths using the following reduced form relationship:[5]

$$Home\ Death_{ipt} = \beta_0 + \beta_1 UR_{pt} + \beta_2 X_{ipt} + \pi_t + \gamma_p + \varepsilon_{ipt}, \qquad (1)$$

where the dependent variable is a dichotomous indicator of death occurring at home. Subscripts i, p, and t refer to the individual, province, and year, respectively. UR is the unemployment rate, and X is a vector of individual characteristics, including sex, marital status, income quintile, age group, and an indicator for rural locality to help pick up the impact of location-of-death options. π is a set of year dummies, and γ is the set of province dummies. The analysis is carried out for the full sample of cancer decedents, and then, to assess the robustness of the effect, the analysis is repeated for a variety of sub-samples. β_1 is our parameter of interest. Its estimates will allow us to speak to the importance and substitutability of time and money inputs in the production of home death.

Results

Figures 4–6 illustrate how home death (from cancer) is related to the three proxies for time inputs: sex, marital status, and age. Recall the prediction that all else equal, we expect male, married, and younger decedents to have a higher likelihood of a home death because these decedents are more likely to have able and available caregivers. Figure 4 displays a higher percentage of home deaths for male decedents relative to female decedents over our sample: men are approximately 1 percentage point (5.6 percent) more likely to die at home than women. This difference is quite small compared with the difference found in Figure 5, which compares home deaths of married and non-married (single, divorced, and separated) decedents. Married decedents are approximately 6 percentage points (33 percent) and 4 percentage points (22 percent) more likely to die at home in the early and later years of our sample, respectively. In Figure 6, the sample is separated by age group: decedents aged younger than 64 years, aged 65–75 years, and aged older than 75 years. A clear gradient is evident, whereby the youngest decedents are the most likely to die at home. Whereas the proportion of home deaths is fairly steady at around 20 percent over the sample for the youngest group, there is a clear increasing trend in home death for the oldest decedents. For them, home deaths increase by 3 percentage points (from 15 percent to 18 percent) over the sample period. The differences between groups (men vs. women, married vs. not married, and aged younger than vs. older than 64 years) are statistically significant at the 1 percent level both on average and for each year in the sample.

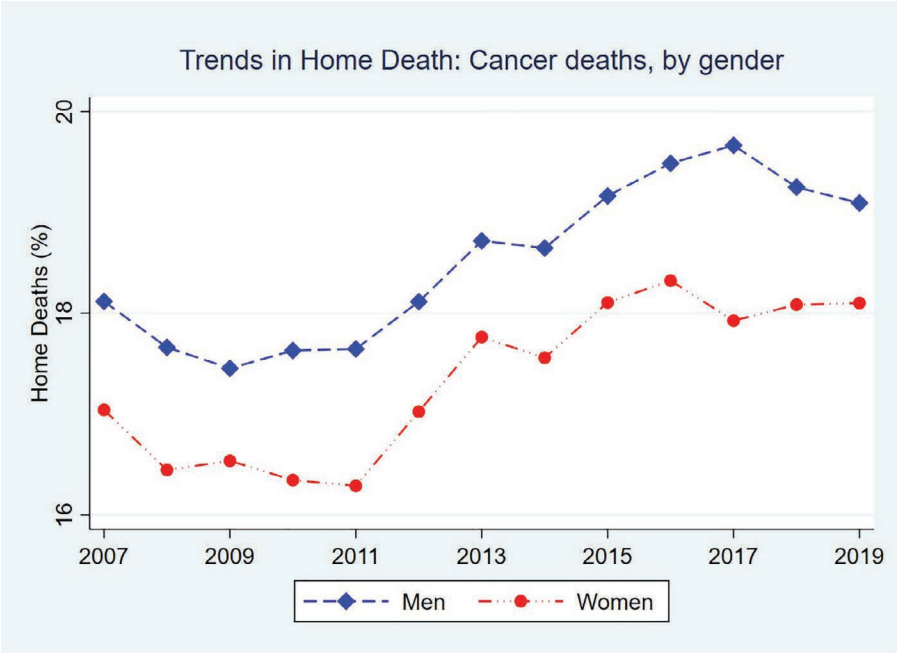

Figure 4: Trends in Home Death: Cancer Deaths by Sex
Source: Authors' tabulations using Canadian Vital Statistics death records.

