Patterns of Health Care Use and Cost at the End of Life

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EXECUTIVE SUMMARY

Background

Issues around end-of-life health care have been gaining increasing attention in the last decade among policy-makers and researchers. On the one hand, concerns have been raised over the "high costs of dying". Health care use at the end of life is often portrayed as a major driver of rising health care costs, and the finding that health care costs at the end of life are substantial has often been misinterpreted as suggesting that unnecessarily "heroic" measures are taken to try to keep people alive. Although evidence has been presented to counter these myths, they seem to persist. On the other hand, and apart from cost issues, the care provided to terminally ill individuals has received increasing attention. Two Senate committee reports were published in the 1990s to address this issue. In 1995, a report entitled *Of Life and Death* was tabled by the Special Senate Committee on Euthanasia and Assisted Suicide, which highlighted the deficiencies in end-of-life care in Canada. The Special Committee recommended among many other things that "governments make palliative care programs a top priority in the restructuring of the health care system". A Subcommittee, chaired by Senator Carstairs, was struck in 1999 to update the report and examine the progress on the implementation of the recommendations. The conclusions regarding end-of-life care had not changed substantially. Indeed, the final report of the subcommittee stated that " . . . many of the unanimous recommendations had not been implemented. [The subcommittee] heard instead about a possible crisis in end-of-life care." (p. 7).

Given the concern with end-of-life issues, the Manitoba Centre for Health Policy (MCHP) was asked by Manitoba Health to examine patterns of health care use and health care costs at the end of life. In addition, we examined where Manitobans die. Most people would prefer to die at home, if given the choice. Yet Canadian studies show that in some provinces close to 90% of people die in hospitals. Concern has been raised over the large proportion of hospital deaths because the care of terminally ill and dying individuals may be treatment oriented, rather than comfort oriented on the one hand, and because people may be dying in the "sterile setting of a hospital surrounded by strangers and medical equipment, rather than loved ones" (The Special Senate Committee on Euthanasia and Assisted Suicide, 1995). Location of death therefore becomes an important issue to examine. Thus, the present report has the following objectives:

1. To determine where Manitobans die.
2. To examine what factors are related to where Manitobans die.
3. To examine how common transfers to hospital are at the end of life and whether they vary by location of residence.

4. To explore what factors are related to health care use at the end of life.
5. To estimate health care costs at the end of life and then examine the factors related to these costs.

Methods

We examined health care use and cost for the entire cohort of adult Manitoba residents (age 19 or older), who died in fiscal year 2000/01 (9,436 decedents). A major aspect of the present report was to examine where Manitobans died. We therefore classified decedents into five mutually exclusive categories: 1) those who died in a hospital, 2) those who died in a long-term care setting (which includes Personal Care Homes and, for Winnipeg, both PCHs and Chronic Care hospitals), 3) those who died while receiving home care, 4) those who died in some other location, but were not on home care. We refer to these individuals here as having died in "Other Locations", and 5) those who died in one of two hospital-based palliative care units in Winnipeg (St. Boniface General Hospital and Riverview Health Centre). See Glossary for further details. Note that our "Other Location" category is derived through a process of elimination and could include deaths that occurred at home, on the road, at work, etc. In terms of palliative care patients, it is also important to note here that the administrative data allow us to identify only those who died in the two hospital-based palliative care units in Winnipeg. Thus, other hospital beds that may have been specifically set aside for palliative care in hospitals, or individuals who received palliative care on regular wards are not captured here. We therefore underestimate the proportion of deaths in palliative care settings.

In terms of health care use at the end of life, we focused on the following: hospital days, long-term care (LTC) days, home care days, physician visits, and prescription drug use. Health care costs were estimated for these five components as well. Patterns of health care use—and cost—are generally presented for the six months immediately prior to death, except in a few instances when we present findings for a one-year period before death.

In examining what factors were related to location of death, and health care use and cost at the end of life, we considered the following: cause of death, age, sex, marital status, region of residence, and socioeconomic status (as measured by the average household income in people's neighbourhood of residence, referred to here as income quintiles). Note that we excluded the two palliative care units from these analyses, as they provide care predominantly for Winnipeg residents. Moreover, we were not able to estimate reliably the costs associated with these units.

Findings

Where Do Manitobans Die?

- Nearly half (47%) of deaths in Manitoba occurred in a hospital, 24% in a LTC facility, 16% in Other Locations (e.g., at home), 7% in the two Winnipeg palliative care units, and 6% while people received home care.
- There was considerable variation in the location of death across regions of Manitoba. This was particularly apparent for cancer deaths: Among Winnipeg residents, 47% of cancer deaths occurred in hospital; among non-Winnipeg residents the proportion was 72%. This difference is largely explained by the two palliative care units in Winnipeg, in that 34% of cancer deaths among Winnipeg residents occurred in one of the two palliative care units.

What Factors are Related to Location of Death?

Several factors were consistently related to location of death.

- Cause of death was a major predictor of location of death for all ages: cancer deaths were much more likely to occur in hospital than in Other Locations, whereas deaths due to cardiovascular diseases and injuries, that is the more sudden deaths, were more likely in Other Locations.
- Among middle-aged and older adults, men were less likely to die in hospital or in a LTC setting than women, a finding that may, in part, be due to men being more likely than women to die suddenly, such as due to heart attacks. Also, because of the greater longevity of women, women are more likely than men to be admitted to LTC institutions.
- Some regional variation was apparent. For example, among 65+ year old individuals, Southern residents were more likely to die in a LTC setting than in Other Locations or while on home care. This is partly related to the LTC bed supply in the Regional Health Authorities (RHAs)—the more LTC beds there are in an RHA, the more likely people are to die in a LTC institution.
- Neighbourhood income was consistently not related to location of death; in other words, where people died was not related to people's socioeconomic status.

Transfers to Hospital in the Last Six Months of Life

We examined two key questions in terms of transfers to hospital: How many times were individuals hospitalized in the last six months before death? And does this vary by where they live? To address these questions we determined decedents' location of residence six months prior to death, classifying them into four groups: those who were in hospital, in a LTC setting, or on home care, respectively, and the remaining individuals which we assigned to the Other Location category.

- The majority (83%) of LTC residents died in a LTC institution. In contrast, 70% of home care recipients and 58% of individuals who lived in Other Locations six months before death, died in hospital.
- Among LTC residents, about two-thirds (63%) were never transferred to a hospital in the last six months before death. This proportion was much higher than among those on home care (14%) and those who lived in Other Locations six months before death (32%). In other words, LTC residents were considerably less likely to be hospitalized in the last six months of life than anybody else. Indeed, 43% of home care recipients were hospitalized two or more times in the last six months of life; home care recipients therefore also incurred the largest proportion of decedent's hospital days (41%).
- Although the proportion of LTC residents who were hospitalized was relatively low overall, there was considerable variation across PCHs in the proportion of residents who were hospitalized at least once at the end of life, with a range from 7% to 58%.

Health Care Use at the End of Life

We examined two issues in the context of health care use: 1) To put decedents' health care use into context, we compared their use in the last twelve months of life to the health care use of the entire adult population over a one-year period. 2) We examined more specifically what factors were related to health care use in the last six months before death.

- Decedents (who constituted 1% of the adult population) consumed 24% of hospital days, 24% of LTC days, 10% of home care days, 4% of physician visits, and 3% of (out-of-hospital) prescription drugs in the last year of life.
- Cause of death, location of death, age, region of residence, and income quintiles were all related to health care use at the end of life. Key findings were:
  - Cancer deaths were related to more hospital, LTC and home care days, physician visits, and prescription drugs than cardiovascular disease deaths among individuals under 65 years of age; the opposite was true for 65+ year old individuals.
  - Hospital days increased significantly in the last month before death among 65+ year olds who died in hospital; among individuals who died in a LTC institution, hospital days declined in the last month before death.
  - Non-Winnipeg residents had fewer LTC and home care days, made fewer physician visits, and used fewer prescription drugs in the last six months before death than Winnipeg residents. Region of residence was not related to hospital days.
  - Living in more affluent areas was associated with fewer hospital days, LTC days and home care days than living in poorer areas, although in rural areas this was the case only for the 65+ age group. Living in more affluent areas was also related to fewer physician visits and reduced prescription drug use than living in poorer areas.
  - 75+ year old decedents incurred more hospital days, LTC days, and physician visits than younger seniors; younger seniors incurred more home care days and had higher prescription drug use than older seniors. Note that this is the case even though our analyses include drug use in nursing homes.

- Among decedents aged 65 or older, married individuals used fewer health care services than their unmarried counterparts, a finding that would be due to the fact that married individuals tend to be younger and consequently, healthier, than unmarried persons.

Health Care Costs at the End of Life

Health care costs were determined by adding up costs for hospital use, PCH use, home care use, physician visits, and prescription drugs. Similar to our analyses for health care use, we first compared decedents' costs in the last six months of life to the costs incurred by all Manitobans in a six-month period; second, we examined the factors related to health care costs in the last six months of life.

- In the last six months of life, decedents (who represent about 1% of the adult population) used 21.3% of total health care costs.
- Location of death was a major predictor of cost. Deaths that occurred in hospital or an LTC facility were considerably more costly than deaths in Other Locations. Similarly, deaths that occurred while people were on home care were more costly than deaths in Other Locations.
- Age was also strongly related to health care costs, with the average cost for 75+ year individuals being substantially higher than the average cost for 65-74 year old persons. The high average cost for the oldest old, coupled with the large number of decedents in that age group meant that 75+ year old decedents incurred a major proportion of decedents' total health care costs—72%.
- Cause of death was also significantly related to cost. However, the costs associated with different causes also varied depending on the location of death. Thus, the relation between cause of death and cost is complex and depends on a number of different factors.
- Region of residence and income quintiles were generally not related to cost at the end of life.

Key Findings and Conclusions

- About half of deaths in Manitoba occurred in hospital in 2000/01. Is this too high a proportion? Or about right? The question of what proportion of deaths "should" occur in hospital is a difficult one to answer. When asked, most people state a preference for dying at home. Yet some hospital deaths are clearly unavoidable and entirely appropriate. One way to look at this issue is to compare Manitoba to other provinces. By that standard, Manitoba seems to fare quite well. Research shows that the proportion of hospital deaths ranged from 52% to 87% across the provinces and territories in 1997 (Heyland et al., 2000). When we focus only on cancer deaths, Manitoba again compares favourably. A study

from Nova Scotia shows that, in 1997, 70% of cancer deaths in that province occurred in hospital (Burge et al., 2003), compared to 57% in Manitoba.

- There is considerable variation across Manitoba in the proportion of hospital deaths among cancer patients. Among Winnipeg residents, 47% of cancer deaths occurred in hospital, compared to 72% among non-Winnipeg residents. This discrepancy between Winnipeg and non-Winnipeg residents is to a large extent explained by the hospital-based palliative care units at the St. Boniface General Hospital and Riverview Health Centre. Indeed, one-third of cancer deaths among Winnipeg residents occurred in these two palliative care units. Thus, making palliative care a priority through allocation of sufficient resources to facilities and staff clearly makes a difference. In rural areas, there are currently no similar large units, nor is implementing such units likely feasible or desirable, given the relatively small numbers of deaths per year, possible staffing issues, etc. What models of palliative care are most suitable in rural settings is an issue that needs to be examined.

- Only 6% of Manitobans died while on home care; 8% when focusing on cancer deaths. This proportion will likely increase over the next few years, given Manitoba Health's—and the RHAs'—current emphases in the provision of palliative care. For example, the Palliative Care Access Program that was introduced in December of 2002 should make a substantial difference in terms of allowing individuals who wish to die at home to do so. In the past, drug costs for palliative care patients were covered only while they were in hospital. Given the high cost of some drugs, this provided an incentive to admit individuals to hospital. With the new program, deductible-free drug coverage is provided outside the hospital. Thus, the drug program represents an extremely important step forward in allowing Manitobans who are dying a choice of where to die.

- What factors predict where Manitobans die? As one would expect, age and cause of death were two factors that were consistently related to location of death. For example, very elderly individuals aged 85+ years were much more likely to have died in a LTC facility than younger individuals. Deaths due to cancer were more likely to occur in hospital and LTC settings than in Other Locations, whereas deaths due to cardiovascular diseases or injuries were more likely to occur in locations other than hospitals or LTC facilities, reflecting more sudden deaths.

- While it is important to know what factors are related to location of death, equally interesting is to know what is not related to it. Income quintiles—a measure of the average household income of the neighbourhoods in which decedents lived—was one factor that was consistently not related to location of death. Thus, the good news is that in Manitoba, how wealthy (or poor) people are does not determine where they die. While income quintiles were not related to location of death, it should be noted that that they were consistently related to health care use at the end of life. Individuals who lived in poorer neighbourhoods used more health care services (hospital days, LTC days, home care days, physician visits, number of prescrip-

tion drugs) than those living in wealthier neighbourhoods. This is entirely consistent with research on the general population (not just decedents) (Roos and Mustard, 1997), and suggests that income is a major predictor of health status.

- An encouraging finding is that most LTC residents died "in place"—83% of individuals who lived in a LTC setting six months before death also died in a LTC facility. The proportion of individuals who were never hospitalized in the last six months of life was lower, however: 63% of LTC residents were never hospitalized in the last six months of life, with the remaining individuals being hospitalized at least once (16% died in hospital, and an additional 21% were hospitalized at least once in the last six months of life, although they later died in a LTC facility). That about two-thirds of LTC residents were not hospitalized in the last six months of life is a positive sign; however, there is room for improvement. Indeed, when we look at individual PCHs (we did this for Winnipeg and Brandon only), we find that the proportion of residents who were hospitalized at least once in the last six months of life varied dramatically: from 7% to 58%. In other words, some PCHs were much more likely than others to transfer residents to hospital at the end of life. This finding clearly warrants further investigation into the reasons why this is the case.

- A large proportion—70%—of individuals who received home care services six months before death died in an acute care hospital and an even greater proportion (86%) were hospitalized at least once in the last six months before death, although they did not necessarily die there; 43% were hospitalized two or more times. Home care recipients therefore consumed a large proportion of hospital days in the last six months of life. Almost two-thirds of home care recipient who were hospitalized two or more times in the last six months of life were 75 years or older. An issue that needs to be examined relates to the care options for such relatively frail elderly individuals. For instance, what were the reasons for these hospitalizations? Did they allow individuals to remain in their own homes longer, thereby potentially contributing to quality of life? What was the care burden on informal caregivers, such as spouses? These are just some of the issues that need to be explored.

- Decedents used more health care services than survivors—a finding that does not come as a surprise. Concerns are sometimes voiced that heroic (and inappropriate) measures are increasingly used at the end of life, particularly for very old individuals with little chance of survival, thereby placing considerable strain on the health care system. The question of the "aggressiveness" of treatment and whether the services provided at the end of life were appropriate was beyond the scope of the present

report. However, the report shows that decedents did not use an inordinate proportion of services in the last year of life: about 25% of hospital days and LTC days, respectively, about 10% of home care days, and less than 5% of physician visits and (out-of-hospital) prescription drugs.

- Patterns of use differed quite substantially across different types of health care services. While much of hospital use was condensed into the last month before death—indeed hospital days (per decedent) nearly doubled in the last month before death, compared to the month prior to that—LTC days, home care days, physician visits, and drug use were relatively stable across the last six months of life. Factors that predicted health care use included cause of death, location of death, region of residence, neighbourhood-level income, and age. For example, cancer deaths were related to more hospital days, LTC days, home care days, physician visits and prescription drugs (per decedent) than cardiovascular disease deaths among younger adults; the opposite was true among 65+ year old decedents. Thus, overall, the system appears to be responsive to people's needs. For instance, more resources are allocated to individuals from poorer neighbourhoods who are known to have greater health care needs.

- Much has been made of the so-called "high cost of dying"; the assumption seems to be that because decedents incur a high proportion of health care costs, too many unnecessary services are provided at the end of life. Our data show that decedents, who constitute only 1.1% of the population, indeed incur quite a substantial proportion of health care costs—21%. This proportion is similar to what has been found in the U.S. (Lubitz and Riley, 1993; Hogan et al., 2001). A large proportion—almost three-quarters—of decedents' health care costs were incurred by 75+ year olds. Costs for these individuals were high because, on the one hand, 75+ year olds constitute a large proportion of decedents (about two-thirds of decedents are in that age bracket) and, on the other hand, because the average cost per 75+ year old decedent is higher than for younger individuals. Does this mean that costs are high because of inappropriately aggressive treatment for very elderly individuals at the end life? Not necessarily. First of all, among frail elderly individuals, it is difficult to predict who will die and when death will occur; there do not seem to be clear signals that would suggest impending death (Covinsky et al., 2003). This makes it difficult to know when life-prolonging care should be stopped. Also, the present report shows that a large proportion of the cost incurred at the end of life is due to LTC costs, particularly among 85+ year old decedents. Among these very elderly decedents, LTC costs constituted 41% of their total health care cost in the last six months of life. Thus, the high cost of dying among the very old is, to a large extent, related to the costs of caring for frail individuals with high care needs over an extended period of time.

- Given the aging population, health care costs incurred by older adults are an important issue. In Manitoba, population projections suggest that the population aged 75+ will increase by 12% by 2020, relative to 2000. Although seniors are living

longer than ever, the number of decedents in the 75+ year age range will therefore also rise substantially in the next 20 years. The health care costs incurred by these elderly decedents are a concern that will have to be addressed. The present report shows that a high proportion of health care costs among 75+ year old decedents were due to hospital costs. Hospital use among these individuals should therefore be examined in more detail in further research. For example, as noted above, there was up to an eightfold difference between PCHs in terms of the proportion of residents admitted to hospital at the end of life. Similarly, home care recipients incurred a major proportion of hospital days. Why these admissions occurred and how appropriate they are should be explored.

- Health care cost varied substantially by location of death. Average costs of both hospital and LTC deaths (which did not differ significantly from each other) were about twice as high as costs for decedents who died while on home care. Costs for decedents on home care were, in turn, much higher than those for decedents in Other Locations. An important question that could not be addressed in the present report, but needs to be explored in the future, relates to the cost of palliative care. On the one hand, it will be important to calculate costs for hospital palliative care units which, in the present report, were excluded from the analyses because we could not reliably estimate costs. On the other hand, knowing the costs for the provision of palliative care in people's homes will be important. Thus, while our data show that the average cost for decedents on home care is about half of that for individuals who died in hospital, the findings may be very different in the future. If palliative care is provided at home right up to death, with the often high drug costs being covered through the new Palliative Care Drug Access Program, costs may rise substantially.

- Last, but not least, a comment is warranted regarding data issues. In order to be able to conduct research on end-of-life issues, it is critical that palliative care patients can be reliably identified in the administrative data. This will mean, for example, that as new palliative care hospices are opened (e.g., the new Grace General Hospital hospice which opened in 2003), a code is introduced in administrative files to capture these patients. Similarly, it is important that palliative care patients who die at home with the aid of home care are reliably coded in the Home Care database throughout Manitoba. This is currently not the case. Moreover, the palliative care provided by physicians (typically on a salary rather than fee-for-service basis) must be captured. In this respect the care provided in a palliative care context is quite different than that provided to other patients. Considerable time, for example, is spent not with the patient per se, but with family members. Such activities cannot be captured in the physician claims data as they are currently set up.

Lastly, being able to determine the costs of palliative care, be it hospital-based or home-based, will be an important task for the future. Data need to be available that will allow such cost calculation.

What Next?

End-of-life care—and costs—are clearly important issues that are receiving increasing attention. In order to make informed policy decisions, many issues need further exploration. We list here just a few of them:

- Although we examined patterns of health care use at the end of life, we did not focus on the kinds of treatments individuals received at the end of life, for example, surgical and non-surgical procedures, drugs, etc. Examining such specific aspects of health care use, and exploring what factors are related to them, would start to shed light on how aggressively individuals are treated at the end of life and, potentially, can address which—and for whom—specific treatments are most appropriate.

- Earlier we recommended that patterns of hospital admissions for PCH residents at the end of life should be explored. Given the large variability we found in the present report, further research should explore why this is the case, such as characteristics of the PCH (e.g., location, physician complements, resources, for profit or not, religious-based, etc.), severity of residents' illness, reasons for hospitalizations, and so forth.

- More broadly, care options for frail elderly individuals need exploring. Most older adults do not die suddenly; instead, most experience a slow decline and steadily progressive disability, until death occurs as a result of complications associated with conditions such as stroke or dementia (Lunney et al., 2002). Gaining an understanding of what types of care are most appropriate throughout this functional decline will be important.

- In the present report we were able to identify palliative care patients only if they died in one of two hospital-based palliative care units. Research is needed to systematically examine other palliative care options, including palliative care provided in acute care and long-term care settings. Moreover, it will be important to examine what palliative care models might be most suitable for rural areas.

- Manitoba Health has instituted some important enhancements to the provincial palliative care program in the last few years. In 1999/00, funding was provided to the rural and Northern RHAs for palliative care coordinator positions. In 2000/01, specific funding was provided to the WRHA for additional programs, such as a 24-hour response team. In December of 2002, the Palliative Care Drug Access Program was introduced, which provides drug coverage for palliative care patients. Given these positive steps to improving end-of-life care in Manitoba, a task for the future will to examine their effects on health care use—and cost—at the end of life. In this

respect, the present report can be considered a baseline study to which subsequent analyses can be compared.

- Examining patterns of health care use (and cost) at the end of life is one important issue. Administrative data lend themselves extremely well to addressing these issues by allowing population-based analyses and detailed analysis of patterns over time. Equally important, however, is to conduct research on issues that cannot be captured with administrative data, such as palliative care patients' or care providers' perceptions of the quality of end-of-life care.

1.0 INTRODUCTION

Issues around end-of-life health care have been gaining increasing attention in the last decade among both policy-makers and researchers.

Issues around end-of-life health care have been gaining increasing attention in the last decade among both policy-makers and researchers. On the one hand, concerns have been raised over the "high cost of dying". For instance, health care use at the end of life is often portrayed as being a major driver of escalating health care costs. Similarly, the finding that health care costs at the end of life are substantial has often been misinterpreted as suggesting that unnecessarily "heroic" measures are taken to try to keep people alive. Although evidence has been presented to counter some of these myths, as reflected in publications like the Mythbuster Series (Canadian Health Services Research Foundation, 2003) and "The Seven Deadly Myths" (Alliance for Aging Research), they seem to persist.

Apart from cost issues, care provided to terminally ill individuals has also received increasing attention.

On the other hand, apart from cost issues, the care provided to terminally ill individuals has also received increasing attention. Two Senate committee reports were published in the 1990s to address this issue. In 1995, a report entitled *Of Life and Death* was tabled by the Special Senate Committee on Euthanasia and Assisted Suicide, which highlighted the deficiencies in end-of-life care in Canada. The Special Committee recommended among many other things that "governments make palliative care programs a top priority in the restructuring of the health care system". A Subcommittee, chaired by Senator Carstairs, was struck in 1999 to update the report and examine the progress on the implementation of the recommendations. The conclusions regarding end-of-life care had not changed substantially. Indeed, the final report of the subcommittee stated that " . . . many of the unanimous recommendations had not been implemented. [The subcommittee] heard instead about a possible crisis in end-of-life care. There was evidence of uneven provision of services, and disruptive and ineffective care leading to substandard outcomes" (Subcommittee to update "Of Life and Death", p. 7).

Given the concerns with end-of-life issues, MCHP was asked to examine patterns of health care use and health care costs at the end of life.

Given the concern with end-of-life issues, the Manitoba Centre for Health Policy (MCHP) was asked by Manitoba Health to examine patterns of health care use and health care costs at the end of life. Thus, the present report has the following objectives:

1. To determine where Manitobans die.
2. To examine what factors are related to where Manitobans die.
3. To examine how common transfers to hospitals are at the end of life and whether they vary by location of residence.
4. To explore what factors are related to health care use at the end of life.
5. To estimate health care costs at the end of life and examine the factors related to these costs..

1.1 What Does the Literature Tell Us?

1.1.1 Where Do People Want to Die—And Where Do They Actually Die?

Most people would prefer to die at home, if given the choice.

Most people would prefer to die at home, if given the choice. This is the case in North American, European, and Asian countries. In the general population, 59% to 81% express a preference for dying at home (Higginson and Sen-Gupta, 2000). Among those who actually have a life-threatening disease, the proportion who indicate a preference for dying at home is also high —53% to 88% among cancer patients (Tang and McCorkle, 2001). Although the preference for dying at home has been shown to decline with the progression of disease, even close to death about half of terminally ill individuals still report a wish to die at home (Hinton, 1994; Townsend et al., 1990).

The reality is in stark contrast to these preferences . . . many, if not the majority of people die in hospital.

The reality is in stark contrast to these preferences, however. The pattern is similar across many Western countries: many, if not the majority of people die in hospital. A Canadian study that examined trends over time shows that the proportion of deaths in hospital increased steadily from 1950 to 1994 (from 51% to 81%), with the proportion declining again from then on. In 1997, 75% of deaths in Canada occurred in hospital (Wilson et al., 2001). A study from Nova Scotia, which focused more specifically on cancer deaths, shows a similar pattern, with 70% of cancer deaths occurring in hospital in 1997 in that province (Burge et al., 2003). These findings are very similar to those from other countries. Among cancer patients in England, the majority died in institutional settings; only about a quarter died at home (Higginson et al., 1998). Strikingly, a study with cancer patients shows that 69% of individuals who died in hospital had expressed a wish to die elsewhere (Townsend et al., 1990). In the United States, a great deal of variation is also evident across the different states in the proportion of individuals who die in acute care hospitals versus at home (Dartmouth Atlas, 1999; Last Acts, 2002). In 1997, only 25% of Americans died at home, even though more than 70% wished they could die there (Last Acts, 2002).