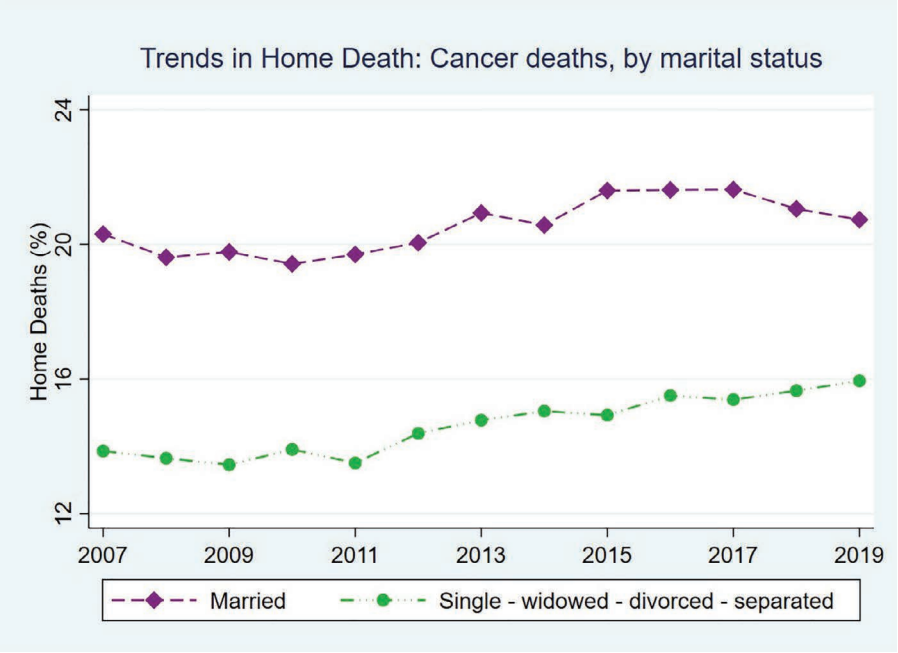

Figure 5: Trends in Home Death: Cancer Deaths by Marital Status
Source: Authors' tabulations using Canadian Vital Statistics death records.

The trends in home death by income quintile, our proxy for money input, are plotted in Figure 7. Again, a very clear gradient emerges. Decedents who lived in the lowest income neighbourhoods are the least likely to die at home; decedents who lived in the highest income neighborhoods are the most likely, with a fairly robust 6 percentage point difference between these groups over time. There appears to be little change in home deaths over time in these extreme groups, but in the middle three groups, some movement is observed.

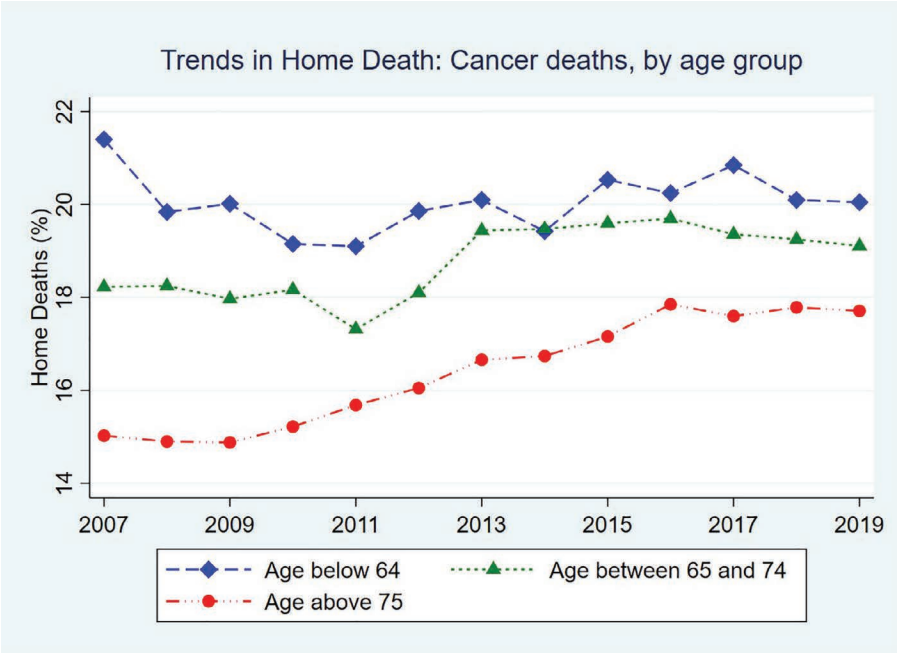

Figure 6: Trends in Home Death: Cancer Deaths by Age Group
Source: Authors' tabulations using Canadian Vital Statistics death records.

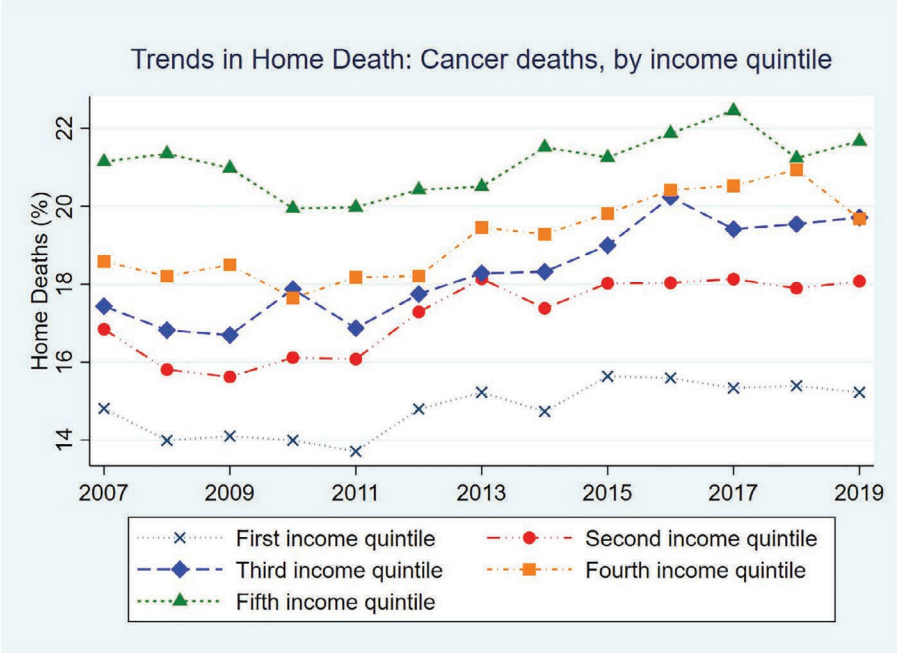

Figure 7: Trends in Home Death: Cancer Deaths by Income Quintile
Source: Authors' tabulations using Canadian Vital Statistics death records.

The preceding three graphs reveal that both time and money inputs seem meaningfully related to home deaths. Regression analyses allow us to control for several factors at once to see whether these relationships continue to hold. Tables 2–4 report the regression results for the relationship between economic conditions and home death. The first column of data in Table 2 presents the estimated coefficients from an ordinary least squares (OLS) regression using the full (cancer death) sample; this is followed by the estimated marginal probabilities from a Probit model

Table 2: Economic Conditions and Home Death: Main Results

			Income Quintile				
Regressor	OLS	Probit	1	2	3	4	5
Unemployment rate	−0.002***	−0.002**	0.001	−0.005***	−0.005***	−0.004***	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Female	0.000	0.000	−0.004**	0.000	0.002	−0.001	0.004*
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Marital status							
Single, widowed, divorced, separated	−0.050***	−0.051***	−0.047***	−0.048***	−0.049***	−0.050***	−0.056***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Unknown	−0.005*	−0.006**	−0.010*	−0.004	0.004	0.006	−0.019**
	(0.003)	(0.003)	(0.005)	(0.006)	(0.007)	(0.007)	(0.008)
Income quintile							
1	−0.028***	−0.029***					
	(0.001)	(0.002)					
2	−0.009***	−0.009***					
	(0.001)	(0.002)					
4	0.007***	0.007***					
	(0.002)	(0.002)					
5	0.025***	0.025***					
	(0.002)	(0.002)					
Unknown	0.010**	0.010*					
	(0.005)	(0.006)					
Age, y							
65–74	−0.014***	−0.014***	−0.012***	−0.015***	−0.010***	−0.015***	−0.022***
	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
≥ 75	−0.029***	−0.029***	−0.029***	−0.029***	−0.029***	−0.032***	−0.028***
	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Urbanicity							
Rural	0.021***	0.020***	0.038***	0.022***	0.021***	0.017***	0.001
	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	0.249***		0.191***	0.259***	0.279***	0.270***	0.262***
	(0.006)		(0.011)	(0.011)	(0.012)	(0.013)	(0.014)
No. of observations	659,130	659,130	145,030	138,810	128,635	123,340	116,245