Concern has been raised over the large proportion of hospital deaths because the care of terminally ill and dying individuals may be treatment oriented, rather than comfort oriented and because people may be dying in the "sterile setting of a hospital surrounded by strangers and medical equipment, rather than loved ones" (The Special Senate Committee on Euthanasia and Assisted Suicide, 1995). The provision of appropriate end-of-life, or palliative care at home, in contrast, may provide the opportunity for quiet, privacy, and dignity that may make dying easier for the patient and family members.

1.1.2 What Factors Are Related to Location of Death?

There is a plethora of research on the factors that are related to location of death (see Grande et al., 1998 for a review). Some of the most consistent findings are summarized here:

The most consistent finding is that availability of an informal caregiver, such as a spouse, is linked to home death. In fact, home deaths are more likely if wives or daughters are the caregivers, rather than husbands or sons.

- Perhaps the most consistent finding is that availability of an informal caregiver, such as a spouse is linked to home death (Grand et al., 1998). The type of informal care provider also makes a difference: home deaths are more likely if wives or daughters are the caregivers, rather than husbands or sons. That an informal care provider is a key predictor of home death has been found in both the general population and, more specifically, among cancer patients.

- Access to home care increases the likelihood of home death (Grande et al., 1998). However, it is noteworthy that the provision of home care does not remove the need for informal caregivers in achieving home deaths, suggesting again that informal care providers are a key factor in home deaths.

- Specific diseases are related to location of death (Grande et al., 1998). For instance, individuals with cerebrovascular disease and pneumonia and influenza are less likely to die at home than those with heart disease, probably because the latter involves sudden death. Among cancer patients, the type of cancer is related to location of death. A diagnosis of haematological and central nervous system cancers, for example, is negatively related to home death and receipt of home care.

Gender is related to location of death; women are less likely to die at home than men. Because women live longer, they are more likely to die in a nursing home than men.

- Gender is related to location of death: women are less likely to die at home than men, possibly because men provide less informal care than women (Grande et al., 1998). Given their longer life expectancy, women are, conversely, more likely to die in a nursing home than men.

- A relation between age and home death has also been found, with older individuals being less likely to die at home than their younger counterparts. This is probably due to the fact that the likelihood of living in a nursing home increases with age. The availability of an informal care provider may also play a role here.

- Higher socioeconomic status has been found to predict home death in cancer patients, albeit not in non-cancer patients, in some studies (Grande et al., 1998). No such relation was found in a Canadian study, however (Burge et al., 2003). Cancer patients with higher socioeconomic status were also more likely than those of lower socioeconomic status to be referred to home care (Constantini et al., 1993), suggesting that the difference in home deaths may be related to access to home care.

Given that medical services provided through home care are covered in Canada, with additional services also covered in some provinces, including Manitoba, this may explain why the Canadian study showed no socioeconomic differences.

- Considerable regional variation has also been found in where people die. In the U.S., the proportion of people who died in acute care hospitals varied from 17% to 49% across regions of the country in 1995 (Dartmouth Atlas, 1999). Conversely, the proportion of home deaths ranged from 15% to 36% across U.S. states in 1997 (Last Acts, 2002). An important factor accounting for these regional differences is the number of acute care beds in the regions: Regions with more acute care beds tended to have a greater proportion of individuals dying in acute care hospitals. There are few studies that have examined location of death in Canada. However, the few studies that exist suggest that there is wide variation across the provinces in the proportion of hospital deaths (Heyland et al., 2000; Wilson et al., 2001), with the Northwest Territories having the lowest proportion of hospital deaths (52%) and Quebec the highest (87%) in 1997 (Heyland et al., 2000).

- An expressed preference to die in a particular location also seems important (Berger, et al., 2002; McWhinney et al., 1995). For example, a Canadian study shows that among patients referred to a palliative care home team, 81% of those who expressed a wish to die at home indeed died there (McWhinney et al., 1995). This suggests that when mechanisms are in place to identify patients' preferences, as well as mechanisms to provide home support for individuals who wish to die there, home death is possible. Researchers have calculated that a policy asking all patients about their preferences for life-sustaining treatment and incorporating these preferences into advance directives could translate into a minimum of $55 billion U.S. of savings per year (Singer and Lowy, 1992), although it should be noted that the question of whether such cost-savings are possible at the end of life is a controversial one (Emanuel and Emanuel, 1994).

The focus in this report is on factors that can be identified using administrative data, including cause of death, age, sex, marital status, and socioeconomic status.

In sum, a number of factors have been linked to location of death. Not all of them can be measured with administrative data (e.g., the presence of informal care providers and individuals' preferred location of death); we therefore focus in this report on those factors that can be identified using administrative data, including cause of death, age, sex, marital status, and socioeconomic status. In addition, we examined potential differences in location of death across regions of Manitoba.

1.1.3 Health Care Use and Cost at the End of Life

The "high cost of dying" has been the focus of much concern in health care. Hospital use has been found to be a major cost driver, with over one-third of the total cost being due to hospital use.

Much concern has been expressed over the so-called "high cost of dying" (Hogan et al., 2001; Lubitz and Riley, 1993). Clearly, health care use increases at the end of life. Hospital use, nursing home use, home care use, and physician use have all been shown to rise in the last few months before death (Mukamel et al., 2002; Roos et al., 1987). The increase in hospital use is particularly dramatic in the last month before death—a 250% increase compared to the second-to-last month of life in one study focusing on frail elderly individuals (Mukamel et al., 2002). Given the increases in health care use, health care costs therefore also increase substantially at the end of life. For instance, total health care cost more than doubled in the last month before death compared to 12 months or 24 months prior to death in one study (Mukamel et al., 2002). Hospital use was a major cost driver—over one-third of the total cost was due to hospital use.

The high cost of dying is sometimes argued to be the cause of a major portion of the growth in health care spending. Research evidence says otherwise.

A substantial proportion of health care expenditures are therefore allocated to people in their last six to 12 months of life. In an American study, 28% of Medicare expenditures in a given year were incurred by individuals in their last year of life (Lubitz and Riley, 1993). This statistic has frequently been misinterpreted as suggesting that a large proportion of health care dollars are misallocated to terminally ill individuals whose lives are unnecessarily prolonged by expensive techniques (Lubitz and Riley, 1993). The high cost of dying, it is sometimes argued, is therefore a major driver of the growth in health care spending.

Research evidence says otherwise, however. In fact, the proportion of expenditures allocated to individuals in their last year of life has remained remarkably stable over the years (Lubitz and Riley, 1993, Hogan et al., 2001). For instance, U.S. studies show that the proportion spent on people in their last year of life has remained at around a quarter of total expenditures for at least two decades. This suggests that health care spending has increased at the same rate for both decedents and survivors. Moreover, in a U.S. study, decedents made up only about half of the 1% of beneficiaries with the very highest cost (Lubitz and Riley, 1993), indicating that survivors constitute a large proportion of the highest cost patients. Similarly, although substantial differences in health care use and cost are apparent when decedents are compared to survivors, the differences are not as great when morbidity is taken into account (Hogan et al., 2001). Thus, the "high cost of dying" may simply be the cost of caring for seriously ill and functionally impaired individuals (Hogan et al., 2001).

In a related vein, the argument is frequently put forth that, increasingly, heroic measures are taken to prolong the lives of elderly individuals. Given the aging population, it is argued, the health care system soon will therefore

Concern that heroic measures are used too frequently on the very elderly, can be laid to rest. Research on adults aged 65 or older indicates that hospital use and "aggressiveness" of care decreases with very old age.

no longer be able to cope with rising health care costs. The concern that the lives of the very elderly are prolonged with unnecessary techniques can be put to rest, given that research focusing on older adults aged 65 or older indicates that hospital use and "aggressiveness" of care (e.g., ICU admissions, cardiac catheterization) decreases with very old age (Demers, 1998; Levinsky et al., 2001). However, when total health care costs are considered, dying at a very old age indeed appears to be more costly than dying at a younger age (Roos et al., 1987; McGrail et al., 2000). For instance, a Manitoba study suggests that total costs for those 85 years or older were higher than those for younger individuals, because of the heavy use of nursing homes among the very old (Roos et al., 1987). The high cost of the oldest-old may therefore not reflect aggressive—and perhaps unnecessary treatment—at the end of life, but rather prolonged care for very frail individuals with high care needs.

1.2 Palliative Care in Manitoba

Palliative care can be defined as "care aimed at alleviating suffering -- physical, emotional, psychosocial, or spiritual -- rather than curing" (Subcommittee to Update "Of Life and Death", 2000). In Manitoba a number of palliative care options are available. Winnipeg has the distinction of being one of two cities in Canada (the other being Montreal) to first introduce a hospital-based palliative care program. Hospital-based palliative care units currently exist in several Winnipeg facilities, the largest being located in the St. Boniface General Hospital and Riverview Health Centre. At the time this report was prepared, a new hospice had just opened at the Grace General Hospital.

Palliative care in people's home is provided through the provincial home care program services administered by the Regional Health Authorities (RHAs). Palliative care options are being expanded in Manitoba on a continuing basis. In 1999/2000, the rural and Northern RHAs were funded to coordinate and improve accessibility to palliative care services in their region, as well as between regions to ensure uniformity in access to palliative care across the province. Specifically, funding was provided to the rural and Northern RHAs for coordinator positions and medical remuneration. In 2000/01, funding was provided to the Winnipeg Regional Health Authority for the establishment of expanded community-based specialized palliative care services in Winnipeg, such as a 24-hour response team of interdisciplinary professionals, and specialized home care services to support community care alternatives. The WRHA Palliative Care Sub-Program is also accessible to general practitioners in rural and Northern Manitoba for expertise in pain management for palliative care patients.

In December 2002, the Palliative Care Drug Access Program was introduced. The program fills an important gap in that it provides deductible-free drug coverage through Manitoba Health for palliative care patients who choose to die at home or in a community setting. In the past, drug coverage was provided in hospitals and personal care homes (PCHs) only, which limited the options and may have provided an inappropriate incentive to admit palliative care patients to hospital or PCHs at the end of life.

Other services for terminally ill individuals not funded through Manitoba Health are also available. Several hospices in Winnipeg provide end-of-life care. Moreover, Hospice and Palliative Care Manitoba, which was founded in 1983 (then known by the name Manitoba Hospice Foundation), provides volunteer visiting services, as well as bereavement services.

2.0 METHODS

2.1 Data Sources

This report was based on anonymized (no names, no addresses) administrative data contained in the Population Health Research Data Repository housed at MCHP. We used the following databases: hospital discharge abstracts, long-term care (PCH) data, home care data, physician data, pharmaceutical files, vital statistics data, population registry and public use census files. In addition, we obtained the palliative care registry maintained by the Winnipeg Regional Health Authority to supplement information on palliative care patients not contained in the Repository.

2.2 Study Period and Population

The health care use and cost for 9,436 individuals who died in fiscal year 2000/01, were examined.

We examined health care use and cost for the entire cohort of adult Manitobans (age 19 or older and residents of Manitoba)—9,436 individuals—who died in fiscal year 2000/01. This year was chosen because it was the most recent year for which we had complete vital statistics data, which is critical for this report in terms of providing information on cause of death. Health care use of this decedent cohort was initially tracked over two years prior to death to determine at what point health care use starts to increase. Thus, our study extended as far back as 1998/99, although our main analyses focused on the last 12 or six months of life (1999/00). Definitions and measures are described in detail in the Glossary.

2.3 Select Measures and Definitions

A description of select measures is provided here. Further information on all measures is provided in the Glossary.

2.3.1 Location of Death

One major aspect of this report was to examine where Manitobans died. We therefore classified decedents into five mutually exclusive categories: 1) those who died in a hospital, 2) those who died in a long-term care setting (which includes Personal Care Homes (PCHs) and, in Winnipeg, both PCHs and Chronic Care hospitals, see Glossary for further details)[1], 3) those who died while receiving home care, 4) those who died in some other location, but were not on home care, and 5) those who died in one of two hospital-based palliative care units in Winnipeg. For convenience sake, we will refer to category (3) as "home care" and category (4) as "Other Location". Note that we do not specifically identify location of death in these instances. For example, an individual might have died on the road in a motor vehicle accident or at home or at work from a heart attack. Also note that the term Other Location is used consistently throughout this report only for those decedents who died neither in hospital, nor in a LTC institution, nor while on home care.

[1] Note that because it is difficult to differentiate in the administrative data between acute care hospitals and chronic care hospitals outside of Winnipeg, chronic care hospitals are classified into our hospital category for Brandon, rural and Northern regions. In Winnipeg, the two main chronic care hospitals that were combined with PCHs into the long-term care category are the Riverview Health Centre and the Deer Lodge Centre.

Our "palliative care unit" category includes the two hospital-based palliative care units in Winnipeg, which can be identified from the hospital file (St. Boniface General Hospital and Riverview Health Centre). Other palliative care units or palliative care beds, or patients that receive palliative care on regular wards, cannot be identified in the administrative data. To fill this data gap, we present additional information from the palliative care registry that we obtained from the Winnipeg Regional Health Authority for 2001/02. The registry captures all individuals registered as palliative care patients in Winnipeg, including, but not restricted to those who died in the two palliative care units. The registry therefore allows comparison to findings based on the administrative data, as well as providing additional information on, for instance, location of death of all palliative patients.

2.3.2 Health Care Use at the End of Life

We focus in the present report on the following health care use indicators: hospital days, long-term care days,[2] home care days, physician visits, and number of prescription drugs (see Glossary for details). We examined health care use in 30-day periods prior to death. In other words, we counted hospital days, for instance, of decedents in the 30 days prior to death (including the date of death) (period 1), the 30 days prior to that (period 2), and so forth. This allowed detailed examination of changes in health care use among decedents over time. Health care use is presented as a rate per decedent.

2.3.3 Health Care Costs at the End of Life

Health care costs were identified for the following: hospital use, PCH use,[3] home care use, physician visits, and prescription drug use. Costs were derived from administrative files for hospital use (calculated on the basis of resource-intensity weights; see Glossary for details), physician visits, and prescription drug use. PCH costs were calculated by multiplying days by an average per diem rate (minus an average residential charge). Thus they represent costs to the health care system. Similarly, home care costs were calculated by multiplying days registered with home care by a per diem. See the Glossary for details on how costs were determined.

2.4 Analyses

We used both descriptive and inferential techniques to describe differences in location of death, use of health care services, and cost of health care services among decedents. Descriptive analyses included percentages, means, medians, and standard deviations.

To examine the factors associated with death in different end-of-life settings we used multinomial regression analyses. A multinomial regression model is similar to a logistic regression model. It is used when there are three or more

[2] As for location of death, long-term care days include PCH days and, for Winnipeg, both PCH days and days in chronic care hospitals (Riverview Health Centre and Deer Lodge Centre).

[3] Note that costs are calculated here separately for PCHs (chronic care hospitals were not included) because we used a per diem approach to estimating the costs.

categories of the outcome variable rather than just two categories as in the logistic model. To examine the factors associated with use of health care services we used regression techniques for count data. In other words, we counted the number of hospital days, physician visits, or drug claims for each decedent, and modelled the count data as a function of the predictor variables. To examine the factors associated with the cost of health care services we used regression techniques for continuous data. Health care costs tend to be highly skewed across the entire population because most people incur relatively low costs, but a few people have very high costs. We transformed the cost data using a logarithmic transformation to reduce the degree of skewness in the data. Then we ran the regression analyses. Further information regarding the analyses is presented in Appendix B.

All of the predictor variables used in the regression analyses were categorical. They included the following (see Glossary for further details):

- Sex;
- Marital status (married versus not married, or unknown), included only for individuals aged 65 or over;
- Cause of death (cardiovascular disease, cancer, respiratory diseases, injuries, and all other causes of deaths);
- Region of residence, determined at the RHA level, although we combined RHAs into larger regions in the analyses;
- Income quintiles, a measure of the average household income of the neighbourhood in which individuals lived, as determined from Census data.

For most analyses we ran separate analyses for the following age groups: 19-44 years, 45-64 years, and 65+ years. We took this approach because of the strong association between age at death and cause of death, which had the tendency to mask the influence of other predictor variables in the models. For the 65+ age group, we also included age in the analysis (65-74, 75-84, 85+ years).

2.5 Data Limitations

Several data limitations should be noted at this point. As indicated above, a major limitation relates to identifying individuals designated as palliative care patients. Although it is possible to identify individuals who died in the Riverview Health Centre and St. Boniface General Hospital palliative care units, other hospital palliative care units cannot be identified using administrative data files. Individuals dying in such units, as well as individuals who died in other beds set aside for palliative patients, or patients who received palliative care on a regular (e.g., medical) ward are therefore classified as having died "in hospital".

Similarly, given that a code for palliative care patients in the home care file was introduced in 2000 only, there was not sufficient data available for our 2000/01 decedent cohort to specifically identify palliative care clients receiving home care. Thus palliative home care clients are categorized into our "home care" group. Hospices also cannot be identified using administrative data, which means that people who died in a hospice would be classified as having died with home care, if they indeed received home care in the hospice, or as having died in Other Locations if they did not receive home care at the time of death. As the number of hospices in Manitoba is small, this will not affect the results substantially, however.

Lastly, it is important to reiterate that, for Winnipeg, chronic care hospitals (Riverview Health Centre, Deer Lodge Centre) were combined with PCHs, given that they provide care for patients with long-term illness. In rural and Northern areas, however, chronic care hospitals were included in the "hospital" category, as they cannot easily be separated from acute care hospitals in the administrative data.

3.0 WHERE DO MANITOBANS DIE?

Of the 9,436 Manitobans who died in 2000/01, only 13.2% lived in the most affluent urban areas, compared to 24.2% who lived in the poorest urban areas. In rural areas, 10.3% lived in the most affluent areas as compared to 29.6% who lived in the poorest areas.

Table 1 provides a general description of the 9,436 Manitoba residents who died in 2000/01. The main cause of death was cardiovascular diseases (37%), followed by cancer (27%). About two-thirds of decedents were 75 years or older. As has been shown in previous research (Roos and Mustard, 1997), a clear gradient is also apparent for income quintiles. If deaths occurred at the same rate in each quintile, approximately 20% of decedents should fall into each of quintiles. This is clearly not the case: only 13.2% of decedents lived in the most affluent urban areas, compared to 24.2% who lived in the poorest urban areas. Similarly, in rural areas, 10.3% of decedents lived in the most affluent areas, as compared to 29.6% who lived in the poorest areas.

Table 1: A descriptive profile of Manitobans (age 19+) who died in 2000/01

	No. of Cases	Per cent
Cause of Death		
Cardiovascular Diseases	3,471	36.8%
Cancer	2,569	27.2%
Respiratory Diseases	734	7.8%
Injuries	533	5.6%
Other	2,129	22.6%
Age Group		
19-44 years	434	4.6%
45-64 years	1,324	14.0%
65 - 74 years	1,614	17.1%
75 - 84 years	2,855	30.3%
85+ years	3,209	34.0%
Sex		
Men	4,768	50.5%
Women	4,668	49.5%
Marital Status		
Not Married	5,681	60.2%
Married	3,734	39.6%
Unknown	21	0.2%
Urban Income Quintile		
1 - Poorest	1,722	29.6%
2	1,507	25.9%
3	1,116	19.2%
4	865	14.9%
5 - Wealthiest	598	10.3%
Rural Income Quintile		
1 - Poorest	485	24.2%
2	554	27.6%
3	405	20.2%
4	299	14.9%
5 - Wealthiest	264	13.2%
RHA of Residence		
South Eastman	340	3.6%
South Westman	351	3.7%
Brandon	398	4.2%
Central	757	8.0%
Marquette	449	4.8%
Parkland	501	5.3%
Winnipeg	5,442	57.7%
North Eastman	288	3.1%
Interlake	595	6.3%
Nor-Man	171	1.8%
Burntwood/Churchill	144	1.5%
Total	9,436	100%

47.4% of deaths in Manitoba occurred in hospital, 24.0% in a LTC institution, 6.2% receiving home care, 15.7% in Other Locations and 6.7% in palliative care units.

Figure 1 shows the proportion of decedents by location of death. Nearly half (47.4%) of deaths in Manitoba occurred in a hospital, 24.0% in a LTC institution, 6.2% while people were on home care at the time of death, 15.7% died in Other Locations and 6.7% died in a palliative care unit. Note that while the percentages for hospital, long-term care institutions (LTC), home care and Other Locations are based on the whole province, palliative care units include only the two units in Winnipeg (St. Boniface General Hospital and Riverview Health Centre).

Figure 1: Location of Death, 2000/01

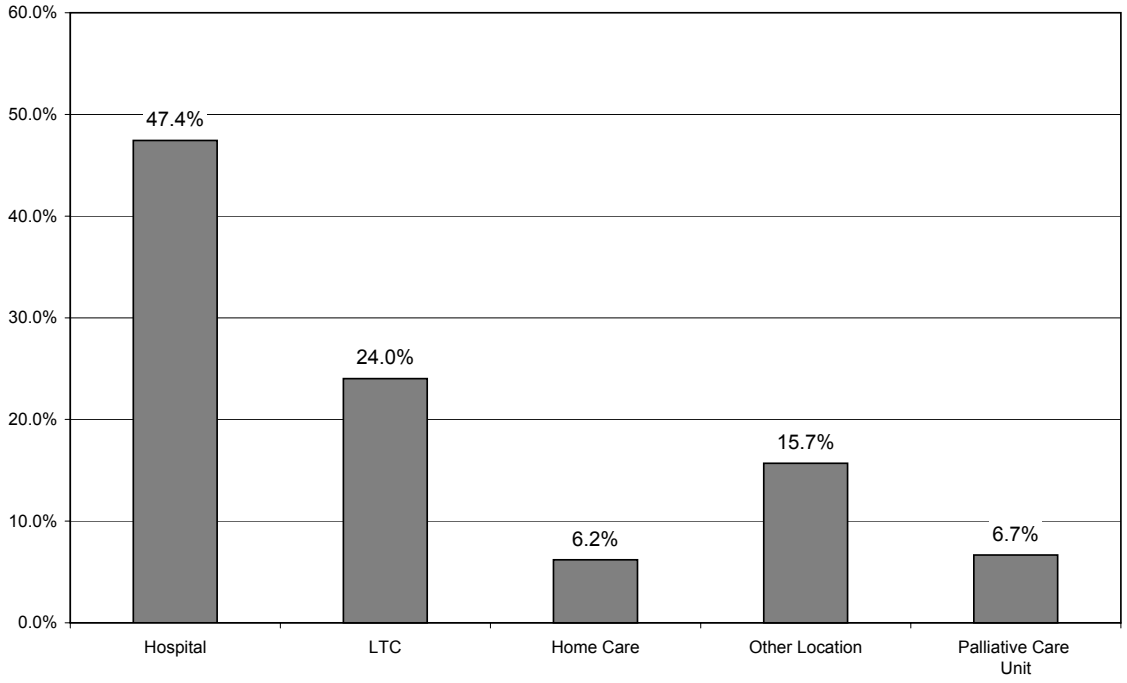


Table 2 provides a more detailed description of patient characteristics by location of death. For example, while 33.2% of deaths in hospital were due to cardiovascular diseases, 52.9% of deaths in Other Locations were due to this cause. Similarly, about a third of deaths in hospital and while on home care were due to cancer. The proportion was much higher in the two palliative care units in which 88.7% of deaths were due to cancer.

Table 2: Descriptive profile of decedents for different locations of death, 2000/01

	Location of Death									
	Hospital		LTC		Home Care		Other Location		Palliative Care Unit	
Cause of Death										
Cardiovascular Diseases	1485	33.2%	951	41.9%	225	38.5%	782	52.9%	28	4.4%
Cancer	1475	32.9%	232	10.2%	209	35.7%	94	6.4%	559	88.7%
Injuries	170	3.8%	40	1.8%	15	2.6%	306	20.7%	2	0.3%
Respiratory Diseases	391	8.7%	250	11.0%	42	7.2%	47	3.2%	4	0.6%
Other	956	21.4%	794	35.0%	94	16.1%	248	16.8%	37	5.9%
Age										
19-44 years	139	3.1%	4	0.2%	17	2.9%	254	17.2%	20	3.2%
45-64 years	636	14.2%	34	1.5%	101	17.3%	389	26.3%	164	26.0%
65-74 years	834	18.6%	142	6.3%	105	17.9%	348	23.6%	185	29.4%
75-84 years	1516	33.9%	576	25.4%	219	37.4%	346	23.4%	198	31.4%
85+ years	1352	30.2%	1511	66.7%	143	24.4%	140	9.5%	63	10.0%
Sex										
Men	2339	52.2%	808	35.6%	294	50.3%	1003	67.9%	324	51.4%
Women	2138	47.8%	1459	64.4%	291	49.7%	474	32.1%	306	48.6%
Marital Status										
Not Married	2441	54.5%	1797	79.3%	319	54.5%	825	55.9%	299	47.5%
Married	2030	45.3%	467	20.6%	264	45.1%	644	43.6%	329	52.2%
Unknown	6	0.1%	3	0.1%	2	0.3%	8	0.5%	2	0.3%
Urban Income Quintiles										
1 - Poorest	883	28.7%	229	28.8%	125	29.4%	324	33.9%	161	28.9%
2	806	26.2%	291	36.6%	98	23.1%	199	20.8%	113	20.3%
3	608	19.8%	115	14.5%	86	20.2%	195	20.4%	112	20.1%
4	457	14.9%	105	13.2%	70	16.5%	135	14.1%	98	17.6%
5 - Wealthiest	322	10.5%	54	6.8%	46	10.8%	102	10.7%	74	13.3%
Rural Income Quintiles										
1 - Poorest	264	24.4%	57	19.8%	38	27.3%	119	26.2%	7	16.7%
2	295	27.2%	108	37.5%	26	18.7%	121	26.6%	4	9.5%
3	214	19.8%	64	22.2%	36	25.9%	85	18.7%	6	14.3%
4	174	16.1%	35	12.2%	13	9.4%	71	15.6%	6	14.3%
5 - Wealthiest	136	12.6%	24	8.3%	26	18.7%	59	13.0%	19	45.2%
RHA of Residence										
South Eastman	179	4.0%	78	3.4%	28	4.8%	45	3.0%	10	1.6%
South Westman	196	4.4%	91	4.0%	19	3.2%	43	2.9%	2	0.3%
Brandon	207	4.6%	112	4.9%	22	3.8%	56	3.8%	1	0.2%
Central	399	8.9%	190	8.4%	40	6.8%	114	7.7%	14	2.2%
Marquette	240	5.4%	114	5.0%	22	3.8%	68	4.6%	5	0.8%
Parkland	269	6.0%	112	4.9%	41	7.0%	74	5.0%	5	0.8%
Winnipeg	2373	53.0%	1388	61.2%	337	57.6%	777	52.6%	567	90.0%
North Eastman	137	3.1%	44	1.9%	20	3.4%	79	5.3%	8	1.3%
Interlake	319	7.1%	113	5.0%	42	7.2%	109	7.4%	12	1.9%
Nor-Man	97	2.2%	21	0.9%	10	1.7%	41	2.8%	2	0.3%
Burntwood/Churchill	61	1.4%	4	0.2%	4	0.7%	71	4.8%	4	0.6%
Total	4477	100%	2267	100%	585	100%	1477	100%	630	100%

Note: Palliative care units include only units at the St. Boniface General Hospital and the Riverview Health Centre in Winnipeg.
Because of rounding, percentages may not add up to 100%.