Notes: The dependent variable in all regressions is the dichotomous outcome, home death. Regressions are all OLS unless otherwise reported. Probit regression reports marginal probabilities. All regressions are unweighted. Standard errors are in parentheses. Province and year dummies are included but not reported. The number of observations is rounded to the nearest 5. OLS = ordinary least squares.

* $p = 0.1$; ** $p = 0.05$; *** $p = 0.01$.

Source: Authors' tabulations based on the Canadian Vital Statistics death records.

Table 3: Economic Conditions and Home Death: Age and Sex Sub-Samples

		Age, y			Sex	
Regressor	OLS	< 64	65–74	≥ 75	Female	Male
Unemployment rate	−0.002***	−0.001	−0.001	−0.003***	−0.002*	−0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female	0.000	−0.017***	−0.004*	0.011***		
	(0.001)	(0.002)	(0.002)	(0.001)		
Marital status						

(*Continued*)

Table 3: (Continued)

Regressor	OLS	Age, y			Sex	
		< 64	65–74	≥ 75	Female	Male
Single, widowed, divorced, separated	−0.050***	−0.062***	−0.056***	−0.046***	−0.041***	−0.063***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Unknown	−0.005*	−0.014***	−0.004	0.001	−0.010**	−0.004
	(0.003)	(0.004)	(0.005)	(0.006)	(0.005)	(0.004)
Income quintile						
1	−0.028***	−0.026***	−0.028***	−0.029***	−0.033***	−0.024***
	(0.001)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
2	−0.009***	−0.007**	−0.012***	−0.009***	−0.011***	−0.008***
	(0.001)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
4	0.007***	0.009***	0.004	0.007***	0.006**	0.008***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
5	0.025***	0.027***	0.015***	0.028***	0.026***	0.024***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Unknown	0.010**	0.012	0.000	0.013**	0.018***	0.003
	(0.005)	(0.009)	(0.009)	(0.007)	(0.007)	(0.006)
Age, y						
65–74	−0.014***				−0.009***	−0.022***
	(0.001)				(0.002)	(0.002)
≥ 75	−0.029***				−0.017***	−0.044***
	(0.001)				(0.002)	(0.002)
Rural	0.021***	0.030***	0.021***	0.016***	0.016***	0.026***
	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.249***	0.253***	0.238***	0.216***	0.233***	0.265***
	(0.006)	(0.011)	(0.011)	(0.008)	(0.008)	(0.008)
No. of observations	659,130	169,555	168,965	320,610	310,805	348,325

Notes: The dependent variable in all regressions is the dichotomous outcome, home death. Regressions are all OLS unless otherwise reported. Standard errors are in parentheses. Province and year dummies are included but not reported. The number of observations is rounded to the nearest 5. OLS = ordinary least squares.

* $p = 0.1$; ** $p = 0.05$; *** $p = 0.01$.

Source: Authors' tabulations based on the Canadian Vital Statistics death records.

Table 4: Economic Conditions and Home Death: Marital Status and Urbanicity Sub-Samples

Regressors	OLS	Marital Status		Urbanicity	
		Married	Not Married	Rural	Urban
Unemployment rate	−0.002***	−0.002***	−0.002**	−0.003***	−0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female	0.000	−0.012***	0.014***	−0.007***	0.002**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Marital status					
Single, widowed, divorced, separated	−0.050***			−0.056***	−0.049***
	(0.001)			(0.002)	(0.001)
Unknown	−0.005*			−0.016**	−0.003
	(0.003)			(0.006)	(0.003)

(*Continued*)

Table 4: (Continued)

Regressors	OLS	Marital Status		Urbanicity	
		Married	Not Married	Rural	Urban
Income quintile					
1	−0.028***	−0.027***	−0.028***	−0.012***	−0.032***
	(0.001)	(0.002)	(0.002)	(0.004)	(0.002)
2	−0.009***	−0.009***	−0.009***	−0.007**	−0.010***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
4	0.007***	0.008***	0.006**	0.003	0.008***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)
5	0.025***	0.028***	0.021***	0.003	0.029***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)
Unknown	0.010**	0.021***	−0.001	0.019*	0.006
	(0.005)	(0.007)	(0.006)	(0.011)	(0.005)
Age, y					
65–74	−0.014***	−0.019***	−0.011***	−0.024***	−0.012***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
≥ 75	−0.029***	−0.042***	−0.019***	−0.041***	−0.026***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.001)
Rural	0.021***	0.026***	0.014***		
	(0.001)	(0.002)	(0.002)		
Constant	0.249***	0.261***	0.182***	0.301***	0.241***
	(0.006)	(0.008)	(0.008)	(0.012)	(0.006)
No. of observations	659,130	348,085	289,510	120,800	512,485

Notes: The dependent variable in all regressions is the dichotomous outcome, home death. Regressions are all OLS unless otherwise reported. Standard errors are in parentheses. Province and year dummies are included but not reported. The number of observations is rounded to the nearest 5. OLS = ordinary least squares.

* $p = 0.1$; ** $p = 0.05$; *** $p = 0.01$.

Source: Authors' tabulations based on the Canadian Vital Statistics death records.

on the same sample. The remaining columns present OLS estimates from the sample parsed by income quintile. Tables 3 and 4 present estimates parsed by age group and sex and by marital status and urbanicity, respectively.

We begin with a discussion of some key covariates. The link between income quintile and likelihood of home death is remarkably monotonic and consistent across the various cuts of the data: as income increases, so too does the likelihood of home death. This once again reinforces the importance of money inputs in the production of home death. Using estimates from the full sample of decedents, those in the lowest income quintiles are 2.8 percentage points (16 percent) less likely to die at home relative to those in the omitted third income quintile; decedents in the highest income quintile are 2.5 percentage points (14 percent) more likely to die at home. The one case in which this result does not hold is for the sub-sample of rural decedents (Table 4, Column 4). In this case, although being in the lowest income quintile is associated with a 1.2 percentage point lower likelihood of a home death than those in the third income quintile, decedents in the highest (fourth and fifth) income quintiles are not more likely to have a home death, although the point estimates are positive.

The results for being non-married are also consistently negative and significant across all specifications. The estimated coefficient for single, widowed, divorced, and separated of −0.050 implies that, relative to married decedents, a non-married decedent is 5 percentage points (28 percent) less likely to have a home death. This is similar to the difference in home deaths by marital status that we noted in Figure 5. Similarly, the age effects are consistent across specifications: relative to the youngest decedents, those in the middle- and high-income groups are 1.4 percentage points and 2.9 percentage points, respectively, less likely to die at home. The availability of able caregivers is, therefore, a very strong predictor of location of death.

We included an indicator for rurality to capture variation in location-of-death options, noting that access to full hospital care is more complicated for individuals in rural locations. In a study looking at rural–urban differences in EOL care, Wilson et al. (2012) highlight the difficulties

for rural residents associated with travelling to various medical care settings for both patients and their caregivers and the relatively limited availability of local services in rural locations. In all but one specification, we find that rural decedents are more likely to pass away at home—by approximately 2 percentage points (11 percent) in most specifications. Although a lack of options and services suggests that rural decedents would be less likely to have a home death, the robustly positive estimate might reflect the cultural closeness of residents of rural communities, who are known to be extremely supportive and helpful in times of need. Thus, the positive estimated effect of rurality might be capturing the greater availability of informal care in rural areas. Looking at the specification parsed by married or not married in Table 4, it is notable that rural married individuals have a much larger likelihood of dying at home than do rural not-married individuals (2.6 percentage points vs. 1.4 percentage points, respectively). There is an interesting income gradient displayed in Table 2, in which rural decedents in the lowest to highest income quintile groups are, respectively, 3.8, 2.2, 2.1, 1.7, and 0 percentage points more likely to have a home death. Whereas in the full sample, higher income is associated with an increased likelihood of home death, the situation is different for rural decedents. For them, income may provide more location-of-death choices, with low-income rural residents dying at home not by choice but by necessity.