A great deal of variation is also apparent for age. For instance, 30.2% of hospital deaths involved individuals aged 85 or older. In comparison, 66.7% of deaths in LTC institutions involved individuals aged 85 or older. This reflects the fact that a large proportion of LTC residents are in that age

range, with approximately half of admissions to Personal Care Homes (PCHs) involving individuals aged 85 years or older (Menec et al., 2002).

The gender distribution also differed systematically across locations of death, with about two-thirds of LTC deaths involving women. Given that the majority of LTC residents are women, this high proportion is not surprising. Conversely, about two-thirds of deaths in the Other Location category involved men.

Income quintiles displayed the gradient noted above across all locations of death, with the proportion of deaths generally being higher among residents living in poorer areas relative to individuals who lived in wealthier areas.

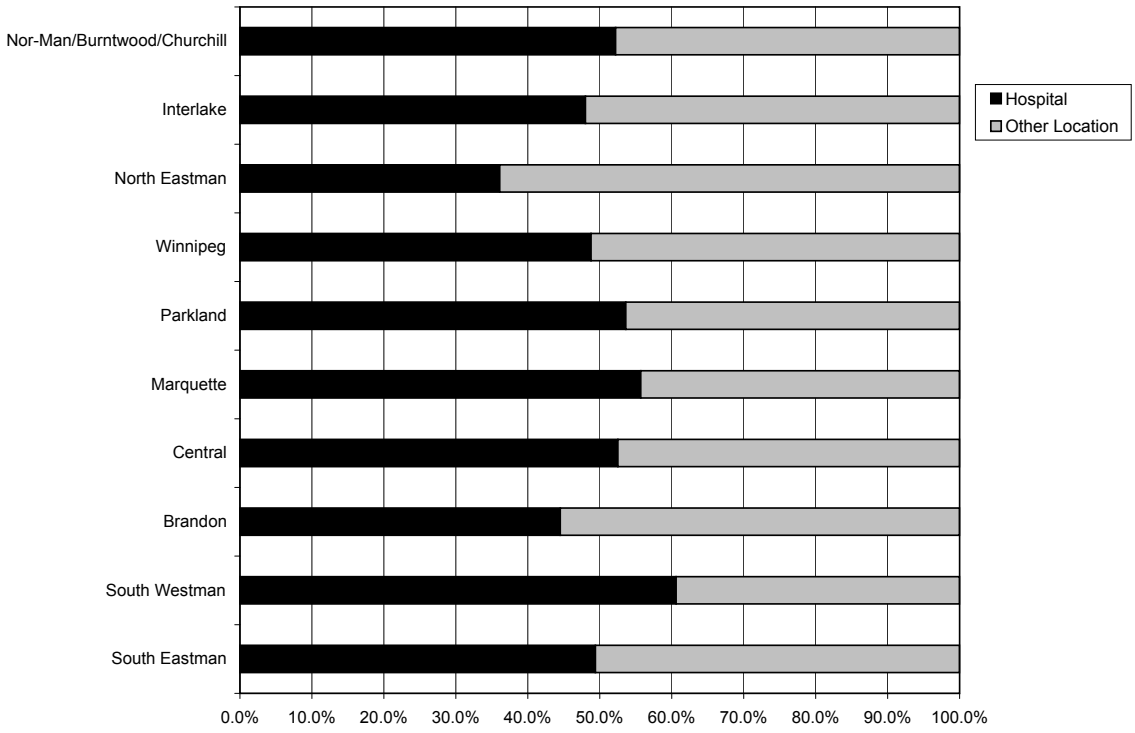
More than half of all deaths occurred among Winnipeg residents.

A breakdown of RHA-specific information is also provided. More than half of all deaths occurred among Winnipeg residents. Because the number of deaths in many of the RHAs was small, for our analyses presented later we grouped the RHAs into regions: Northern (Nor-Man, Burntwood, Churchill); Central (Marquette, Parkland, North Eastman, Interlake); Southern (South Eastman, South Westman, Brandon, Central); and Winnipeg (Brownell et al., 2003; see Glossary for further details on these groupings).

3.1 Regional Variation in Location of Death

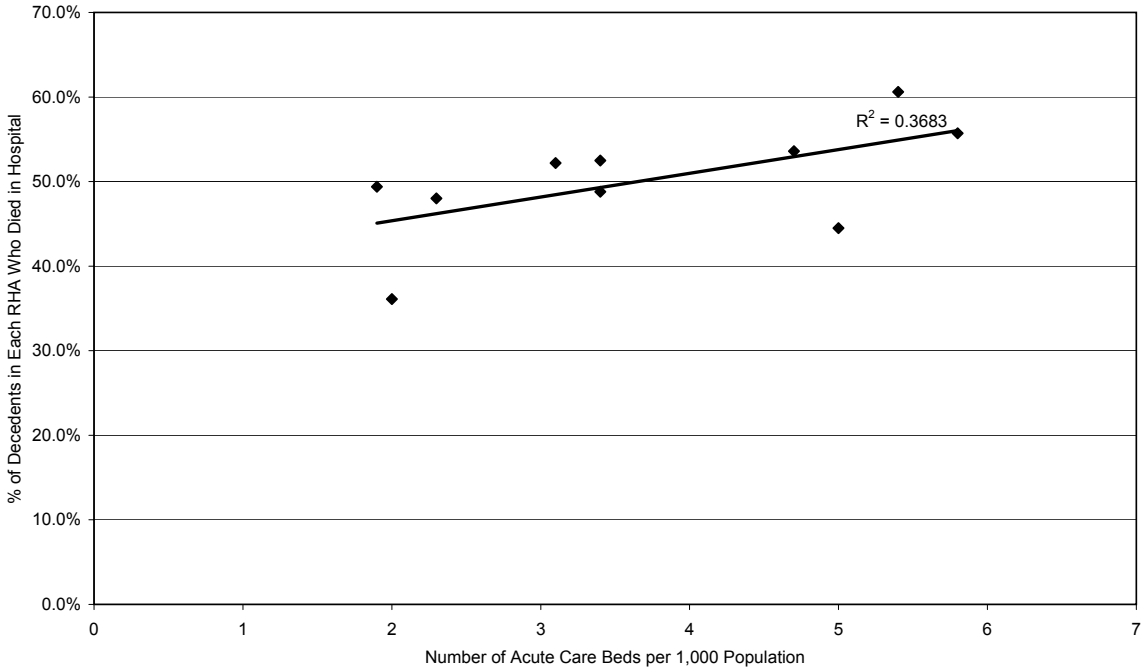
To take a closer look at whether there was any regional variation in where Manitobans died, we calculated age-sex standardized rates for the different locations of death for each RHA. Given the relatively small number of decedents in some RHAs, we used two age categories—19 to 64 and 65+. Figure 2 shows the proportion of individuals who died either in hospital or in Other Locations. Only two locations of death are included, as virtually nobody in this age group died in a LTC setting or while on home care. Note that RHAs are rank ordered on the basis of premature mortality rates—a measure of the health of the population—to be consistent with previous MCHP reports (Black et al., 1999). Nor-Man/Burntwood/Churchill exhibit the highest premature mortality rate, reflective of the poorest health status, and South Eastman the lowest premature mortality rate, reflective of the best health status in Manitoba.

Figure 2: Location of Death by RHA of Residence, Age 19-64



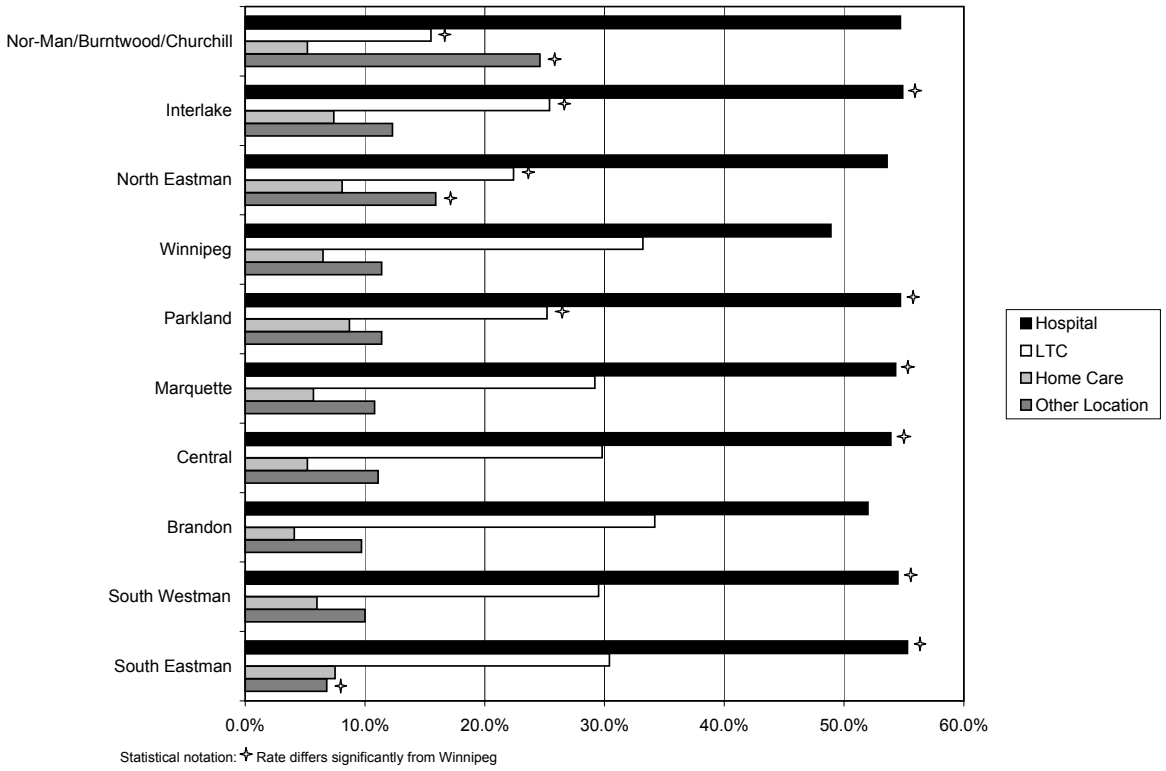
There was considerable variation in location of death among decedents 19 to 64 years of age, with the proportion of hospital deaths ranging from 36.1% to 60.6%. However, specific comparisons indicated that none of the rural and Northern RHAs differed from Winnipeg in a statistically significant way. Previous research shows that the number of acute care beds in a region is related to the likelihood of hospital death (Dartmouth Atlas, 1999). To explore this issue we examined the relation between the number of acute care beds (per 1,000 population) in each RHA and the proportion of hospital deaths. A strong relation between the two factors indeed emerged, with about a third of the variation in hospital death rates attributable to the number of acute care beds (see Figure 3; Spearman's rho=.64, $p < .05$). This finding is virtually identical to what has been found in the U.S. (Dartmouth Atlas, 1999).

Figure 3: The Relation Between Acute Care Beds and the Proportion of Individuals Dying in Hospital: Age 19-64



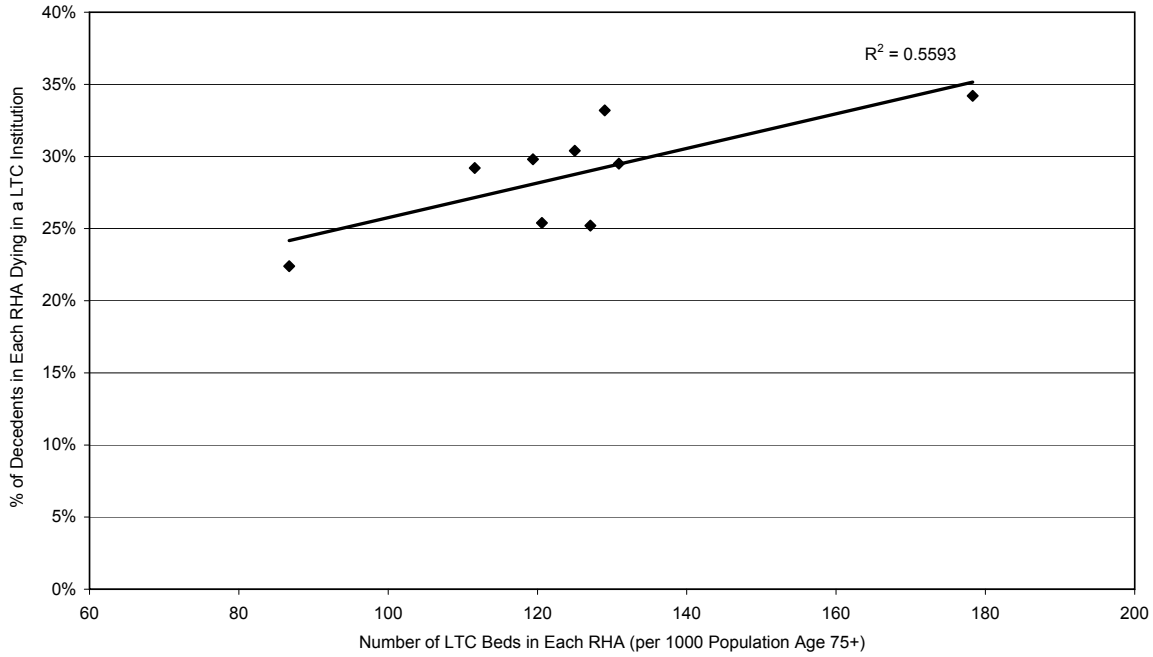
Substantial variation across RHAs in location of death also emerged for 65+ year old decedents (see Figure 4). The proportion of hospital deaths ranged from a low of 48.9% among Winnipeg residents to a high of 54.9% among Interlake residents. Residents of Interlake, Parkland, Marquette, Central, South Westman, and South Eastman had significantly higher proportions of hospital deaths than Winnipeg residents. Conversely, Winnipeg residents had a significantly higher proportion of LTC deaths (33.2%) than residents of Nor-Man/Burntwood/Churchill (15.5%), Interlake (25.4%), North Eastman (22.4%), and Parkland (25.2%). The proportion of individuals who died on home care did not differ significantly across RHAs. Some differences emerged for death in Other Locations, with the proportion being higher for residents of Nor-Man/Burntwood/ Churchill and North Eastman, but lower for South Eastman residents, relative to Winnipeg residents.

Figure 4: Location of Death by RHA of Residence, Age 65+



Unlike the findings for younger decedents, the number of acute care beds (per 1,000 population) per RHA was not related to the proportion of hospital deaths. However, the number of LTC beds in each RHA (per 1,000 75+ year old population) was related to the proportion of decedents who died in LTC settings (see Figure 5; Spearman's rho = .72; $p < .05$). LTC bed supply was not significantly related to the proportion of decedents who died while on home care.

Figure 5: The Association Between LTC Bed Supply and the Proportion of Decedents Who Died in LTC Institutions



3.2 A Profile of Palliative Care Patients in Winnipeg

This section supplements the administrative data with information from the palliative care registry maintained by the WRHA.

Using administrative data, we are able to capture only those palliative care patients admitted to the two main palliative care units in Winnipeg (St. Boniface General Hospital, and Riverview Health Centre). Some information on patients in these units has already been presented (see Table 2). The purpose of this section is to supplement the administrative data with information from the palliative care registry maintained by the Winnipeg Regional Health Authority. The database captures all individuals registered as palliative care patients in Winnipeg, regardless of where (and when) they died. As the registry was implemented only in the fall of 2000, we present data for calendar year 2001. Note that the year therefore does not correspond directly to the rest of the data presented in this report, which focused on fiscal year 2000/01.

Table 3 shows descriptive information for palliative care patients in Winnipeg. We differentiate in the Table between individuals who died in either the Riverview Health Centre or St. Boniface Hospital palliative care units and all other patients identified in the palliative care registry. The latter group is of particular interest because we could not identify them in the

administrative data. In 2001, a total of 1,063 individuals were registered as palliative care patients, 55.6% of which died in the two palliative care units.

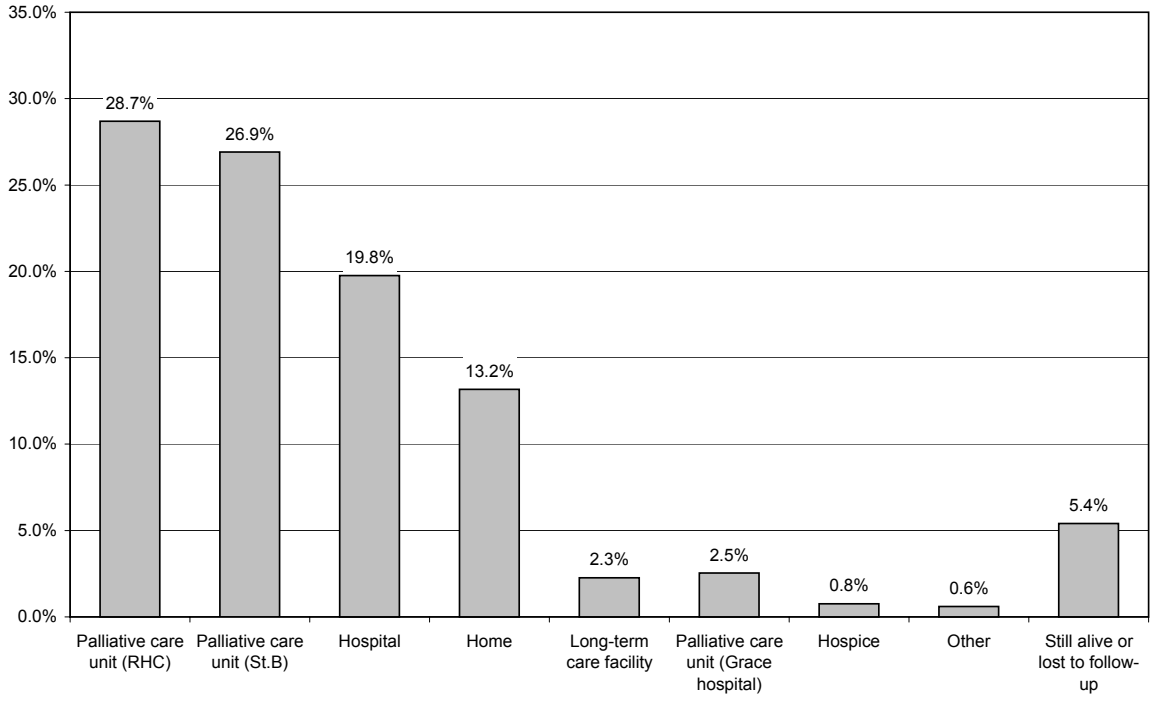
Table 3: Palliative care patients, Winnipeg, 2001

	St. Boniface, Riverview Palliative Care Units		Other Palliative Patients		Total	
Age Group						
19-44 years	28	4.7%	14	3.0%	42	4.0%
45-64 years	158	26.7%	113	23.9%	271	25.5%
65-74 years	157	26.6%	110	23.3%	267	25.1%
75-84 years	186	31.5%	162	34.3%	348	32.7%
85+ years	62	10.5%	73	15.5%	135	12.7%
Sex						
Men	309	52.3%	235	49.8%	544	51.2%
Women	282	47.7%	237	50.2%	519	48.8%
Total	591	100%	472	100%	1063	100%

A relatively small proportion of palliative care patients were 85 years or older (see Table 3). For example, 10.5% of individuals who died in the Riverview and St. Boniface palliative care units and 15.5% of other palliative care patients were 85 years or older. This is to a large extent due to the patient population—predominantly cancer patients—who tend to be younger than patients in other disease groups.

Figure 6 shows location of death of palliative care patients. As noted earlier, slightly over half of them died in the Riverview and St. Boniface palliative care units (55.6%), 19.8% in hospital, and 13.2% at home. The remaining patients died either in long-term care facilities, other palliative care settings (Grace palliative care unit and hospices), or other settings.

Figure 6: Palliative Care Patients: Location of Death, 2001



The palliative care registry also includes the length of registration as palliative until death. Length of registration varied quite substantially. About a third (37.2%) of palliative care patients were registered for two weeks or less, 47.9% between two weeks and four months, and 14.9% of palliative care patients had been registered for four months or longer.

The palliative care registry adds important information that could otherwise not be captured with administrative data.

Thus, the palliative care registry adds important information on palliative care patients that could otherwise not be captured with administrative data. Given that the St. Boniface General Hospital and Riverview Health Centre palliative care units that are captured in the administrative data represented only about half of palliative care patients in Winnipeg in 2001, this highlights the need for reliable identifiers of such patients within the administrative data. A specific code identifying palliative care patients in the home care file was introduced in some RHAs in 2000. Given the increasing emphasis on home deaths, it will be important to ensure that this data field indeed captures palliative home care patients across all of Manitoba. Similarly, it will be important to be able to identify other palliative care units, such as the recently opened hospice at the Grace General Hospital.

4.0 WHAT FACTORS ARE RELATED TO LOCATION OF DEATH?

4.1 Analyses for All Decedents

As a next step, we examined what factors were related to location of death. Four locations of death were considered: hospital, LTC, home care, and Other Locations. However, we sometimes combined or excluded certain locations if the number of deaths was too small. This was an issue for decedents under 65 years of age, because very few young people die in a LTC setting or while on home care. It is important to reiterate here that the label Other Location is reserved throughout this report for decedents who did not die in hospital, or in a LTC institution, or while on home care. Palliative care units were not included in these analyses, because they were predominantly used by Winnipeg residents with cancer. We present analyses with these individuals in a subsequent section on cancer patients.

The label "Other Location" is for decedents who did not die in hospital, in a LTC institution, or while on home care.

Multinomial regression analyses were used to examine the relation between cause of death, region of residence, sex, marital status (included for 65+ year olds only), and income quintiles, and the outcome variable—the location of death.

4.1.1 Individuals Aged 19 to 44

Our regression analyses indicated that that there was a significant association between cause of death and location of death (see Table 4). Note that there were too few deaths among young adults in LTC institutions or home care settings to include these locations in the analysis. Decedents who died in hospital were significantly more likely to have died of cancer and significantly less likely to have died of cardiovascular diseases and injuries than individuals who died in Other Locations. Figure 7 illustrates this relation; while 36% of hospital deaths involved cancer, only 1.2% of deaths in Other Locations did. Conversely, 66.9% of deaths in Other Locations were due to injuries, compared to only 16.5% of deaths in hospital.

Those who died in hospital were more likely to have died of cancer (36%), and less likely to have died from cardiovascular diseases and injuries than those who died in Other Locations (1.2%).