The estimated effect of being female is not consistent across specifications, but it reveals some interesting patterns. We expected that because caregivers are disproportionately female (Schrank et al. 2016), male decedents would be more likely to have a caregiver. This result holds up in Figure 4, although the difference is small, only 1 percentage point. In the full sample regression, no difference is found in the likelihood of home death for men and women, controlling for all other factors (the estimate is exactly 0 percentage points). However, differences are found in the subgroups. Looking at the estimated effects by income quintile, we find that being female is associated with a 0.4 percentage point lower likelihood of a home death for the lowest income quintile group and a 0.4 percentage point higher likelihood of home death for the highest income group. Married women are 1.2 percentage points less likely to die at home; non-married women are 1.4 percentage points more likely to die at home. Women in the youngest age group are 1.7 percentage points less likely to die at home; women in the oldest age group are 1.1 percentage points more likely to die at home. As discussed by Gott, Morgan, and Williams 2020, in the context of palliative care and sex, intersectionality and context clearly matter for understanding differences in the likelihood of home death between the sexes. Looking further into why these differences arise would be an interesting avenue for future work.

We next turn to the estimated effect of the unemployment rate, our variable of interest. The unemployment rate has a statistically significant and negative association with home deaths for the full sample of cancer deaths (OLS and Probit) and for 10 of the 14 sub-samples across Tables 2–4. As mentioned, a negative relationship between the unemployment rate and home death is consistent with two key results. First, time and money inputs are not easily substitutable; the same quantity of home death is not achievable by substituting the relatively cheaper input (here, time) when relative prices change. Second, following from the first result, money inputs are crucial in the production of home death and represent a real barrier.

To interpret the magnitude, we follow Oreopoulos et al. (2012) and assume that the unemployment rate increases by 5 percentage points in a recession. This means that a point estimate of −0.002 (e.g., Columns 1 and 2 in Table 2) is associated with the probability of a home death falling by 1 percentage point in a recession ($5 \times -0.002 = 0.01$). Given that the average proportion of home deaths in our sample is 18 percent, this represents a 6 percent decrease in home deaths.

The importance of money inputs is reinforced in the results in the income quintile columns of Table 2. No effect of economic conditions for either the lowest or highest income quintiles is consistent with money constraints not being binding for either group. The lowest income group is unlikely to be able to afford the needed out-of-pocket inputs for a home death and hence is unresponsive to the economic cycle; the highest income group can afford those inputs and hence is similarly unresponsive. The estimated effect of economic conditions is highest for the middle-income groups, where we expect financial constraints to be binding and changes in the relative cost of time and money to matter. For the second and third income quintiles, our estimates suggest that in a recession, home deaths would fall by 2.5 percentage points, or 14 percent.

This U-shaped response also allows us to speak to another channel through which home deaths could be affected by economic conditions—the counter-cyclical staffing in health facilities, documented in the United States by Stevens et al. (2015). If capacity in such facilities increases in economic downturns, we would see home death falling for all groups. That we do not see any relationship specifically for groups in which the money constraints are not binding suggests that this alternative channel is unlikely to be driving our results.

The estimated unemployment rate coefficients in the sub-samples parsed by sex, age, marital status, and urbanicity generally indicate that home deaths are procyclical, with estimated magnitudes similar to when the full sample is used. The only exception is found for the younger age groups (those aged < 64 years and 65–74 years). Although the point estimates are negative, they are not precise.

Discussion and Conclusions

This article is the first to examine the role played by time and money costs in influencing the home death outcome using Canadian Vital Statistics death records from 2007 to 2019. We find compelling evidence that both time and money inputs are important determinants of home death. Young and married decedents, those more likely to have available caregivers and thus lower time costs, are found to be more likely to die at home. We find a very clear income gradient: decedents from the highest income quintile neighbourhoods are significantly more likely to pass away at home than those in the lowest income quintile neighbourhoods. We exploit variation in economic conditions to examine how home deaths vary with changes in the relative costs of the inputs. We find a robust negative relationship between unemployment rate and home death. Our estimates suggest that in a recession the probability of home death would fall by 6 percent. From this we draw two conclusions: first, that time and money inputs are not easily substitutable—the same quantity of home deaths is not achievable by substituting the relatively cheaper input (here, time) when relative prices change—and second, that money inputs are crucial in the production of home deaths and present a real barrier for some families.