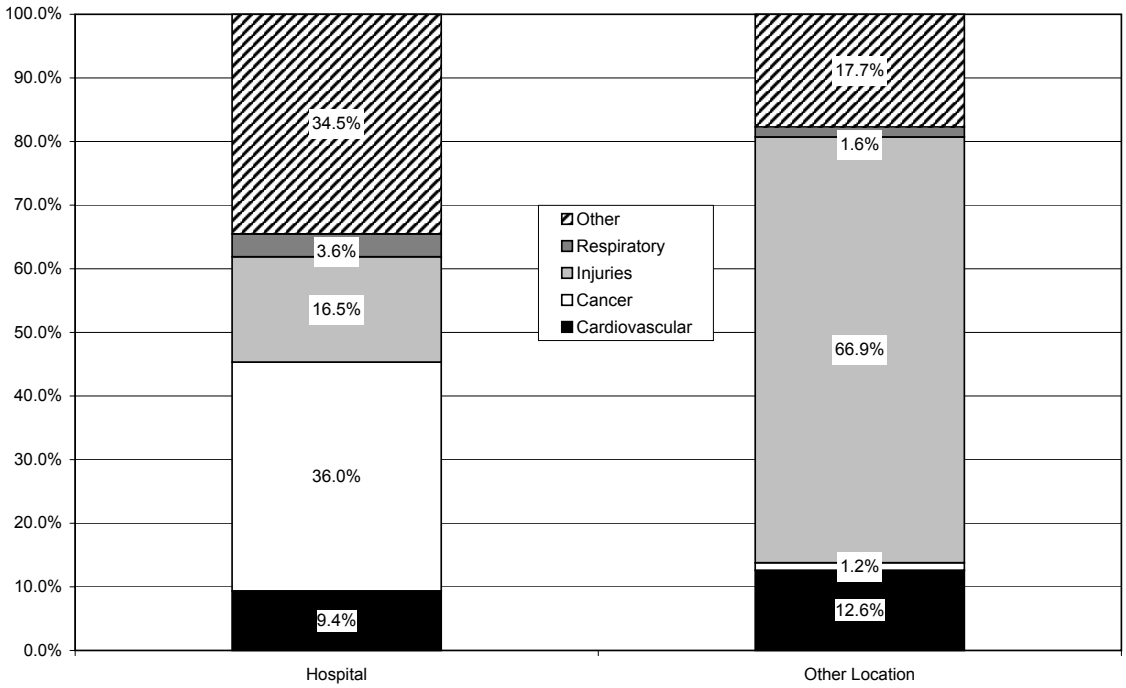
Table 4: Factors related to death in hospital versus in Other Locations, age 19-44: Regression results

Factors	Odds Ratio
Cause of Death	
Cancer	17.95*
Cardiovascular Diseases	0.39*
Injuries	0.14*
All Other Causes (comparison group)	--
Sex	
Men	0.86
Women (comparison group)	--
Region of Residence	
Non-Winnipeg	0.76
Winnipeg (comparison group)	--
Urban Income Quintiles[a]	
Q4/Q5 - Wealthiest	1.00
Q3	1.41
Q2/Q1 - Poorest (comparison group)	--
Rural Income Quintiles[a]	
Q4/Q5 - Wealthiest	1.12
Q3	1.70
Q2/Q1 - Poorest (comparison group)	--

Odds ratios >1 indicate an increased likelihood of dying in hospital; odds ratios <1 indicate a decreased likelihood of dying in hospital (relative to dying in Other Locations). A star (*) beside the odds ratio denotes statistical significance.

[a] Urban and rural income quintiles were entered in the model in separate regression analyses.

Figure 7: Location of Death by Cause of Death, Age 19-44



Note: Other Location includes only individuals who died neither in hospital, nor in an LTC institution, nor while on home care.

Neither sex nor region of residence was related to location of death (see Table 4). In other words, men and women and Winnipeg versus non-Winnipeg residents were as likely to have died in hospital as in Other Locations.

In a second set of analyses we examined the relation between income quintiles and location of death for urban and rural regions, respectively. Income quintiles were not related to location of death in either urban or rural areas.

4.1.2 Individuals Aged 45 to 64

The two categories of LTC and on home care were combined, due to small numbers of deaths in the group aged 45 to 64 years.

For individuals aged 45 to 64 we considered three locations of death: hospital, LTC/home care, and Other Locations. Given the small numbers of deaths in LTC and on home care in this age group, these two categories were combined. Comparisons were made between hospital versus Other Locations, and LTC/home care and Other Locations, using cause of death, sex, and region in a first analysis and adding income quintiles in a second set of analyses (see Table 5). Note also that four regions are considered in this analysis: Northern (Nor-Man, Burntwood, Churchill); Central (Interlake, Marquette, North Eastman, Parkland); Southern (South Eastman, South Westman, Brandon, and Central); and Winnipeg. This was possible because of the larger number of deaths in the 45-64 age group than in the youngest age group where we could only look at Winnipeg versus non-Winnipeg.

Table 5: Factors related to location of death, age 45-64: Regression results

	Hospital (versus Other Location)	LTC/Home Care (versus Other Location)
Factors	**Odds Ratio**	**Odds Ratio**
Cause of Death		
Cancer	7.57*	5.36*
Cardiovascular Diseases	0.50*	0.50*
Injuries	0.17*	0.22*
All Other Causes (comparison group)	–	–
Sex		
Men	0.72*	0.66*
Women (comparison group)	–	–
Region of Residence		
Northern MB	1.25	0.37
Central MB	0.78	0.81
Southern MB	1.02	1.62
Winnipeg (comparison group)	–	–
Urban Income Quintiles[a]		
Q4/Q5 - Wealthiest	1.05	1.10
Q3	0.87	0.98
Q2/Q1 - Poorest (comparison group)	–	–
Rural Income Quintiles[a]		
Q4/Q5 - Wealthiest	0.85	0.80
Q3	1.09	1.81
Q2/Q1 - Poorest (comparison group)	–	–

Odds ratios >1 indicate an increased likelihood of dying in a particular location; odds ratios <1 indicate a decreased likelihood of dying in a particular location (relative to dying in Other Locations). A star (*) beside the odds ratio denotes statistical significance.

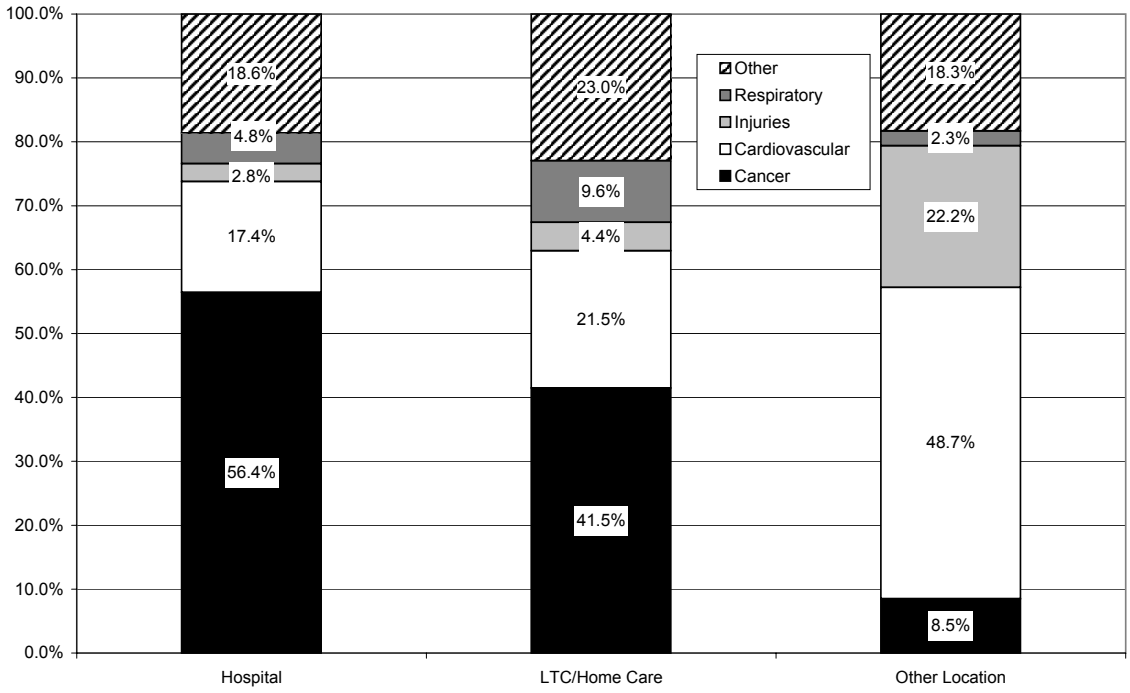
[a] Urban and rural income quintiles were entered in the model in separate regression analyses.

More sudden deaths, such as heart attacks and accidents, occurred in Other Locations such as at home or on the road.

In comparison with individuals who died in Other Locations, those who died in hospital were significantly more likely to have died of cancer or respiratory diseases and were less likely to have died of cardiovascular diseases and injuries. That is, more sudden deaths such as heart attacks and accidents occurred, not surprisingly, in Other Locations such as at home or on the road. Those who died in a LTC setting or while on home care were also significantly more likely to have died of cancer and respiratory disease than those who died in Other Locations. They were also significantly less likely to have died of cardiovascular diseases and injuries.

Figure 8 shows these patterns by displaying the proportion of individuals aged 45 to 64 who died of specific causes in each of the locations of death. The differences in cancer and cardiovascular disease deaths are striking across the different locations. While 56.4% of hospital and 41.5% of LTC/home care deaths were due to cancer, only 8.5% of deaths in Other Locations were due to cancer. Conversely, cardiovascular disease-related deaths were prominent in Other Locations (48.7%), reflective of sudden deaths, such as heart attacks. Similarly, the proportion of injury deaths was considerably higher in Other Locations (22.2%) than in hospital and LTC facilities or while on home care.

Figure 8: Location of Death by Cause of Death, Age 45-64



Note: Other Location includes only individuals who died neither in hospital, nor in an LTC institution, nor while on home care.

Sex also emerged as a significant predictor of location of death (see Table 4): Men were less likely than women to have died in hospital or in LTC/home care than in Other Locations. This may be due to the greater likelihood of men dying suddenly, such as due to a heart attack. Region of residence was not significantly related to location of death.

Individuals living in poorer areas were no more or less likely to die in hospital or LTC/home care than in Other Locations, than those who lived in more affluent areas.

In a second set of analyses we examined the relation between income quintiles and location of death, in addition to cause of death, sex, and region of residence. Income quintiles were not related to location of death in either urban or rural areas. That is, individuals living in poorer areas were no more (or less) likely than people living in more affluent areas to die in hospital or LTC/home care than in Other Locations.

4.1.3 Individuals Aged 65 Years or Older

Table 6 shows results from the regression analysis for individuals 65 years and older. As the number of decedents in this age group was larger than was the case for the younger individuals, it was now possible to examine all four locations of death: hospital, LTC, home care, and Other Locations.

Those who died in hospital were significantly more likely to have died of cancer and respiratory diseases and significantly less likely to have died of cardiovascular diseases and injuries, compared to decedents in Other Locations. The same was true for individuals who died in a LTC setting. For those individuals who died while receiving home care the same pattern generally held true, although those who died of respiratory diseases were as likely to have died while on home care as in Other Locations.

Table 6: Factors related to location of death, age 65+: Regression results

	Hospital (vs. Other Location)	LTC (vs. Other Location)	Home Care (vs. Other Location)
Factors	**Odds Ratio**	**Odds Ratio**	**Odds Ratio**
Cause of Death			
Cancer	3.94*	2.10*	4.90*
Cardiovascular Diseases	0.37*	0.50*	0.50*
Respiratory Diseases	1.66*	2.24*	1.38
Injuries	0.39*	0.20*	0.34*
All Other Causes (comparison group)	--	--	--
Sex			
Men	0.81*	0.74*	0.79*
Women (comparison group)	--	--	--
Marital Status			
Not Married/Unknown	0.90*	1.23*	0.91
Married (comparison group)	--	--	--
Age Group			
85+ years	2.39*	5.31*	2.02*
75 - 84 years	0.95	0.88*	1.09
65 - 74 years (comparison group)	--	--	--
Region of Residence			
Northern MB	0.48*	0.25*	0.40*
Central MB	1.14	1.21	1.33*
Southern MB	1.44*	1.81*	1.30
Winnipeg (comparison group)	--	--	--
Urban Income Quintiles[a]			
Q5 - Wealthiest	1.00	0.80	0.94
Q4	0.97	1.08	1.13
Q3	0.88	0.67	0.90
Q2	1.15	1.66	1.03
Q1 - Poorest (comparison group)	--	--	--
Rural Income Quintiles[a]			
Q5 - Wealthiest	0.96	0.97	1.60
Q4	0.96	0.83	0.52
Q3	0.98	1.05	1.20
Q2	0.89	1.21	0.68
Q1 - Poorest (comparison group)	--	--	--

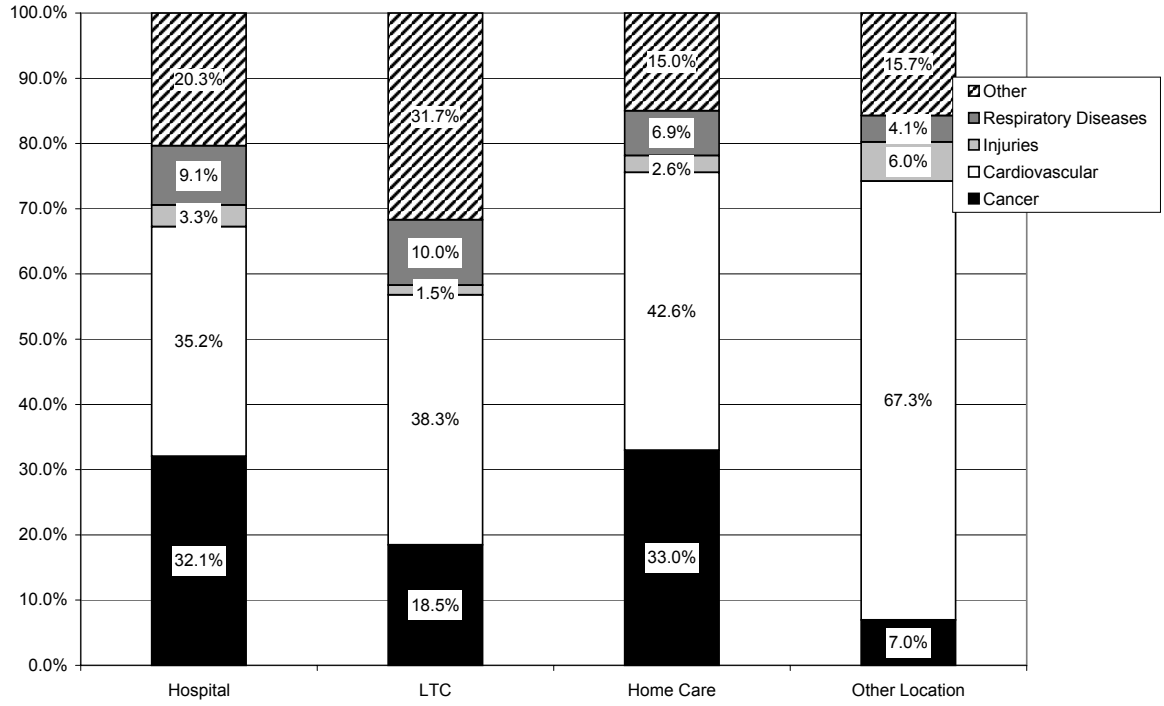
Odds ratios >1 indicate an increased likelihood of dying in a particular location; odds ratios <1 indicate a decreased likelihood of dying in a particular location (relative to dying in Other Locations). A star (*) beside the odds ratio denotes statistical significance.

[a] Urban and rural income quintiles were entered in the model in separate regression analyses.

To illustrate these patterns, Figure 9 displays again the proportion of individuals who died of various causes by location of death. As was the case for the younger age groups, substantial differences are evident across the different locations of death. For example, while about one-third of individuals who died in hospital or while receiving home care died of cancer (32.1%

and 33%, respectively), cancer deaths constituted only 7% of deaths in Other Locations. In contrast, a large proportion of deaths in Other Locations were due to cardiovascular diseases (67.3%).

Figure 9: Location of Death by Cause of Death, Age 65+



Men were less likely than women to have died in hospital, LTC or while on home care than in Other Locations.

The regression analysis also showed a gender effect: Men were less likely than women to have died in hospital, LTC or while on home care than in Other Locations (see Table 6). As noted for the 45 to 64 year olds, this may be because of the greater likelihood of men dying suddenly, such as of a heart attack. Also, given the greater longevity of women, one would expect more women to die in LTC settings and while on home care than men.

Marital status was also related to location of death. Decedents who were not married, or for whom marital status could not be identified, were less likely to die in hospital than in Other Locations, and were more likely to die in LTC institutions than in Other Locations. Moreover, an additional analysis (data not shown) indicated that individuals who were not married were more likely to die in a LTC institution than on home care. In combination, these findings would reflect the fact that LTC residents tend to be unmarried, be it widowed or never married.

Not surprisingly, age was also related to location of death. Decedents who were 85 years of age or older were more likely to have died in hospital, in

LTC institutions, and while on home care than individuals 65 to 74 years old.

Some regional variation also emerged (see Table 6). Northern residents were less likely to have died in hospital, LTC settings, and while on home care than Winnipeg residents. This may, in part, be due to differences in cause of death—Northern areas have a higher proportion of injury deaths than Winnipeg (15.5% versus 5.6%), many of which occur outside the hospital. It may also be related to data issues in that we do not capture the federal nursing homes located in the North.

Southern residents were more likely to have died in hospital and LTC settings, relative to Other Locations, than Winnipeg residents.

In contrast to Northern residents, residents of Southern areas were more likely to have died in hospital and LTC settings, relative to Other Locations, than Winnipeg residents. Moreover, a supplementary analysis (data not shown) indicated that Southern residents were also more likely to die in a LTC institution than on home care. LTC bed supply, which is quite high in some Southern areas relative to Winnipeg, and which we saw earlier is correlated quite strongly with the proportion of individuals dying in LTC settings, likely account to some extent for this finding. The availability of palliative care units in Winnipeg, which allows transfer of palliative patients out of acute care hospitals may also, in part, explain why hospital deaths are lower in Winnipeg.

Lastly, we examined the relation between income quintiles and location of death. Income quintiles were not related to location of death in either urban or rural areas. That is, individuals living in poorer areas were no more (or less) likely than people living in more affluent areas to die in hospital, in a LTC institution, or while on home care than in Other Locations.

4.1.4 Summary

In sum, several factors were consistently related to location of death.

- Cause of death was a major predictor of location of death for all age groups: cancer deaths were much more likely to occur in hospital than in Other Locations, whereas deaths due to cardiovascular diseases and injuries, that is the more sudden deaths, were more likely in Other Locations. This highlights the importance of taking cause of death into account when examining where people die.
- Among middle-aged and older adults, men were less likely to die in hospital or in a LTC setting than women, a finding that may, in part, be due their greater likelihood of dying suddenly due to heart attacks, for instance.
- Some regional variation was apparent. For example, among 65+ year old individuals, Southern residents were more likely to die in a LTC setting than while on home care or in Other Locations. They were also more

likely to die in a hospital or LTC institution than in Other Locations. This fits with our earlier conclusion that there are systematic differences across RHAs in the proportion of hospital and LTC deaths among 65+ year old individuals.

- Lastly, income quintiles were consistently not related to location of death.

4.2 A Look at Different Types of Hospitals

The factors that related to death in teaching hospitals, urban community hospitals in Winnipeg and Brandon and rural hospitals, were explored to determine if patients differ across different types of hospitals.

Our analyses indicated that individuals who died in hospitals differed systematically from those who died in the other three locations of death. Generally, they were more likely to have died of cancer, tended to be female and young-old (65-74 years old) rather than old-old (85+ years old), with the oldest-old being more likely to die in LTC settings. Do patients also differ across different types of hospitals? To explore this question we examined what factors were related to deaths in teaching hospitals, urban community hospitals (in Winnipeg and Brandon), and rural hospitals.

In comparing teaching and urban community hospitals to rural hospitals (see Appendix A, Table 1 for results of the regression analyses), we found that patients who died in teaching hospitals and urban community hospitals were less likely to have died of cancer than those who died in rural hospitals. Injury deaths were more likely in teaching than in rural hospitals and individuals who died in teaching hospitals tended to be younger than those who died in rural hospitals.

A separate analysis, in which we more specifically compared teaching hospitals to urban community hospitals (Winnipeg and Brandon) revealed similar patterns. Regression results are summarized in Table 7. Deaths due to cancer and respiratory illnesses were less likely in teaching hospitals than community hospitals. Conversely, deaths due to injuries were more likely to occur in teaching hospitals. In addition, younger individuals were much more likely to die in teaching hospitals than in community hospitals. In combination, this suggests that, not surprisingly, more acute and complex, as well as trauma cases tend to be treated at the teaching hospitals.

Table 7: Factors related to death in teaching versus urban community hospitals (Winnipeg and Brandon)

Factors	Odds Ratio
Cause of Death	
Cancer	0.66*
Cardiovascular Diseases	1.12
Respiratory Diseases	0.67*
Injuries	1.66*
All Other Causes (comparison group)	--
Sex	
Men	1.02
Women (comparison group)	--
Age Group	
19-44 years	4.70*
45-64 years	1.53
65-74 years	0.90
75-84 years	0.58*
85+ years (comparison group)	--
Region of Residence	
Non-Winnipeg	0.92
Winnipeg (comparison group)	--

Odds ratios >1 indicate an increased likelihood of dying in teaching hospitals; odds ratios <1 indicate a decreased likelihood of dying in teaching hospitals (relative to dying in urban community hospitals). A star (*) beside the odds ratio denotes statistical significance.

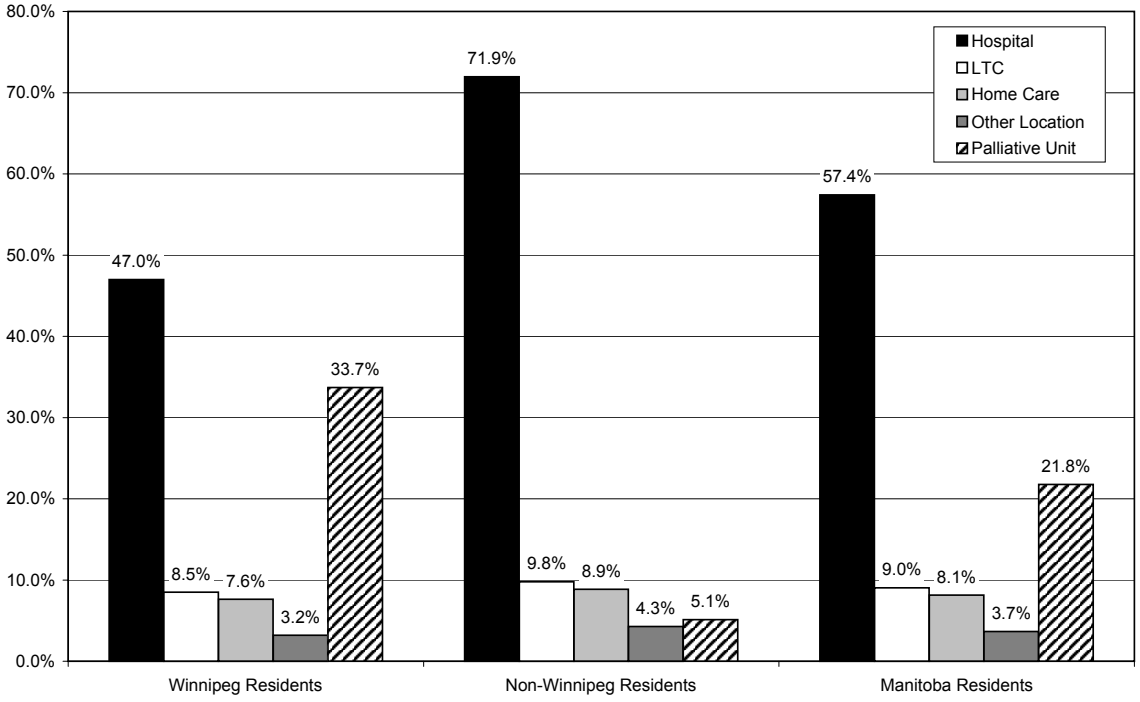
4.3 A Profile of Cancer Patients

Cancer patients represent a group of individuals that is quite different from individuals with other diseases, in part because the duration, intensity, and type of symptoms follow a different course (Seale, 1991). Unlike for other diseases, a terminal decline is more readily apparent. Considerable research has therefore focused exclusively on cancer patients. We therefore conducted a separate set of analyses for individuals who died of cancer.

In Winnipeg, 47% of cancer deaths occurred in hospital, compared to 71.9% of cancer deaths among non-Winnipeg residents. This is largely explained by the presence of palliative care units in Winnipeg.

Figure 10 shows the proportion of individuals who died of cancer in different locations for Winnipeg residents, non-Winnipeg residents, and all Manitobans. Two key findings emerged: 1) a large proportion of cancer deaths occurred in hospitals, both in Winnipeg and outside of Winnipeg and 2) a substantial difference is apparent between Winnipeg and non-Winnipeg in terms of the proportion of hospital deaths. Among Winnipeg residents, 47% of cancer deaths occurred in hospital, compared to 71.9% of cancer deaths among non-Winnipeg residents. This large Winnipeg/non-Winnipeg discrepancy is largely explained by the palliative care units, in that 33.7% of cancer deaths occurred in one of the two palliative care units among Winnipeg residents, compared to only 5.1% (55 individuals) among non-Winnipeg residents. Note that the 5.1% of deaths represent non-Winnipeg residents who died in one of the two palliative care units in

Figure 10: Location of Death: Cancer Deaths



Winnipeg.

It is important to reiterate at this point that we underestimate the number of individuals who died in palliative care settings.

It is important to reiterate at this point that we underestimate the number of individuals who died in palliative care settings; the proportions would in reality be somewhat higher for both Winnipeg and non-Winnipeg and, correspondingly, the proportion of hospital deaths somewhat lower. Also, given the new developments in Manitoba regarding palliative care (expansion of the palliative care program and, more recently, the introduction of the Palliative Drug Access Program), current figures of the number of deaths at home with home care are likely higher than what we present here for 2000/01.

4.3.1 Factors Related to Location of Death Among Cancer Patients

Analogous to the analysis we conducted for all decedents, we examined factors related to location of death among individuals who died of cancer. We conducted several analyses focusing on the questions: 1) what factors were related to dying either in hospital, LTC setting, on home care, or in Other Locations?, 2) among Winnipeg residents, what factors were related to death in a palliative care unit, on home care or in Other Locations?, and 3) for hospital deaths (Winnipeg facilities only), what factors were related to dying in an ICU, on another ward (essentially any ward other than ICUs), or a palliative care unit?