Although this analysis has several important strengths, it has limitations. First, we measure the location of death, not where people spent the bulk of their last days. It could be that an individual spent most of their last days at home but went to the hospital at the very end or vice versa. Relatedly, we have no information on hospice or other care decedents may have used near or at the EOL. Hospice use, for example, has been associated with location of death, although notably even among those receiving home hospice care, we find that home death is less likely among low-income decedents (Barclay et al. 2013). Second, the neighbourhood income quintile is a high-level proxy for socio-economic status (SES). Finally, the incomparability of the definitions of location of death meant that we excluded three provinces from our analysis. Economists have been slow to contribute to EOL and location-of-death discussions despite their clear public finance implications in Canada. The aging (aged) population and attendant reduction in the number of available caregivers exacerbate the home death challenge and render this topic of particular importance.

Some piecemeal policies address the costs of home care. The CCB policy was first introduced by the federal government in 2004 to help support those caring for a gravely ill family member by partially compensating family members who take time off work. The benefit was extended in 2016 from six weeks of benefits to up to six months, and it provides 55 percent of average insurable earnings to a yearly maximum amount that differs each tax year (Canada 2022). In 2021, the maximum insurable earnings for Employment Insurance were $56,300. According to the most recent available data, 7,581 claims were made for the CCB in the 2019/20 fiscal year (down from 8,385 in the previous year), and more than 70 percent of the claimants were women. The cost of the program was $39.6 million that year (Canada Employment Insurance Commission 2021, Table 48, 149).

To put the number of claimants of the CCB in context, 296,920 individuals died in the 2019/20 fiscal year (Statista 2022), meaning that about 2.6 percent of them had caregivers who received benefits from the CCB program. The average duration of benefits was 11 weeks (this figure is the lowest in the three most recent years of data). So, although the CCB undoubtedly provides much-needed assistance to a group of caregivers, it does not have a large take-up rate.

To date, no analysis has evaluated the impact of the CCB on home deaths. Indeed, the rather scant literature on the CCB tends to focus on small-sample qualitative methods designed to examine questions around, for instance, awareness of the CCB (e.g., Dykeman and Williams 2013) or caregiver experiences with the program (e.g., Giesbrecht et al. 2012). We see this as a topic worthy of future quantitative study.

Another policy that could affect home deaths is medical assistance in dying (MAID), which came into effect in 2016 and was revised in 2021 (Health Canada 2021). Data are available from its inception to 2020, where we see an upward trend in the number of assisted deaths from 1,018 to 7,595. Although still a small portion of total deaths, almost 70 percent of these deaths were among individuals with cancer. Private residences were the most common location of MAID, with 48 percent of deaths, followed by hospitals at 28 percent (Health Canada 2021). A population-based case-control study of Ontario decedents found that lower-SES decedents had 39 percent lower odds of receiving MAID under universal health coverage (Redelmeier et al. 2021). Thus, although the MAID policy has the potential to boost home deaths over time, it may in fact exacerbate the differences in home death between SES groups.

A recent C.D. Howe Institute commentary on the cost of EOL care (Quinn et al. 2021) provides a useful analysis of the big picture in the Canadian health care scene, including the problem of supply. It points to four structural problems in the current environment that help explain the situation: the lack of EOL beds and options, the way in which health care is financed (silos), the inability to transition to palliative care early enough, and barriers to home and community resources. On this latter point, Quinn et al. (2021) speak to the lack of alternative care arrangements to which patients no longer needing acute care services can be discharged. These alternative-level-of-care (ALC) patients, as they are known in Ontario, include those who are nearing the EOL. Just before the coronavirus disease 2019 pandemic began, the Ontario Hospital Association (as reported in Quinn et al. 2021, 7)

estimated that about 17 percent of all patients admitted to acute care beds were ALC. The alternatives available to ALC patients range from hospital-like settings, such as rehabilitation centres (hospitals) that help people recover from a variety of conditions (brain surgery, stroke, hip replacement) with the view toward helping them live more independent lives back home, to hospices designed to provide palliative and other EOL care, senior residences and long-term-care facilities, and homes with in-service arrangements (home care).