Only two important findings were identified in these analyses: women who died of breast cancer were more than three times as likely to have died in a LTC facility than in Other Locations; and 85+ year old individuals were more likely to die either in hospital, in LTC settings or while on home care than in Other Locations. As well, 85+ year old individuals were also less likely to have died in a palliative care unit relative to another ward, and 65-74 years individuals were more likely to have died in a palliative care ward. Regression results are presented in Appendix A, Tables 2A and 2B. Region of residence and income quintiles were not important predictors of location of death in these analyses.

Several noteworthy findings emerge for cancer deaths; there is considerable regional variation in where cancer deaths occurred and there were few systematic effects that predicted location of death.

4.3.2 Summary

In sum, several noteworthy findings emerge for cancer deaths. First, there is considerable regional variation in where cancer deaths occurred: the proportion was substantially lower for Winnipeg residents than non-Winnipeg residents. This was due primarily to the two palliative care units in Winnipeg that can be identified in the data, which absorbed a large proportion of cancer deaths. Second, in terms of our analyses that looked at factors that predict location of death, perhaps the most interesting finding was that there were few systematic effects that predicted location of death.

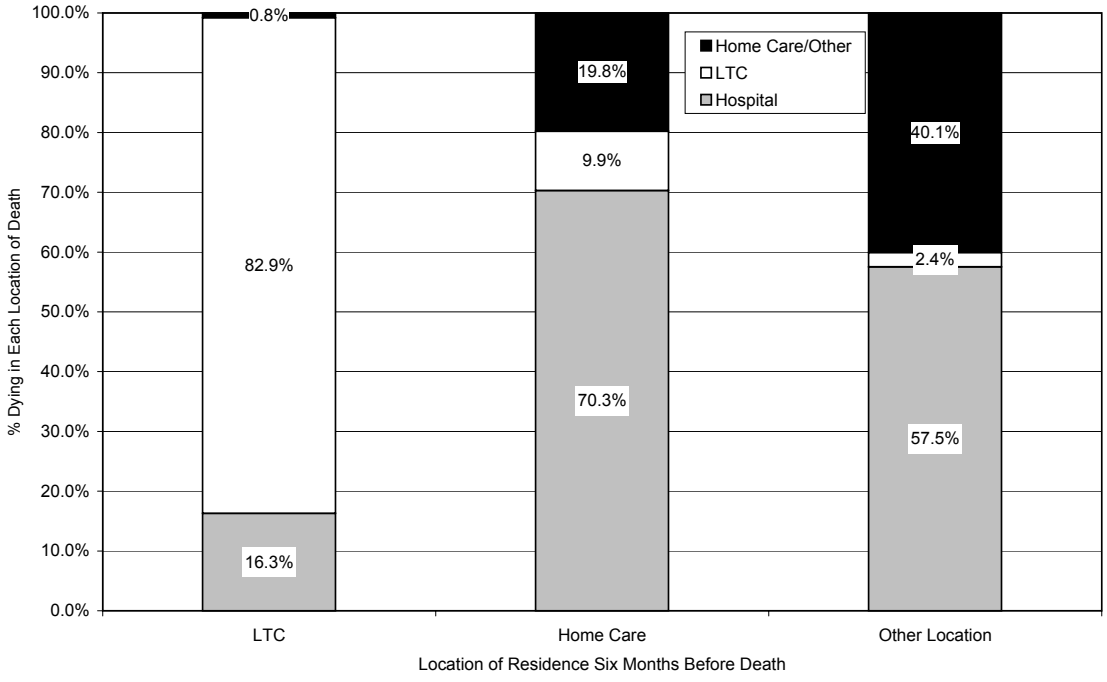
5.0 TRANSFERS TO HOSPITALS IN THE LAST SIX MONTHS OF LIFE

In the previous section we examined what factors are related to location of death. In this section we focus more specifically on transfers to acute care hospitals. Key questions we address are: How many times are individuals hospitalized in the last six months before death? And does this vary by where they live? To address these questions we determined decedents' location of residence six months prior to death, classifying them into four groups: those who were in hospital, those who lived in a LTC setting, those who were on home care, and the remaining individuals whom we assigned to the Other Location category (see Glossary for details).

82.9% of individuals who lived in a LTC setting died "in place". Given the increasing emphasis on dying in place—be it at home or in a PCH—this is an encouraging finding.

In Figure 11 we display decedents' location of residence six months before death by location of death (as the number of decedents who were in hospitals six months before death was small, they are not shown here). Among individuals who lived in a LTC setting, 82.9% died in a LTC institution. In other words, the majority of LTC residents died "in place", with relatively few being transferred to hospital and dying there. Given the increasing emphasis on dying in place—be it at home or in a PCH—this is an encouraging finding.

Figure 11: Location of Residence Six Months Before Death by Location of Death



The proportion of individuals who died in hospitals was higher among those who were on home care six months before death than those who lived in Other Locations (70.3% versus 57.5%). This would be due to individuals on home care being sicker than those who live in Other Locations; thus the need for hospitalization would be greater. Another way of looking at these findings is that a large proportion of those who lived in Other Locations six months before death also died there. This likely reflects sudden deaths, such as death due to injury.

20.5% of LTC residents were hospitalized at least once in the last six months before death, although they did not die while in hospital.

We next examined how many times decedents were hospitalized in the last six months of life (see Figure 12). Note that we include here the terminal hospitalizations. Thus, individuals who were identified as being hospitalized once, for instance, might have died during that hospital stay. Among LTC residents, about two-thirds of LTC residents (63.2%) were never hospitalized in the last six months before death. The remainder (36.8% or 921 decedents) were hospitalized at least once in the last six months before death. This is a considerably higher proportion than the 16.3% (409 LTC residents) who, as we saw earlier, actually died in hospital. In combination, Figures 11 and 12 indicate that quite a substantial number of LTC residents (512 individuals or 20.5%) were hospitalized at least once in the last six months before death, although they did not die while in hospital.

Figure 12: Number of Hospitalizations in Last Six Months Before Death by Location of Residence

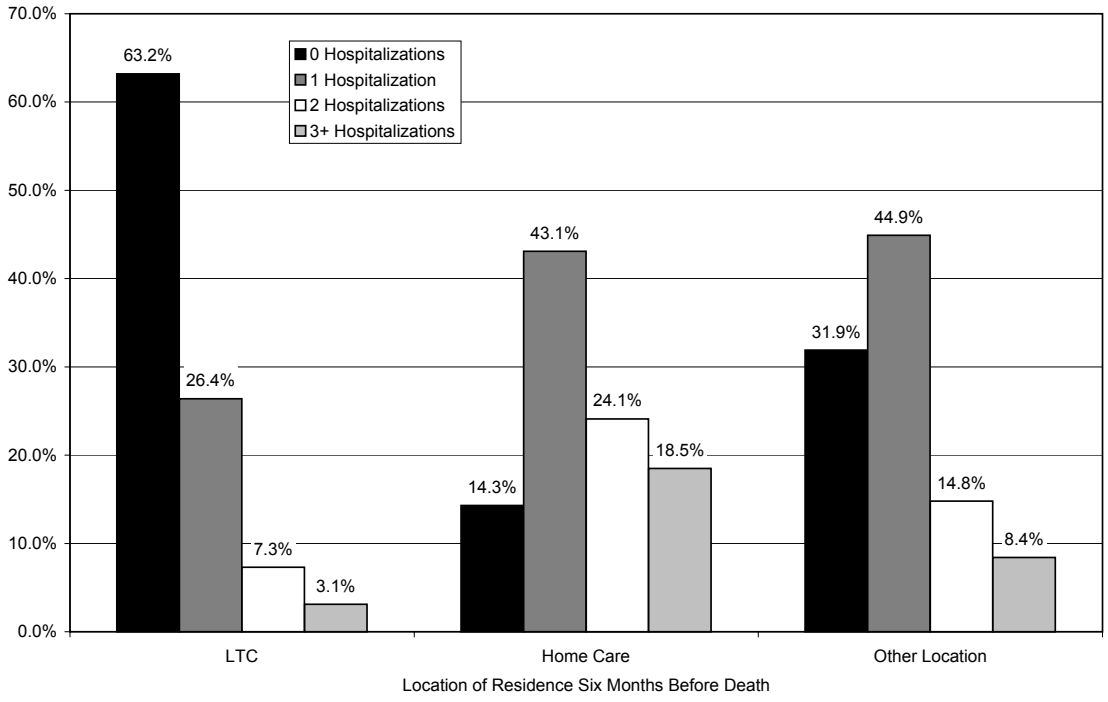
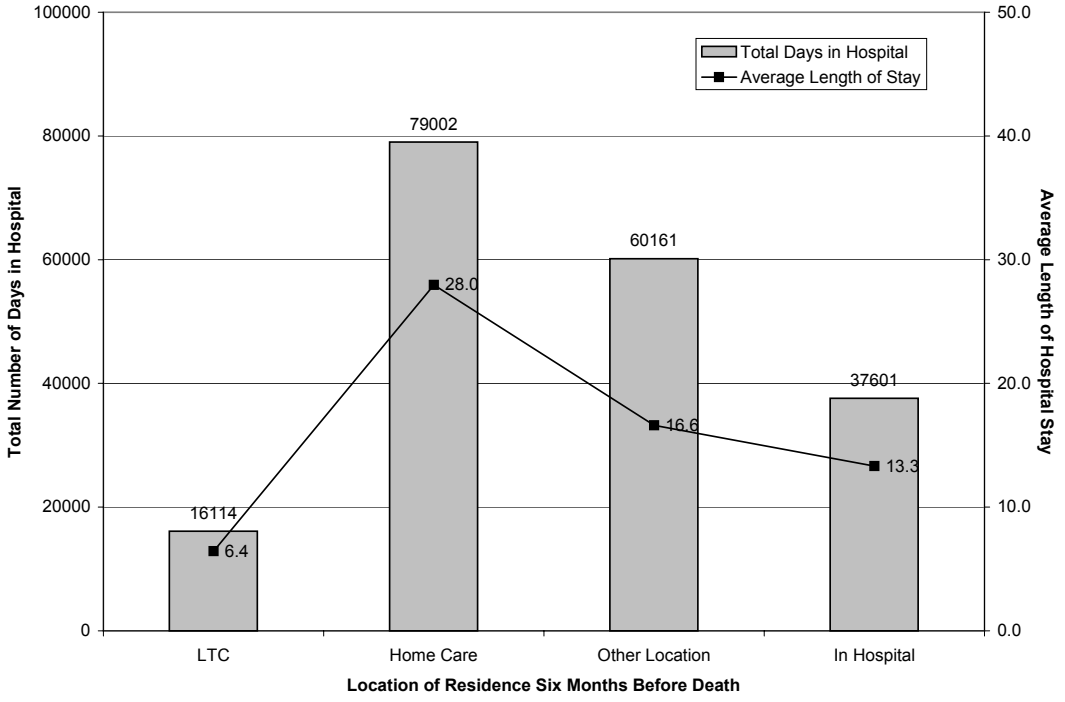


Figure 12 further shows that among those on home care, only 14.3% were never hospitalized in the last six months before death. Among those who lived in Other Locations six months before death, 31.9% were never hospitalized. Thus, in comparison, the proportion (63.2%) of LTC residents who were never hospitalized was considerably higher, suggesting that care is provided in the LTC setting, which minimizes the need for hospitalization.

LTC residents used 8.4% of all the hospital days that decedents used in the last six months before death, while individuals on home care used 41%.

Indeed, although about a third of LTC residents were hospitalized at least once in the last six months of life, their average length of stay and, consequently the number of days in acute care hospitals, was relatively low (see Figure 13). LTC residents consumed about 16,000 hospital days, or 8.4% of all the hospital days that decedents incurred in the last six months before death (average length of stay = 6.4). In contrast, individuals who were on home care consumed about 79,000 hospital days, which constituted 41% of all decedents' hospital days. Their average length of stay was 16.6 days. Note that this does not necessarily mean that these individuals spent 16 days in a row (on average) in hospital; instead, many were admitted to hospital several times before death (see Figure 12) and would have spent a few days in hospital before being released and then readmitted again later on. Individuals who lived in Other Locations, as well as those who were already in hospital six months before death also consumed relatively large proportions of hospital days (31.2% versus 19.5%, respectively).

Figure 13: Hospital Days in the Last Six Months of Life by Location of Residence

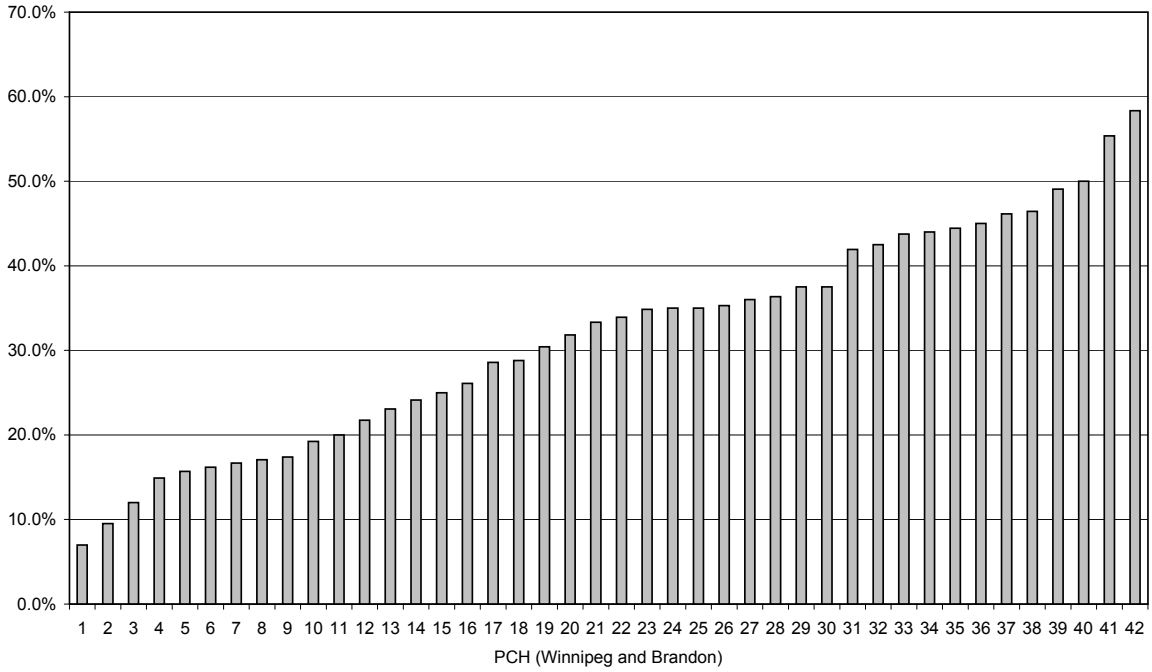


A look at the age distributions of hospital days showed that, among LTC residents, the majority of the days in hospitals were consumed by individuals 75+ years old (89.4%). In contrast, among those on home care, only 68.4% of the days were incurred by 75+ year old individuals, with an additional 16.8% incurred by 65-74 year olds, and the remainder by those less than 65 years of age. Thus, clearly, individuals on home care were younger than LTC residents.

Substantial variation across PCHs in the proportion of decedents who were hospitalized at the end of life was found. The variation ranges from 7% to 58%. There was no association between the number of beds in the PCH and the proportion of individuals with at least one hospitalization.

In Figure 12 we showed that about two-thirds of LTC residents were never admitted to hospitals in the last six months of life. Closer examination, however, indicated that there was substantial variation across PCHs[4] in the proportion of decedents who were hospitalized at the end of life. In Figure 14 we show data for PCHs in Winnipeg and Brandon and, for each PCH, the proportion of decedents in that institution who were hospitalized at least once in the last six months before death (including terminal hospitalizations). The variation is striking, ranging from 7% to 58%. Was this perhaps linked to the size of the institution, with smaller PCHs perhaps being less well equipped to deal with individuals who are dying? That was not the case. There was no association between the number of beds in the PCH and the proportion of individuals with at least one hospitalization.

Figure 14: Per cent of PCH Residents Hospitalized at Least Once in the Last Six Months Before Death



[4] In this analysis we focus on PCHs only. In other words, Winnipeg chronic care hospitals are not included here.

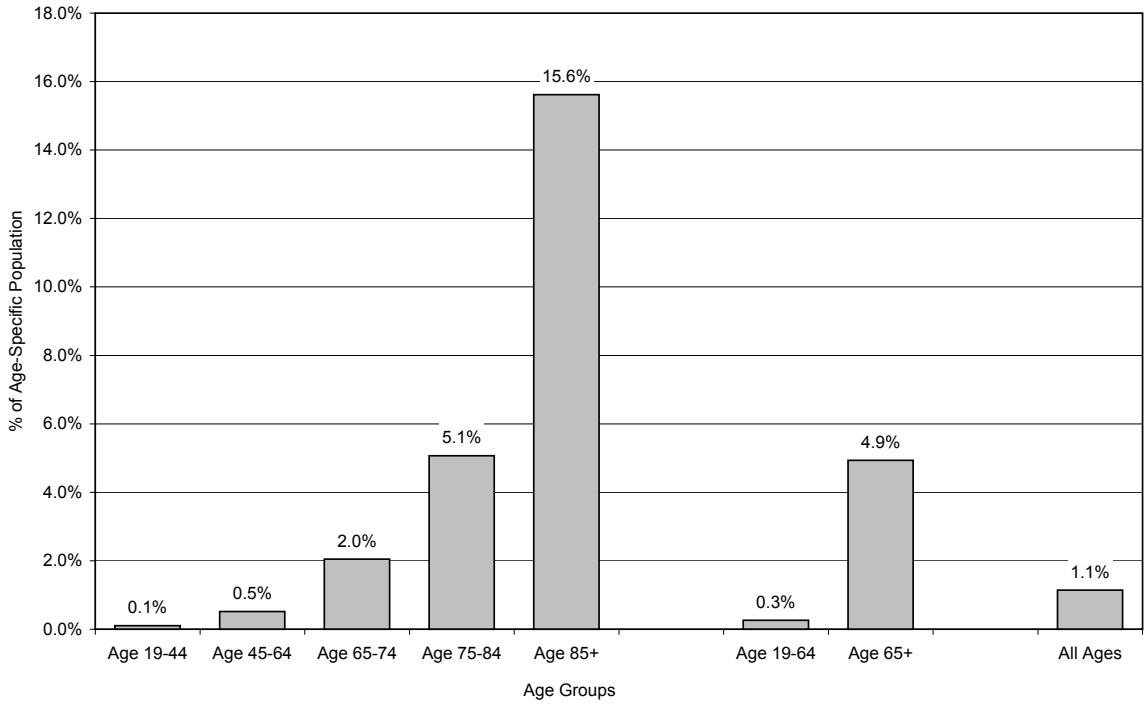
6.0 HEALTH CARE USE AT THE END OF LIFE

6.1 How Much Health Care Do Decedents Really Use?

We examined health care use for the following indicators: hospital days, LTC days, home care days, physician visits, and (out-of-hospital) prescription drug use. Before describing decedents' health care use more specifically, we wanted to put their use into context. To do so we first examined what proportion of total use, say hospital days, in 2000/01 were consumed by decedents in their last twelve months of life. For comparison purposes, Figure 15 shows what proportion of the population decedents constituted. For example, the youngest decedents aged 19 to 44 constituted only 0.1% of the 19-44 year old population, whereas the oldest decedents aged 85+ constituted 15.6% of the 85+ year old population. Overall, decedents constituted 1.1% of the adult population in Manitoba.

The 9,436 individuals who died in 2000/01 made up 1.1% of the adult population of Manitoba.

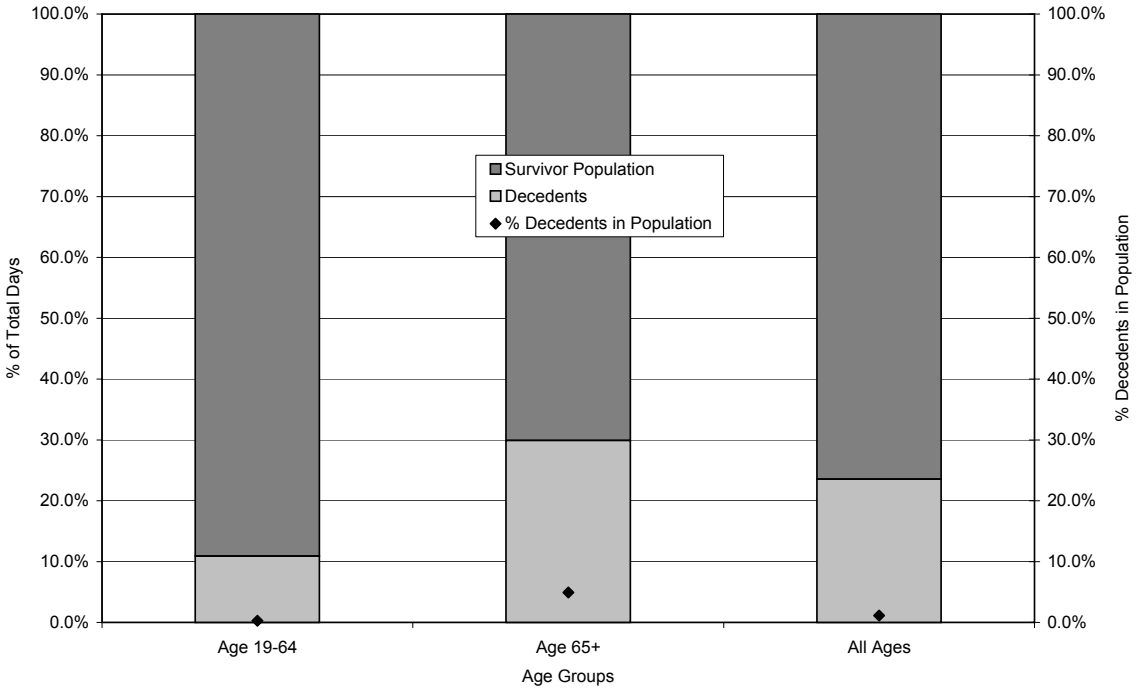
Figure 15: Proportion of Decedents in Population, 2000/01



The proportion of hospital days consumed by decedents in the last year of life is shown in Figure 16. The proportion of total use is presented separately for individuals aged less than 65 and for 65+ year old individuals, as well as for all age groups. Among individuals under 65, decedents consumed 10.9% of all days used by individuals in that age bracket. The proportion was much higher among the 65+ year olds; decedents in that age group used 29.9% of

total hospital days. Population proportions are displayed here for comparison purposes. Thus, decedents aged 65+ constituted 5% of the 65+ year old population, yet used about one-third of all hospital days incurred by seniors. Note that we examine here decedents' use during the year before death. The proportion of days incurred by decedents is much higher if we focus on the last six months of life. That is because hospital use increases substantially shortly before death. When we focus on hospital days in the last six months before death only, decedents incurred 34.6% of all hospital days (43.5% versus 16.8% for decedents aged 65+ versus < 65, respectively).

Figure 16: Proportion of Total Hospital Days Consumed by Decedents, 2000/01



% of Population represents the proportion of decedents in the population. E.g., decedents aged <65 constitute 0.3% of the population aged <65, whereas decedents aged 65+ constituted 4.9% of the 65+ year old population.

Analogous findings are presented for LTC days and home care days (see Figure 17). As the Figure shows, 65+ year old decedents consumed a substantial proportion of LTC days (24.3%) in the last year before death. The proportion of home care days was much lower—11.8%. This makes sense in the context of what we saw earlier regarding where individuals die. Given that individuals on home care are more likely to die in hospital than LTC residents, home care use correspondingly declines as care provided in the home is replaced with hospital care.