One main economic argument for having alternative care arrangements is that they typically cost less than acute care. The CHPCA (2012) has been vocal in this regard, issuing a report synthesizing the literature. The economic case for alternative care arrangements, while relying on a large number of narrowly focused studies typically using US data, is compelling. There are dissenters, of course, who underscore the need for sophisticated (often heroic) interventions at the EOL (e.g., Isenberg et al. 2020). By and large, however, there is agreement that the current practice of using acute care hospital beds at the EOL serves neither patients nor the health care system.

On the face of it, the solution is simple: take the savings associated with fewer EOL patients in the acute care system and use them to help support alternative arrangements. As pointed out many times, however, and most recently by Quinn et al. (2021), the siloed nature of health care financing means that the savings in one sector (say, hospitals) rarely make it to other sectors (say, home care). Of course, the solution is not simple. Indeed, it would necessitate a re-evaluation of entrenched health care boundaries, a broadening of the definition of health care to include home care supports and alternative configurations, and a re-thinking of health care financing and responsibilities, political quagmires at the best of times.

Stabile, Laporte, and Coyte (2006) show that public spending on home care may lead to an increased level of formal care with an almost entirely offsetting decline in informal care at home. Publicly funded home care policies might not affect overall levels of care but change who is doing the caregiving. Palliative care was not specifically considered in the Stabile et al. article. Like the CCB, though, more generous home care programs may make it easier to accommodate the needs of the dying at home by lowering the cost to informal caregivers. Determining the nature of these differences and potentially creating policies to incentivize provinces to move toward a particular location-of-death outcome, when possible, is a fruitful avenue for future work.

A careful examination of determinants and correlates of location of death—in particular the identification of any barriers to the cheaper and preferred location—is vital for informed policy discussions surrounding EOL and the allocation of scarce EOL resources. We contribute to the paucity of work on the impact of economic factors on the decision of where to die by looking at the impact of time and money inputs into EOL home care and by examining how general economic conditions affect EOL decisions.

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Notes

1 In Ontario, for example, HomeInstead is a facility that provides private care. It charges about $65 per hour for a minimum of three hours for a registered nurse and $35 per hour for a minimum of three hours for a personal support worker. These costs can add up very quickly if daily help is needed.

2 Before 2010, the CVSD included deaths of Canadians occurring in the United States. Since 2010, the CVSD no longer records deaths of Canadians outside Canada. The data do, however, include deaths of non-Canadians occurring in Canada.

3 The category "other health care facility" captures deaths occurring in nursing homes, other long-term-care facilities, nursing stations, other short-term-care facilities, and other health care facilities not licensed to operate as hospitals by provincial, territorial, or federal governments, such as free-standing birthing centers.

4 The starting point for this literature is a series of articles (e.g., Ruhm 2000, 2003, 2007; Gerdtham and Ruhm 2006) that show that health is pro-cyclical, that is, that health improves during economic downturns, despite the well-established positive relationship between income and health. These results have been reproduced many times in various contexts and using different measures of health and economic conditions, including Ariizumi and Schirle (2012), who document the cyclicality of health for middle-aged individuals using Canadian data.

5 There is considerable variation in the unemployment rate both between and across provinces over time. For example, the gap between provinces in a given year ranges from 7 percentage points (the unemployment rate was 6.1 percent in Alberta and 13.1 percent in Newfoundland in 2015) to 9.9 percentage points (the unemployment rate was 3.6 percent in Alberta and 13.5 percent in Newfoundland in 2007). Although in each year the highest rates were in Newfoundland, the lowest rates were in Alberta from 2007 to 2015 and in British Columbia from 2016 to 2019. Within-province variation is also considerable. The unemployment rate in Nova

Scotia had the least variation over the sample (from a low of 7.4 percent in 2019 to a high of 9.6 percent in 2010), and Alberta had the most variation (from 3.6 percent in both 2007 and 2008 to a high of 8.2 percent in 2016).

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