Figure 17: Proportion of LTC and Home Care Days Consumed by Decedents, 2000/01

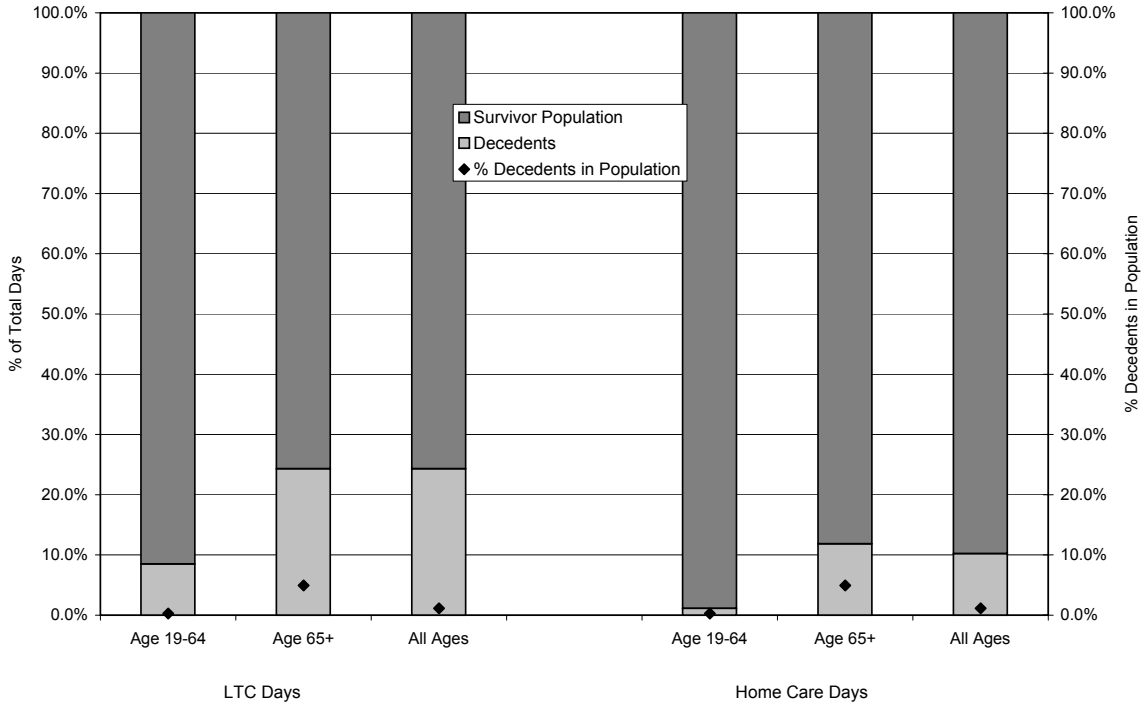
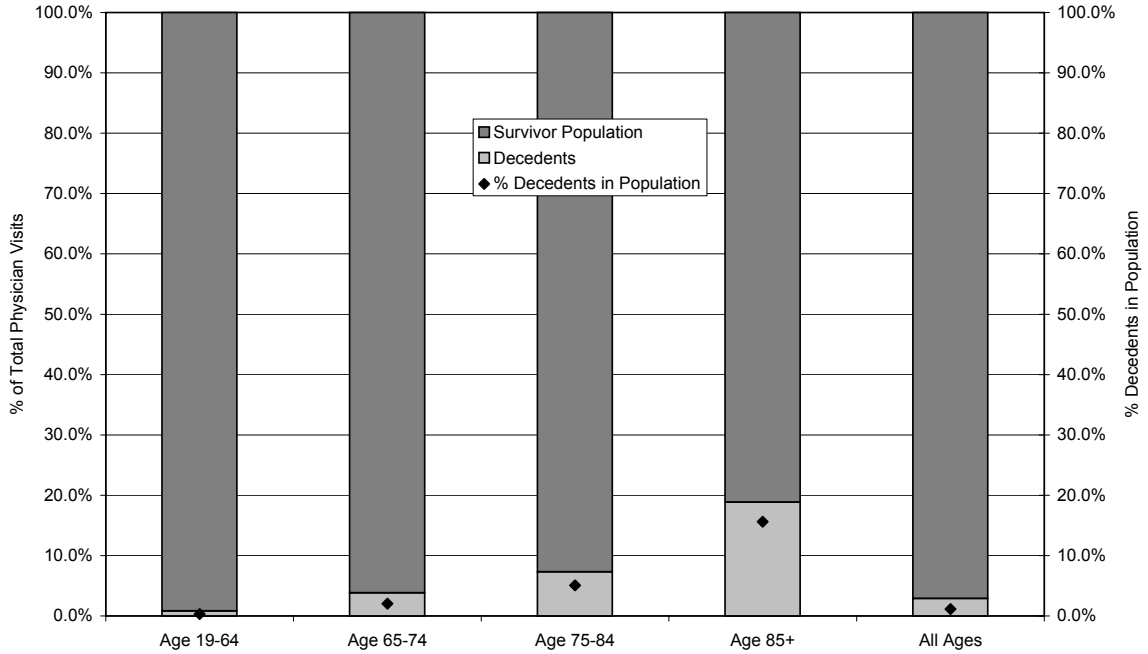


Figure 18 shows findings for physician visits (both visits to family/general practitioners and specialists). Note that physician visits are defined as ambulatory visits, that is visits outside the hospital. Among 19 to 64 year old individuals, decedents made less than 1% of all physician visits. This is in contrast to the 85+ year old age group among which decedents made 18.9% of all visits.

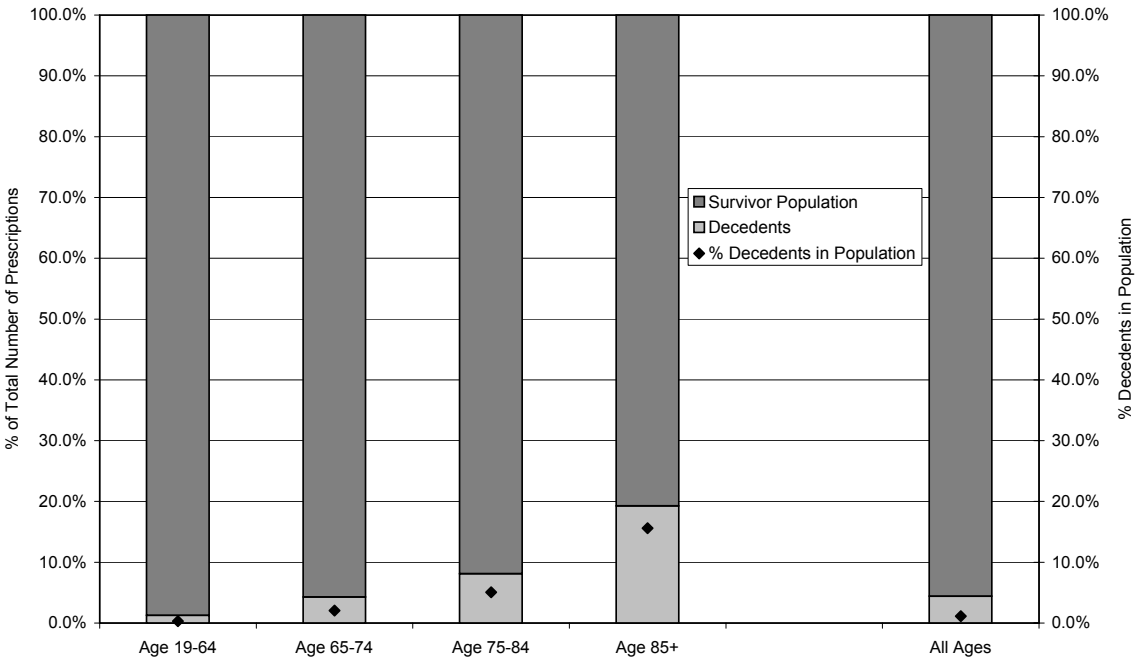
Figure 18: Proportion of Total Physician Visits Made by Decedents, 2000/01



Decedents used only 4.4% of all prescription drugs.

Lastly, in Figure 19 we present the proportion of prescription drugs filled by decedents, relative to the total number of prescriptions filled. The proportion used by decedents was lower than for the other health care use measures. Indeed, overall, decedents used only 4.4% of all prescription drugs. It is important to note that we capture here only prescription drugs outside the hospital. Thus, drug use of decedents who died in hospital is not included.

Figure 19: Proportion of Total Prescription Drugs Filled by Decedents, 2000/01



Note: This does not include drugs taken in hospitals.

6.2 Comparing Decedents to a Survivor Cohort

Another way of putting health care use of decedents into context is to compare their use to that of a survivor cohort. This is what we did next. We extracted health care use for a group of individuals who were still alive at the end of fiscal year 2000/01. The survivor cohort was matched to our decedent cohort by age group, sex, and region of residence (Northern, Southern, Central and Winnipeg). Three survivors were matched to each decedent, for a total of 28,356 individuals.

Use among decedents aged 75 to 84 years, for hospital days, showed an eightfold difference between survivors (at 4 days) and decedents (at 32 days).

In Table 8 we present comparisons for all health care use measures over a one-year period. Clearly, use was considerably higher among decedents than survivors. For instance, for hospital days, there was an eightfold difference between survivors and decedents among individuals aged 65 to 74 (32 days per decedent versus 4 days per survivor).

Table 8: Health care use per person: Decedents versus survivor cohort, 2000/01

	Age Group				
	19-44 years	45-64 years	65-74 years	75-84 years	85+ years
Hospital Days					
Decedents	16.0	25.6	28.8	32.0	26.1
Survivors	0.4	0.9	2.2	4.3	7.6
LTC Days					
Decedents	3.5	11.1	31.9	73.7	172.3
Survivors	0	0.8	3.7	19.0	76.2
Home Care Days					
Decedents	27.6	51.2	69.7	94.5	95.0
Survivors	0.5	3.7	13.4	41.7	99.0
Physician Visits					
Decedents	11.2	15.2	14.7	13.8	12.5
Survivors	3.7	5.8	7.7	9.1	9.3
# Prescriptions					
Decedents	29.5	29.5	39.6	42.8	43.3
Survivors	5.1	12.9	18.7	25.2	31.8

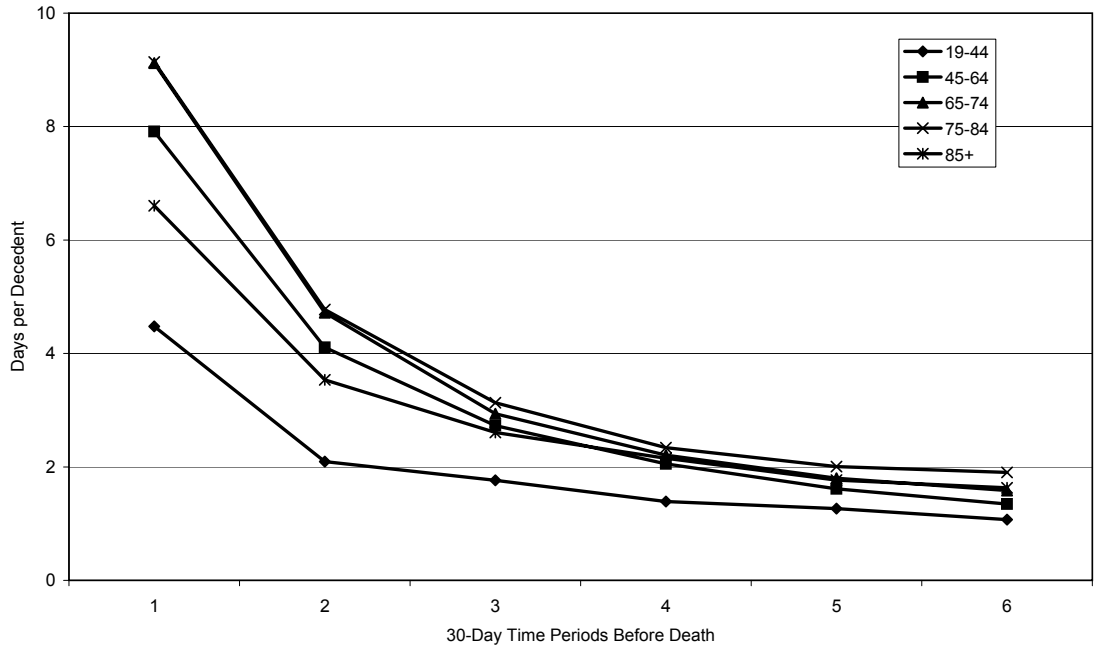
6.3 Health Care Use in the Last Six Months of Life

We next examined more specifically patterns of health care use—hospital days, LTC days, home care days, physician visits, and prescription drug use—at the end of life. We started by examining use for a 24-month period before death (Figure 1 in Appendix A shows patterns for use of hospital days over a 24-month period). Health care use was very low up to about six months before death, at which point (in the case of hospital use) it started to increase. Therefore, we focused only on the last six months of life in our analyses. Health care use of our decedent cohort was determined for each of six 30-day time periods immediately prior to the date of death. Individuals who died in one of the two palliative care units are excluded from these analyses, as they almost exclusively serve Winnipeg residents only.

6.3.1 Hospital Days

Figure 20 shows hospital days in the last six months of life by age groups. Clearly evident is the sharp increase in hospital days in the last 30 days before death, as well as the large age gap: days per decedent were lowest among the 19 to 44 age group across all six time periods and, at least in the last two time periods, highest among individuals aged 65 to 84.

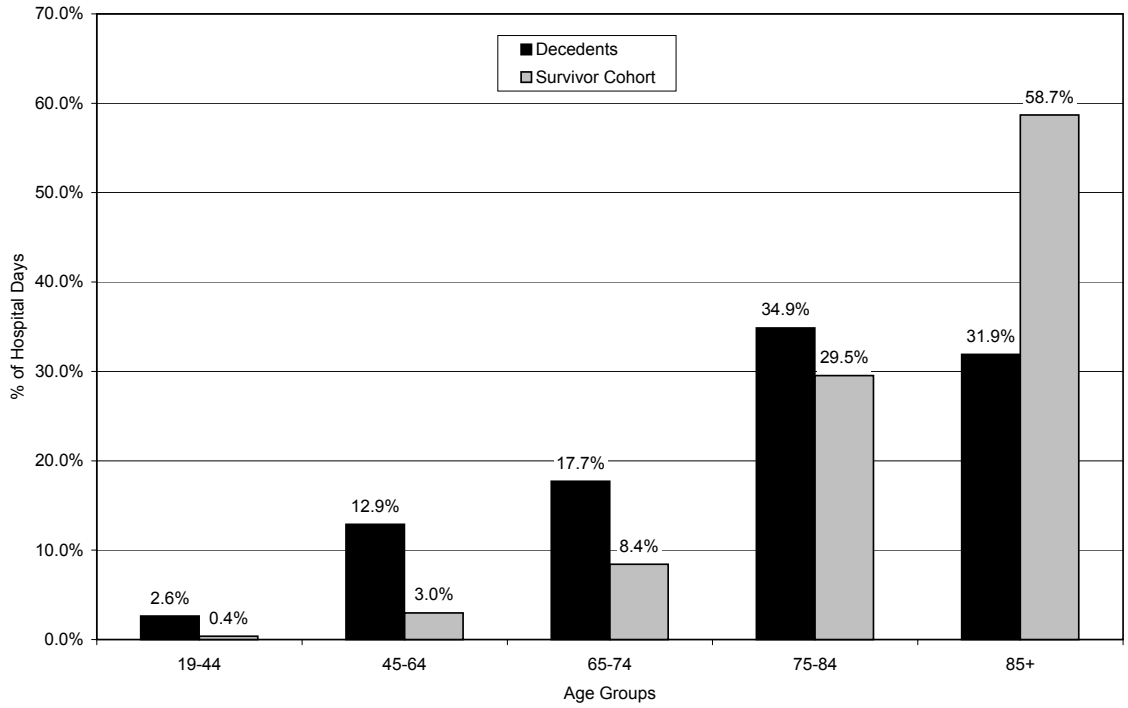
Figure 20: Hospital Days (per Decedent) by Time Period



Two-thirds of hospital days in the last six months before death were incurred by 75+ year old decedents. This is in fact lower than that of survivors.

It is important to remember that Figure 20 displays days per decedent, not hospital users. Thus, although 85+ year old decedents used fewer hospital days than 65 to 74 year old individuals on a per decedent basis, when we look at the age distribution of hospital users, we find that 85+ year old individuals in fact use a large proportion of the hospital days—31.9% (see Figure 21). This proportion is slightly lower than that for 75 to 84 year old individuals—who incurred 34.9% of days, reflecting the fact that many 85+ year old individuals live (and die) in LTC settings. In combination, therefore, two-thirds of hospital days in the last six months before death were incurred by 75+ year old decedents. While substantial, this proportion is in fact lower than for survivors. In our survivor cohort, 58.7% of hospital days in 2000/01 were incurred by 85+ year old individuals and an additional 29.5% by 75 to 84 year olds.

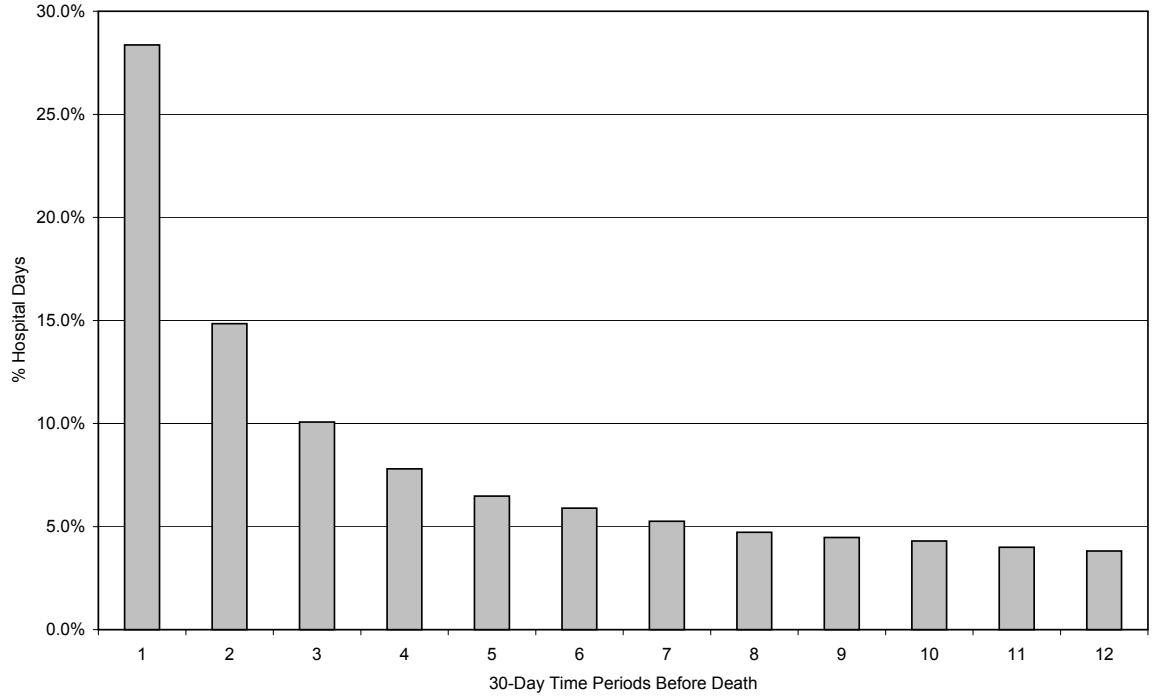
Figure 21: Age Distribution for Hospital Days: Decedents vs. Survivor Cohort



Use of hospital days by decedents was concentrated into the last month before death.

Consistent with Figure 20, which showed a sharp increase in hospital use in the last month of life, Figure 22 shows that much of the hospital use is concentrated into the last month before death. Note that the Figure shows use for 12 months before death to provide a better sense of the concentration of use than would be possible if we focused only on a six-month time period. Twenty-eight per cent of all the days used by decedents in the last 12 months before death were concentrated into the last month before death.

Figure 22: Proportion of Hospital Days in Last 12 Months of Life



Days almost doubled in the last month before death, relative to the second-to-last month before death. This is considerably below the 250% increase found in a U.S. study.

Days (per decedent) almost doubled in the last month before death, relative to the second-to-last month before death. While this is a substantial increase, it is considerably below the 250% increase found in a U.S. study among frail elderly individuals (Mukamel et al., 2002). Indeed, even when we focus only on 85+ year old decedents, days only increased by 87% in the last month before death, relative to the second-to-last month.

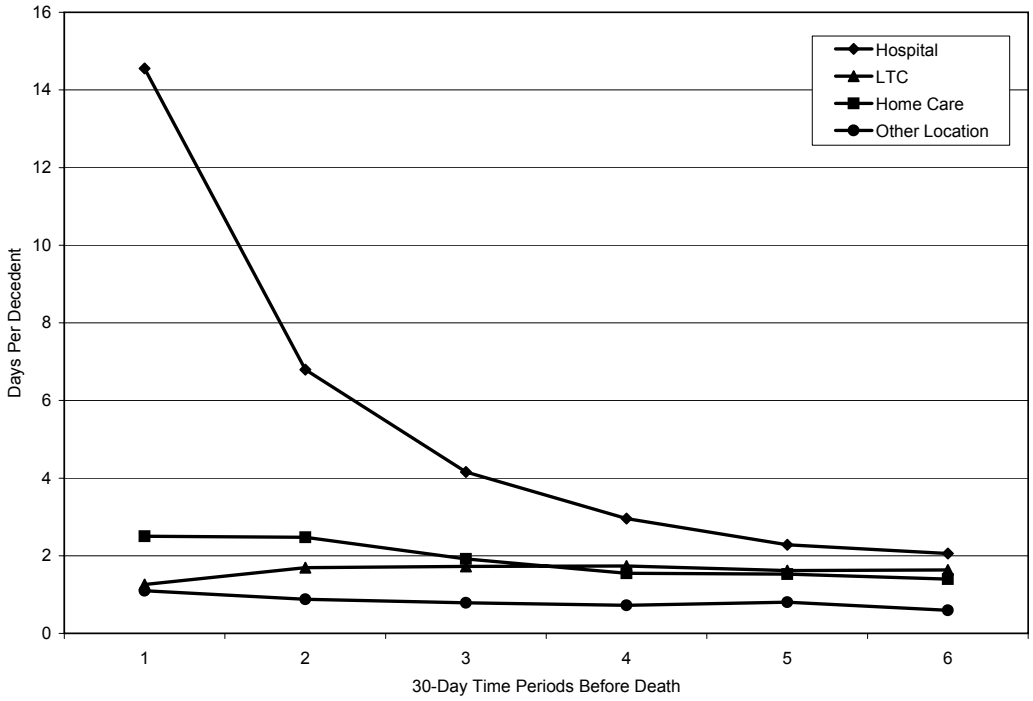
Regression Results

We next examined what factors were associated with hospital days in the last six months of life. Like the analyses for location of death, we ran separate regression models for 19-44, 45-64, and 65+ year old decedents, because of the differences in use patterns across these age groups. In a first analysis, we considered cause of death, location of death, sex, time period and, for individuals aged 65 or older, age group (65-74, 75-84, 85+) and marital status. A second analysis included these factors, as well as region of residence. The third set of analyses included the predictors for the first model, as well as income quintiles, defined separately for urban and rural residents. Key findings are summarized here. Results from the regressions for the first set of analyses are presented in Appendix A (Tables 3A-3C). A summary of findings for all health care use measures is provided at the end of this section.

In general, cause of death was related to hospital days for all age groups.

In general, cause of death was related to hospital days (per decedent) for all age groups. As one might expect, individuals who died of cancer used more hospital days than those who died more sudden deaths, such as from an injury, at least in the case of younger adults. Among 65+ year olds, deaths due to cardiovascular diseases were associated with more hospital days than other causes of death. Location of death was also significantly related to hospital use. This finding is illustrated in Figure 23 for the 65+ age group. As the Figure shows, there was a dramatic increase in hospital use in the last month before death only among individuals who ended up dying in hospital, whereas among individuals who died in LTC settings, hospital use actually decreased slightly in the last month before death. This suggests that LTC residents were less likely to be admitted to hospital shortly before death than in previous months. Hospital use was also greater for men than for women in both the 45-64 years and 65+ years age groups. In the 65+ year age group, individuals who were not married or for whom marital status was not known had greater use of hospital days than individual who were married.

Figure 23: Hospital Days (per Decedent) by Location of Death, Age 65+



The analyses further showed that there were no regional differences in hospital use for any age group. Lastly, living in more affluent areas was generally associated with fewer hospital days, although for younger individuals this was the case only in urban, but not rural regions.

6.3.2 LTC Days

In Figure 24 we present LTC days (per decedent) in the last six months before death by age group. Unlike hospital use which increased substantially in the last month before death, LTC days remained relatively constant over the six-month period. Given that individuals aged 85+ constitute the majority of residents in LTC institutions, their use in the six months before death was, not surprisingly, also the highest. Consistent with the fact that LTC use was quite constant at the end of life—and unlike what we had seen for hospital days—LTC days were not particularly concentrated into the last month, or even into the last six months of life (see Figure 25): only 10% of all the LTC days in the last 12 months before death were incurred in the last month before death, a proportion that is only slightly above the 7% of days that were incurred in the 12th month before death. In other words, individuals lived in LTC settings for several months before death.

Figure 24: Long-Term Care Days (per Decedent) by Time Period

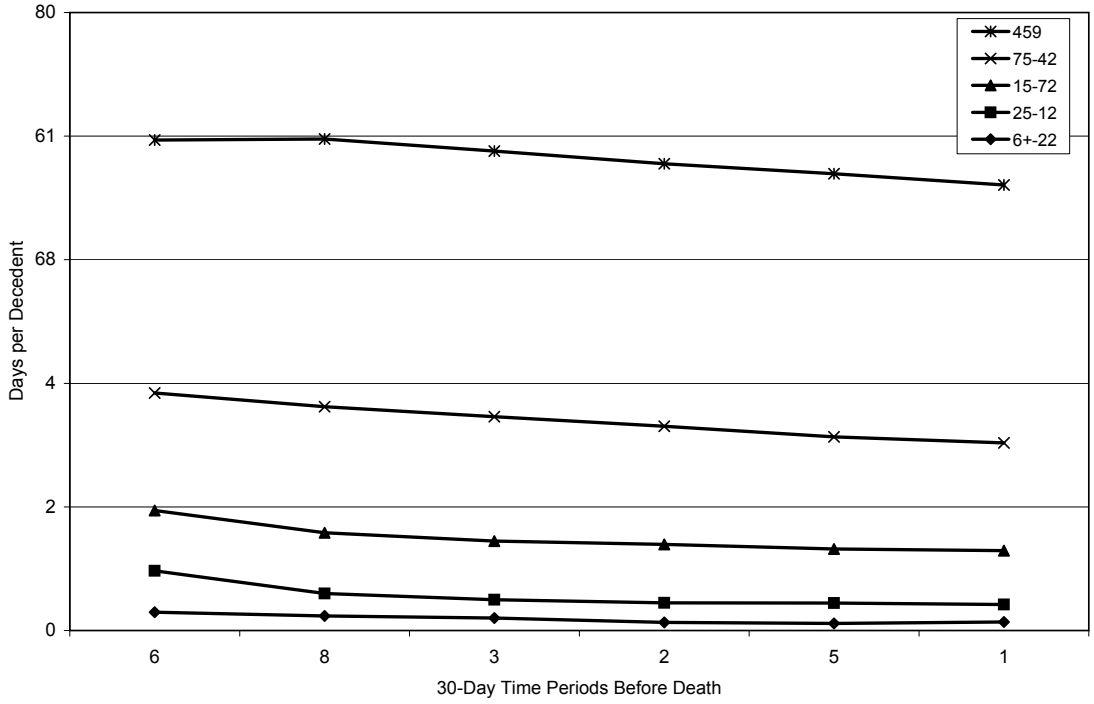
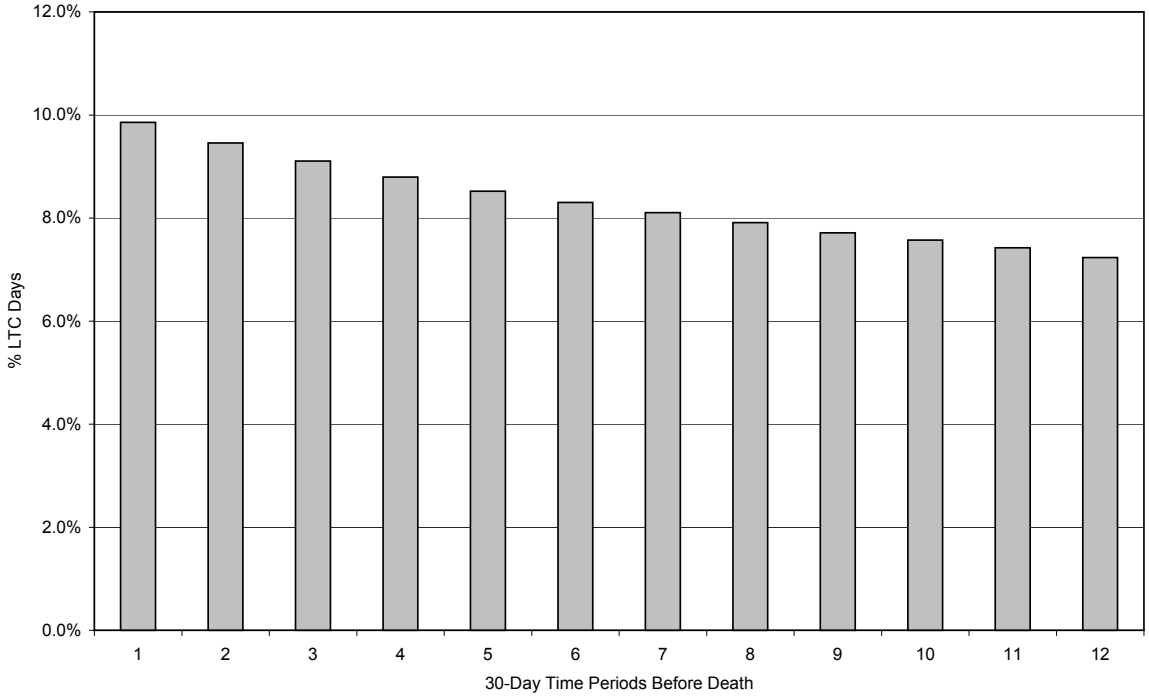


Figure 25: Proportion of LTC Days in Last 12 Months of Life



Regression Results

Analogous to the analyses for hospital days, we next examined the relation between LTC days (per decedent) and cause of death, location of death, sex, age (among seniors), marital status (among seniors), time period, region of residence, and income quintiles. Regression results are presented in Appendix A, Tables 4A and 4B. Note that we focused here only on two age groups (45-64 and 65+), given the low LTC use among young adults.

In general, deaths due to cancer were associated with more LTC days than cardiovascular disease deaths among younger adults, but fewer days among the 65+ year olds. Dying in a LTC setting was, not surprisingly, associated with more LTC days at the end of life than dying in hospital. Regional and income quintile differences were also apparent, with non-Winnipeg residents incurring fewer LTC days than Winnipeg residents and individuals living in more affluent areas incurring fewer days than those living in poorer areas.

6.3.3 Home Care Days

The age distribution of home care users shows that 85+ year olds in fact use most of the home care days in the last six months before death (36.5%).

Figure 26 shows home care days (per decedent) in the last six months before death. While use was constant for the 85+ year olds, it increased slightly over the six months for the younger age groups. Once again it is important to keep in mind that we are displaying use per decedent. Thus, while use per 85+ year old decedent is slightly lower in the last few months before death than that among younger age groups, the age distribution of home care users shows that 85+ year olds in fact incur most of the home care days in the last six months before death (36.5%), followed closely by individuals aged 75-84 (35.4%; see Figure 27).

Figure 26: Home Care Days (per Decedent) by Time Period

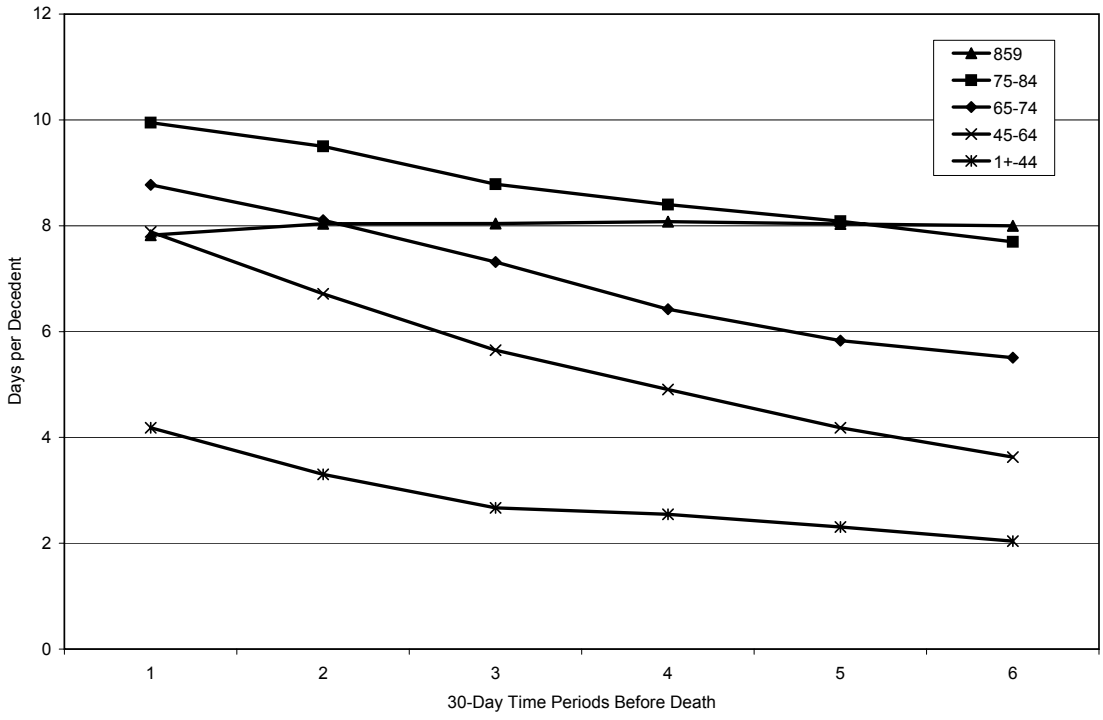
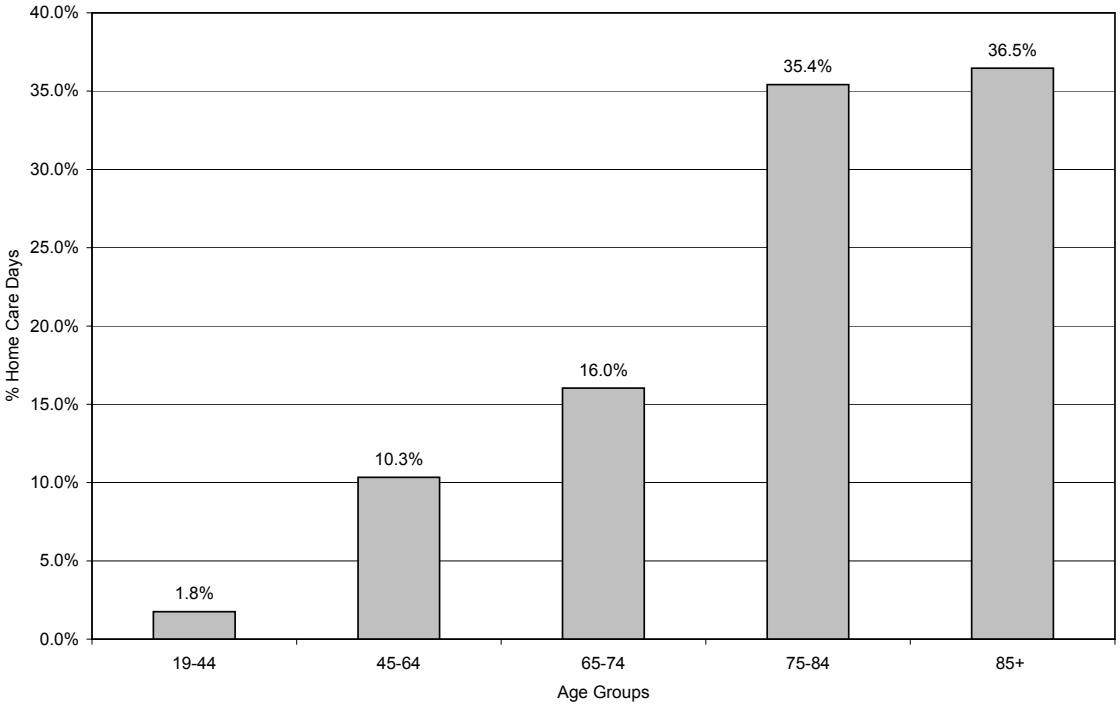


Figure 27: Age Distribution of Home Care Days in the Last Six Months Before Death



Regression Results

Our regression analyses (see Appendix A, Tables 5A and 5B, for regression results) indicated that cause of death, location of death, age, marital status, region of residence, and income quintiles were all significantly related to home care days in the last six months before death. The findings paralleled those for hospital and LTC days:

1. Deaths due to cancer were associated with fewer home care days (per decedent) than deaths due to cardiovascular disease among younger individuals, with the opposite being the case for individuals aged 65+.
2. Deaths in LTC settings were related to fewer home care days than death in hospital.
3. Those 85+ years of age used fewer days than younger seniors.
4. Individuals who were not married or for whom marital status was unknown used more home care days than those who were married.
5. Non-Winnipeg residents incurred fewer home care days than Winnipeg residents.
6. Individuals who lived in more affluent areas incurred fewer home care days than those in poorer areas.

6.3.4 Physician Visits

Visits to specialists decreased in the last month before death, whereas visits to general/family physicians increased.

Figure 28 displays physician use by decedents in the last six months before death. Use increased slightly over the six months for all age groups; quite a sharp increase in visits is apparent for 85+ year old decedents in the last month before death. The patterns are quite different, however, when we examine visits to general/family practitioners versus visits to specialists (see Figures 29 and 30). While visits to general/family physicians increased in the last month before death for all age groups, visits to specialists decreased in the last month. Note that physician visits include only ambulatory visits—essentially visits outside the hospital. Thus, the drop in specialist visits at the end of life is likely due to individuals being admitted to hospital prior to death, with physician care at that point being provided in the hospital setting.

Figure 28: Physician Visits (per Decedent) by Time Period

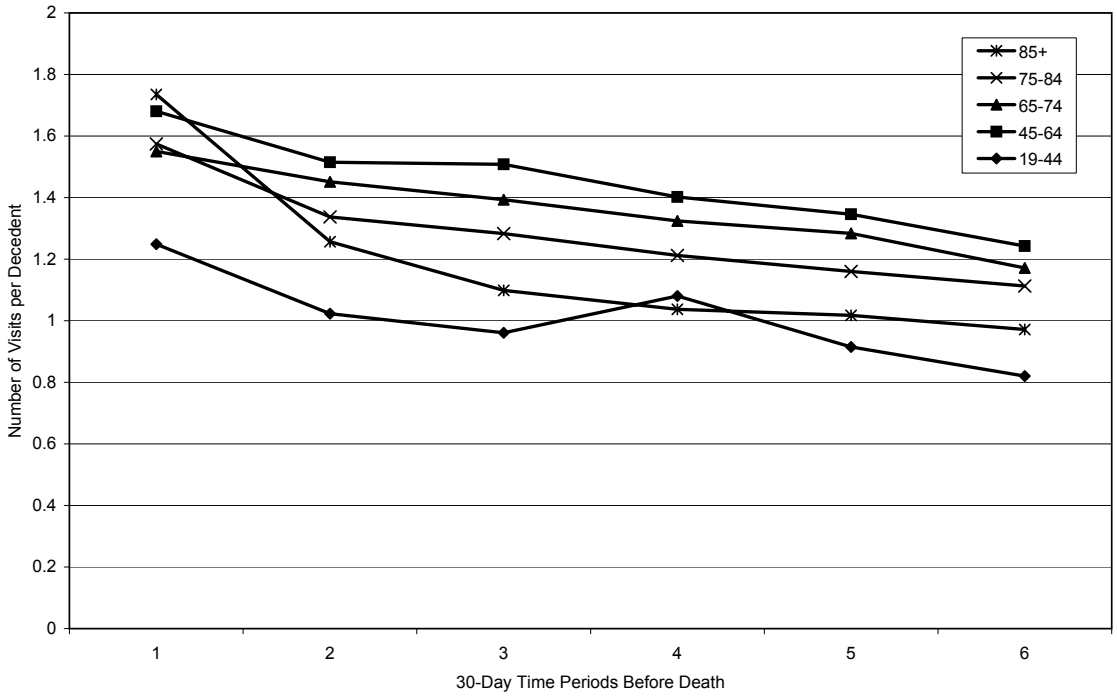


Figure 29: General/Family Physician Visits (per Decedent) by Time Period

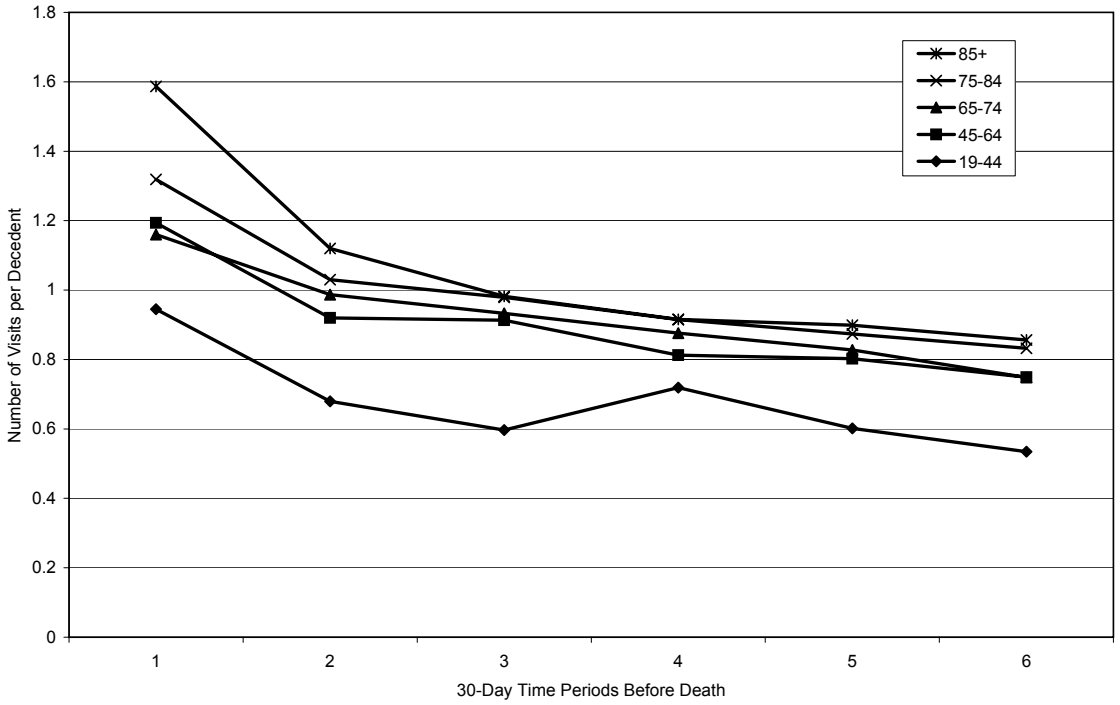
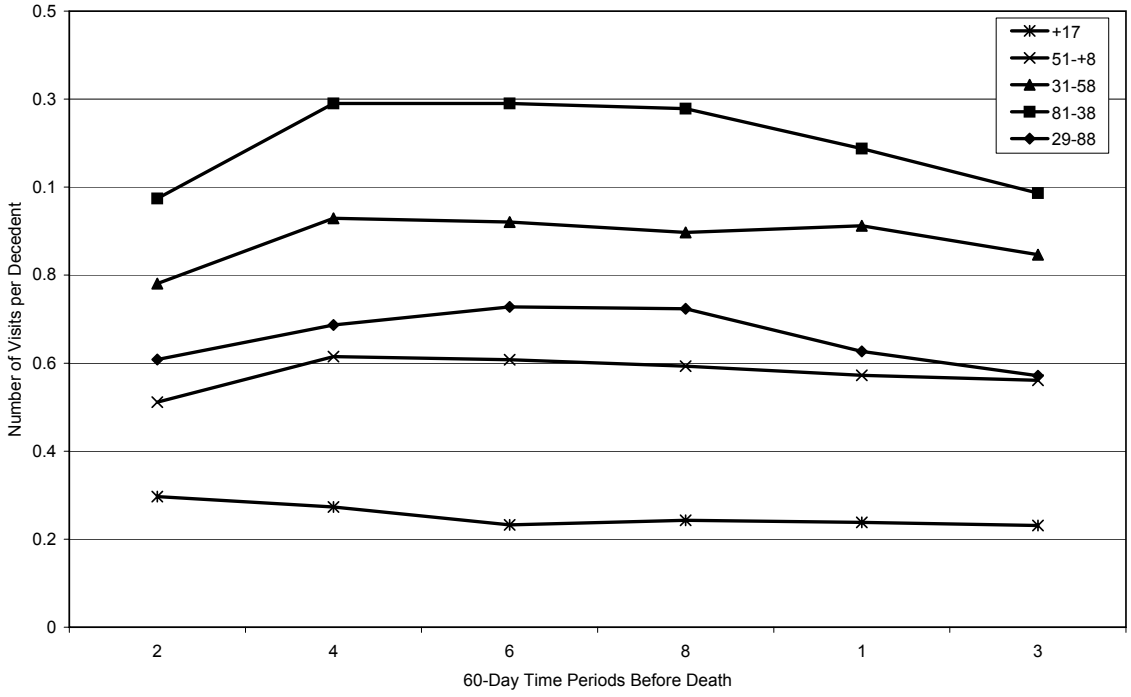


Figure 30: Specialist Visits (per Decedent) by Time Period



Care provided by palliative care physicians is only partially captured in the physician claims file, thus limiting the examination of end-of-life care.

An additional data-related issue warrants noting at this point. Physicians specializing in the provision of palliative care are paid on salary basis, rather than a fee-for-service basis. Like other salaried physicians, they are therefore expected to shadow-bill—which means in essence that claims are sent to Manitoba Health even though they are not used for payment purposes. Palliative care is different from other care, however. For example, considerable time is spent not with the patient per se, but rather with family members. The claims system is not set up for capturing this kind of care. In practical terms, this means that the care provided by palliative care physicians is only partially—if at all—captured in the physician claims file. When examining end-of-life care, an important part of the care provided is therefore missed.

Regression Results

We next again ran regression analyses to examine which factors were related to physician visits. General/family physician and specialist visits were combined for these analyses (regression results are presented in Appendix A, Tables 6A to 6C). The findings were remarkably consistent with those for hospital days, LTC days, and home care days, with cause of death, location of death, age, sex, and marital status (for individuals aged 65 or over only), region of residence, and income quintiles being related to physician use. Key findings for all the health care use measures are summarized in Table 9.

6.3.5 Prescription Drugs

The slight drop in drug use in the last month of life is attributed to individuals being admitted to and dying in hospital.

Lastly, we examined the number of prescriptions filled (per decedent) in the last six months before death. Patterns are shown in Figure 31. It is important to reiterate that we capture here only prescriptions filled outside the hospital. In-hospital drugs cannot be identified as they are not recorded separately. Thus the slight drop in drug use in the last month of life that is apparent in the Figure is likely due to individuals being admitted to and dying in hospital.

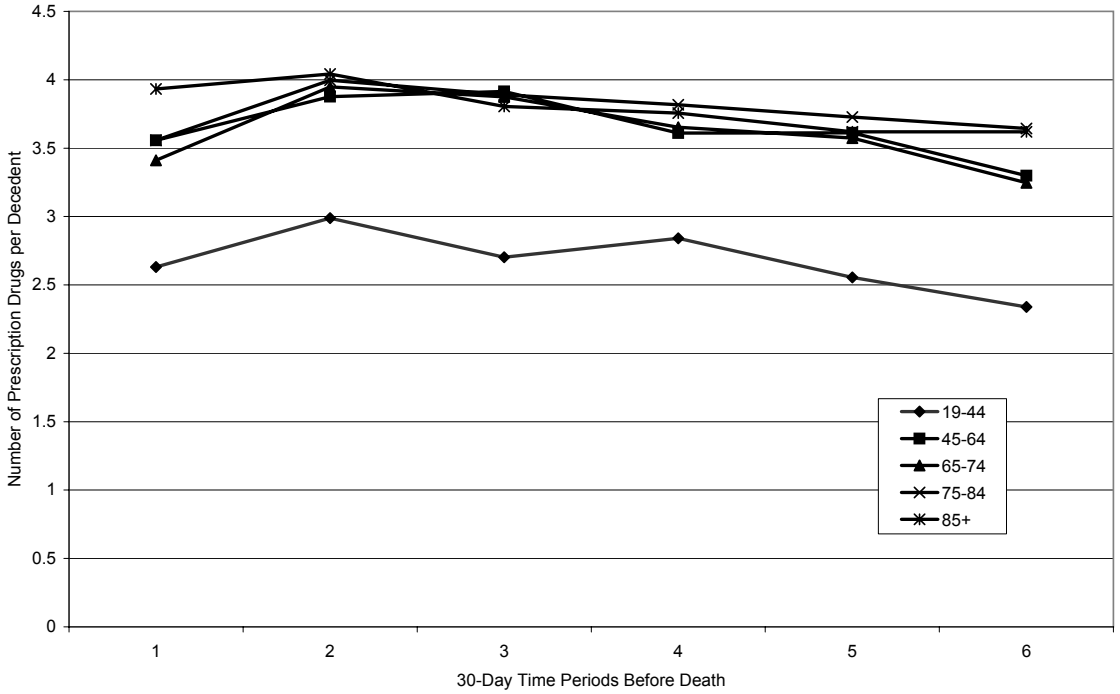
Regression Results

As in the previous analyses, cause of death, location of death, age, sex, marital status (for 65+ year individuals only), region of residence, and income quintiles were significantly related to the number of prescription drugs (per decedent). Key findings are summarized in Table 9 (The complete results of the regression analyses are contained in Appendix A, Tables 7A to 7C).

Table 9: Select findings for health care use in the last six months before death

Factor	Key Findings
Cause of Death	Cancer deaths were related to a greater number of hospital, LTC and home care days, physician visits, and prescription drugs than cardiovascular disease deaths among younger individuals; the opposite was true for 65+ year old individuals. Deaths due to respiratory disease were related to fewer LTC and home care days than deaths due to cancer among the 65+ year olds.
Location of Death	Hospital days increased significantly in the last month before death among 65+ year olds who died in hospital; among individuals who died in a LTC institution, hospital days declined in the last month before death. Home care use among the 65+ year olds increased in the last month before death for those who died while on home care. Among those who died in a LTC institution, home care days decreased in the last three months before death.
Region of Residence	Non-Winnipeg residents had fewer LTC and home care days, fewer physician visits, and fewer prescription drugs in the last six months before death than Winnipeg residents. Region of residence was not related to hospital days.
Income Quintiles	Living in more affluent areas was associated with fewer hospital days, LTC days and home care days than living in poorer areas, although in rural areas this was the case only for the 65+ age group. Living in more affluent areas was also related to fewer physician visits and reduced prescription drug use than living in poorer areas.
Age	Specific age comparisons were made only for the 65+ age group. Three age groups were included: 65-74, 75-84, 85+. 75+ year old decedents had more hospital days, LTC days, and physician visits than younger seniors; younger seniors incurred more home care days and had higher prescription drug use than older seniors.
Marital Status	As for age, marital status was examined only for adults aged 65 or older. Married individuals in this age group incurred fewer hospital days, LTC days, home care days, physician visits, and used fewer prescription drugs than their unmarried counterparts or individuals whose marital status was not known.

Figure 31: Prescription Drug Use (per Decedent) by Time Period



Deaths due to cancer were consistently associated with greater health care use than deaths due to cardiovascular disease, among adults under age 65, whereas the opposite was true for the 65+ year olds.

6.3.6 Summary of Findings

There was considerable consistency in findings across all health care use measures (see Table 9 for key findings). For example, deaths due to cancer were consistently associated with greater health care use—be it hospital days, LTC days, home care days, physician visits, or prescription drug use—than deaths due to cardiovascular disease among adults under 65, whereas the opposite was true for the 65+ year olds. Similarly, non-Winnipeg residents consistently had lower use than Winnipeg residents, except in the case of hospital days. Income quintiles were also consistently related to health care use, with living in more affluent areas being associated with lower use in the last six months before death than living in poorer areas.

7.0 HEALTH CARE COST AT THE END OF LIFE

Note: The two palliative care units were excluded from these analyses, as we could not reliably estimate costs associated with dying in these settings.

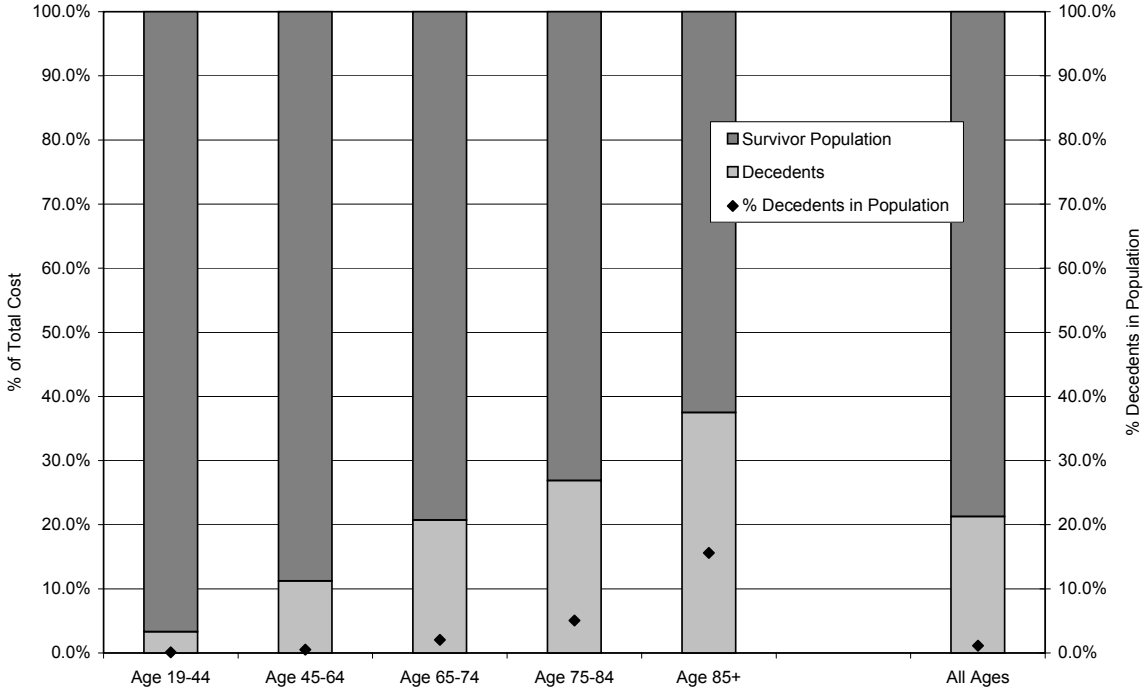
In this section we examine health care costs at the end of life. To do so, we added up costs for hospital use, PCH use[5], home care use, physician visits, and prescription drugs in the last six months of life (details regarding the methods used to determine these costs are presented in the Glossary). Note that we excluded the two palliative care units from these analyses, as we could not reliably estimate costs associated with dying in these settings. Also, other potentially important costs, such as those for ambulance, non-prescription drugs, etc. cannot be estimated from our data and are therefore not included. Indirect costs, such as financial losses due to premature death, or costs incurred by informal caregivers, such as spouses, are also not included.

7.1 Comparing Decedents' Costs to Total Costs

Older adults consume a larger share of health care than younger adults, who frequently die suddenly and do not require health care services.

Similar to health care use, we first wanted to put decedents' health care costs into context. Figure 32 shows costs incurred by decedents in the last six months of life, in relation to costs of the entire population during a six-month period. For example, among 19 to 44 year old individuals, decedents incurred 3.3% of all costs in that age group, whereas among 85+ year olds, decedents incurred 37.5% of the total costs of that age group. In other words, decedents consume a larger share of total health care costs as age increases. This is not surprising, given the patterns of health care use at the end of life that we saw earlier. Older adults clearly consume a larger share of health care than younger adults who frequently die suddenly and do not require health care services.

Figure 32: Proportion of Total Cost Incurred by Decedents



[5] Unlike the health care use analyses, for which we combined, for Winnipeg only, PCH days and chronic care days, we estimated health care costs for PCHs separately. Chronic care units were therefore included in the hospital cost. We took this approach because chronic care units are contained in the hospital file and costs can, therefore, be estimated from that data source. Costs for PCHs, in contrast, were estimated on a per diem basis (see Glossary for details).

Hospital costs constituted the largest proportion of total costs by decedents in all age groups, but particularly younger individuals.

The proportion of decedents within each age-specific population is also shown in Figure 32 for comparison purposes. For example, among 85+ year olds, decedents in that age bracket constituted 15.6% of the population, but incurred 37.5 % of total health care costs. For all ages combined, decedents, who represented 1.1% of the adult population, consumed 21.3% of health care costs.

In Table 10 we show total costs for decedents in their last six months of life only, with a breakdown for each of the five components that went into the total: hospital, PCH, home care, physician, and prescription drugs. The breakdown is shown separately for each age group, as well as for all decedents combined. Hospital cost constituted the largest proportion of total costs by decedents for all age groups, but particularly younger individuals. In the youngest age group (19-44), hospital cost constituted 84.2% of the total cost. The proportion dropped to 47.7% among 85+ year old decedents, for whom PCH costs constituted an almost equally large share (41.2% of total costs).

Table 10: Breakdown of total health care costs by decedents in the last six months before death, by age

	Hospital Cost	PCH Cost	Home Care Cost	Physician Cost	Drug Cost
Age Group					
19-44 years	84.2%	0.0%	4.3%	2.3%	9.2%
45-64 years	81.0%	3.1%	5.7%	2.2%	8.1%
65-74 years	76.8%	8.9%	6.6%	1.8%	5.9%
75-84 years	67.9%	18.8%	7.5%	1.4%	4.3%
85+ years	47.7%	41.2%	6.7%	1.1%	3.2%
All Ages	63.1%	24.0%	6.8%	1.5%	4.6%

Health care costs increased with age, with 75+ year old decedents incurring about 70% of all decedents' costs.

Health care costs increased with age (see Figure 33). The high average cost for the oldest-old, coupled with the large number of decedents in that age group means that 85+ year old decedents incur a major proportion of all decedents' health care costs. As Figure 34 shows, 85+ year old decedents used 39.5% of the costs for all decedents, with 75-84 year old decedents consuming another 31.8%. Thus, 75+ year old decedents incurred about three-quarters of all decedents' costs.

Figure 33: Median Health Care Costs in Last Six Months of Life by Age

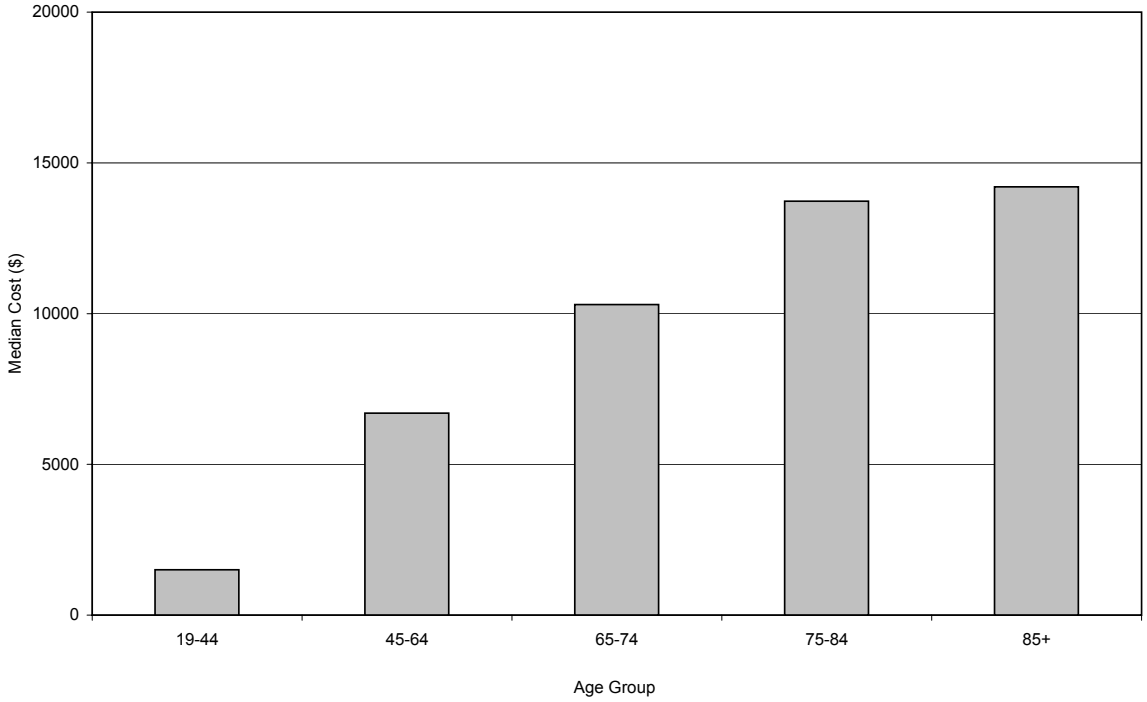
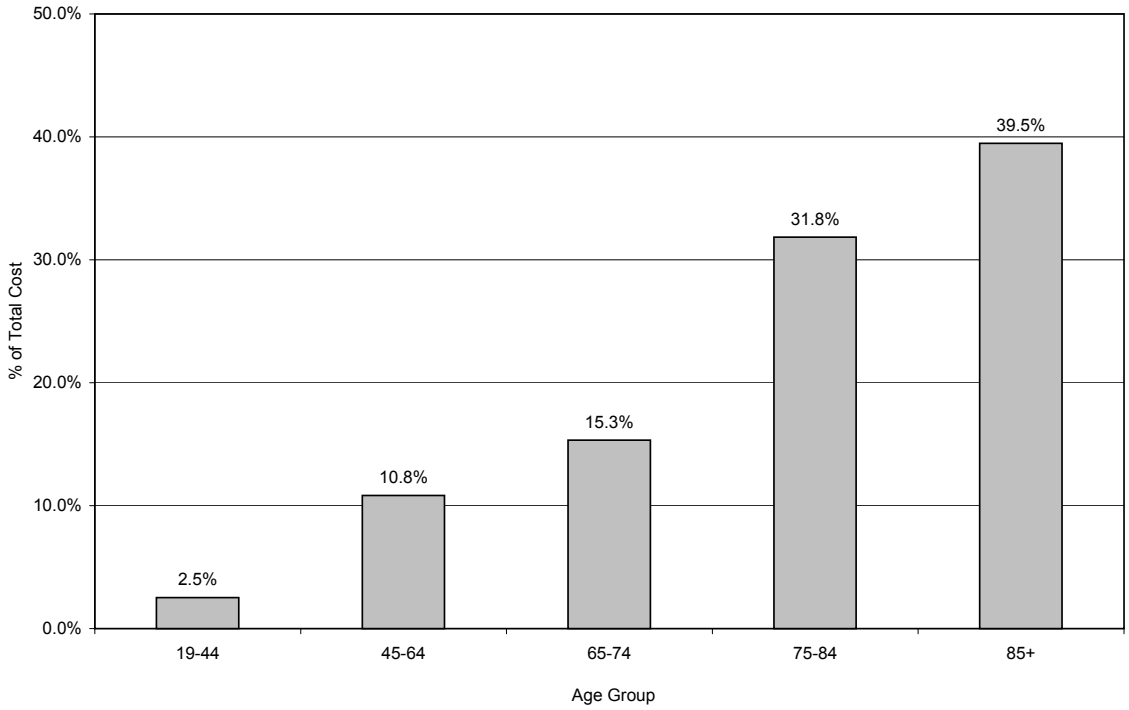


Figure 34: Age Distribution of Health Care Cost in the Last Six Months of Life



It is important to remember that decedents—overall—incur only about 20% of all health care costs.

While this is a large proportion, it is important to recall that decedents overall incurred only about 20% of all health care costs. Table 11 shows what proportion of the total adult population in Manitoba consumed what proportion of health care costs. As we saw earlier, decedents who overall constituted 1.1% of the population consumed 21.3% of health care costs. Table 11 further shows a distinct age gradient in costs, both among decedents and in the survivor population, with costs clearly increasing with age. For example, 85+ year old decedents, who constituted 0.4% of the entire adult population consumed 8.4% of health care costs, compared to 19-44 year old decedents who consumed 0.5% of total health care costs.

Table 11: What proportion of the population consumes what proportion of health care costs?

	Per cent of Entire Population (Age 19+ years)	Per cent of Total Health Care Costs (Age 19+ years)	Ratio (Cost/Population)
Survivor Population			
Age Group			
19-44 years	50.00%	15.63%	0.3
45-64 years	30.96%	18.22%	0.6
65-74 years	9.34%	12.48%	1.3
75-84 years	6.47%	18.41%	2.8
85+ years	2.10%	13.99%	6.7
All Ages	98.9%	78.7%	0.8
Decedents			
Age Group			
19-44 years	0.05%	0.54%	10.8
45-64 years	0.16%	2.30%	14.4
65-74 years	0.20%	3.26%	16.3
75-84 years	0.35%	6.77%	19.4
85+ years	0.39%	8.39%	21.5
All Ages	1.10%	21.30%	19.4
Total	100%	100%	

7.2 What Factors are Associated with Health Care Cost?

Similar to the analyses we conducted for health care use, we conducted a series of regression analyses for health care costs (see Appendix B for details regarding the analytic approach). We conducted separate analyses for three age groups: 19-44, 45-64, and 65+ years. Factors we considered included: cause of death, location of death, sex, age (for the 65+ age group only), marital status (for the 65+ age group only), region of residence (Winnipeg, Northern RHAs, Central RHAs, and Southern RHAs) and income quintiles. The regression results are displayed in Table 12.

Table 12: Factors related to total health care costs in the last six months before death: Regression results

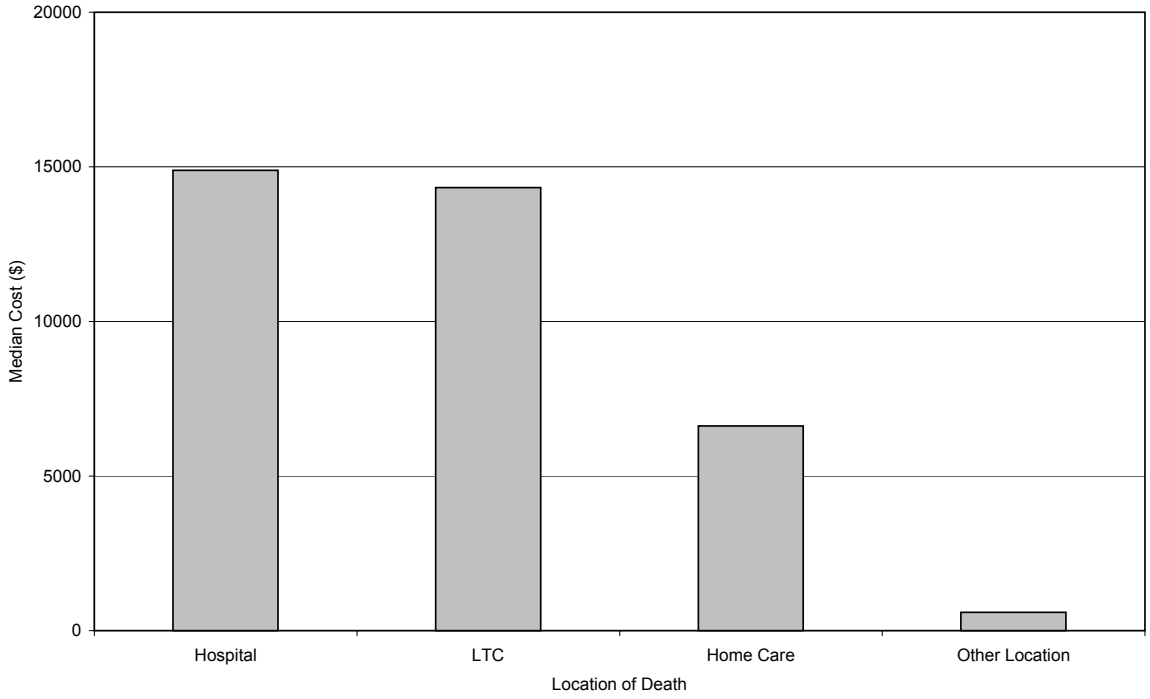
Factor	Relative Rate
	19-44 years
Cause of Death	
Cardiovascular Diseases	0.36*
Injuries	1.22
Respiratory Diseases	0.19*
All Other Causes	0.83
Cancer (comparison group)	--
Location of Death	
Hospital	15.35*
LTC/Home care	10.73*
Other Location (comparison group)	--
Region of Residence	
Northern MB	0.76
Central MB	1.00
Southern MB	0.68
Winnipeg (comparison group)	--
	45-64 years
Cause of Death	
Cardiovascular Diseases	0.64*
Injuries	1.03
Respiratory Diseases	0.45*
All Other Causes	1.01
Cancer (comparison group)	--
Location of Death	
Hospital	12.77*
LTC/Home care	11.69*
Other Location (comparison group)	--
Region of Residence	
Northern MB	1.08
Central MB	0.99
Southern MB	0.98
Winnipeg (comparison group)	--
	65+ years
Cause of Death	
Cardiovascular Diseases	0.82*
Injuries	0.98*
Respiratory Diseases	0.80
All Other Causes	0.95
Cancer (comparison group)	--
Location of Death	
Hospital	13.14*
LTC	15.08*
Home care	6.89*
Other Location (comparison group)	--
Region of Residence	
Northern MB	1.23*
Central MB	0.99
Southern MB	1.02
Winnipeg (comparison group)	--
Age Group	
85+ years	1.10*
75 - 84 years	1.08*
65 - 74 years (comparison group)	--

A relative rate >1 indicates the estimated probability of health care costs are higher than in the comparison group. A star (*) beside the relative rate denotes statistical significance.

Location of death was the most important predictor of cost.

Location of death was the most important predictor of cost. Deaths that occurred in hospital and LTC settings were more costly than deaths in Other Locations. Similarly, deaths that occurred while people were on home care were more costly than deaths in Other Locations. Figure 35 illustrates this for all age groups combined.

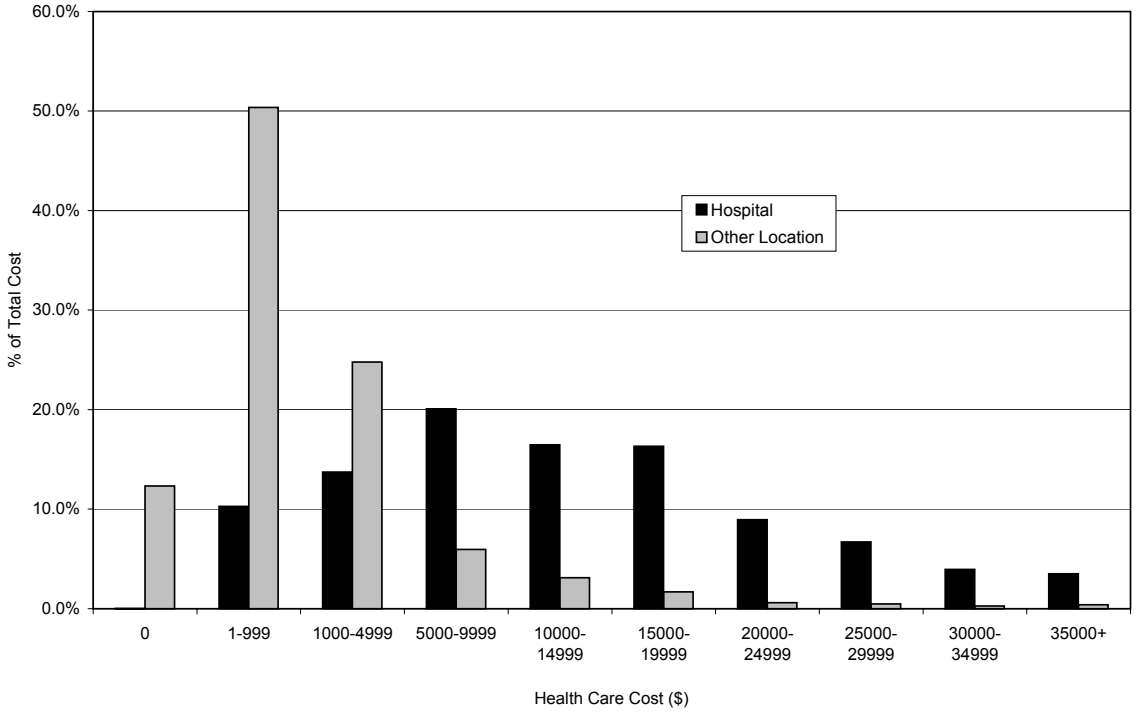
Figure 35: Median Health Care Costs in Last Six Months of Life by Location of Death



Results indicate that hospitals and LTC facilities are the most expensive places to die.

While this is generally the case, it should be noted, however, that high-cost users can be found not only in hospital, but also in all the other locations of death. Figure 36 illustrates this by displaying the distribution of costs for individuals who died in hospital versus in Other Locations. While most individuals who died in Other Locations incurred few health care costs in the last six months of life—indeed 62.7% of these decedents incurred costs below $1,000—a small number incurred very high costs of at least $35,000. These extremely high costs influence the results of the analyses substantially. However, when we exclude these extreme values, the results still indicate that hospitals and LTC facilities are the most expensive places to die.

Figure 36: Distribution of Health Care Cost by Location of Death (Hospital vs. Other Location)



Analyses showed that death was significantly related to cost, with deaths due to cardiovascular and respiratory diseases being less costly than deaths due to cancer. Costs associated with different causes also varied depending on the location of death.

The regression analyses further showed that cause of death was significantly related to cost, with deaths due to cardiovascular diseases and respiratory diseases being less costly than deaths due to cancer (see Table 12). However, although cause of death was an important factor in determining health care costs in the last six months of life, the costs associated with different causes also varied depending on the location of death. For example, among 65+ year old decedents, deaths due to cardiovascular disease that occurred in hospital were more costly than cardiovascular disease deaths in Other Locations; however the same effect did not emerge for deaths due to respiratory illnesses, which incurred similar costs regardless of location of death. For the 45-64 age group, analyses conducted after removing individuals with high costs showed that respiratory disease deaths were in fact less costly than cancer deaths. Thus, the relation between cause of death and cost is complex.

Costs among decedents generally did not differ across regions of Manitoba, with the exception of Northern residents in the 65+ year old age group.

Health care costs among decedents generally did not differ across regions of Manitoba. The only exception was that costs were higher among Northern residents than Winnipeg residents for 65+ year old individuals. Some caution is advised in interpreting these findings. Given that we estimated PCH and home care costs using an average per diem rate, subtle regional differences that might have emerged had we been able to estimate these costs for each region may have been missed.

Income quintiles also did not predict health care costs. This seemingly contradicts our findings for health care use, where we saw consistent income quintile effects for all measures. Two factors account for this discrepancy in findings. First, income quintiles, as we saw earlier, were not associated with location of death; yet location of death is a major predictor of health care costs. Second, hospital costs—the major driver of total health care costs—were not derived on a per diem basis. Thus, more days do not necessarily mean a corresponding increase in hospital costs in our decedent cohort; instead, cause of death was a stronger determinant of costs.

8.0 KEY FINDINGS AND CONCLUSIONS

Half of deaths in Manitoba occurred in hospital in 2000/01.

- About half of deaths in Manitoba occurred in hospital in 2000/01. Is this too high a proportion? Or about right? The question of what proportion of deaths "should" occur in hospital is a difficult one to answer. When asked, most people state a preference for dying at home. Yet some hospital deaths are clearly unavoidable and entirely appropriate. One way to look at this issue is to compare Manitoba to other provinces. By that standard, Manitoba seems to fare quite well. Research shows that the proportion of hospital deaths ranged from 52% to 87% across the provinces and territories in 1997 (Heyland et al., 2000). When we focus only on cancer deaths, Manitoba again compares favourably. A study from Nova Scotia shows that, in 1997, 70% of cancer deaths in that province occurred in hospital (Burge et al., 2003), compared to 57% in Manitoba.

There is considerable variation across Manitoba in the proportion of hospital deaths among cancer patients.

- There is considerable variation across Manitoba in the proportion of hospital deaths among cancer patients. Among Winnipeg residents, 47% of cancer deaths occurred in hospital, compared to 72% among non-Winnipeg residents. This discrepancy between Winnipeg and non-Winnipeg residents is to a large extent explained by the hospital-based palliative care units at the St. Boniface General Hospital and Riverview Health Centre. Indeed, one-third of cancer deaths among Winnipeg residents occurred in these two palliative care units. Thus, making palliative care a priority through allocation of sufficient resources to facilities and staff clearly makes a difference. In rural areas, there are currently no similar large units, nor is implementing such units likely feasible or desirable, given the relatively small numbers of deaths per year, possible staffing issues, etc. What models of palliative care are most suitable in rural settings is an issue that needs to be examined.

Only 6% of Manitobans died while on home care; 8% when focussing on cancer deaths.

- Only 6% of Manitobans died while on home care; 8% when focusing on cancer deaths. This proportion will likely increase over the next few years, given Manitoba Health's—and the RHAs'—current emphases in palliative care. For example, the Palliative Care Access Program that was introduced in December of 2002 should make a substantial difference in terms of allowing individuals who wish to die at home to do so. In the past, drug costs for palliative care patients were covered only while they were in hospital. Given the high cost of some drugs, this provided an incentive to admit individuals to hospital. With the new program, deductible-free drug coverage is provided outside the hospital. Thus, the drug program represents an extremely important step forward in allowing Manitobans who are dying a choice of where to die.

Age and cause of death were related to location of death.

- What factors predict where Manitobans die? As one would expect, age and cause of death were two factors that were consistently related to location of death. For example, very elderly individuals aged 85+ years were much more likely to have died in a LTC facility than younger individuals. Deaths due to cancer were more likely to occur in hospital and LTC settings than in Other Locations, whereas deaths due to cardiovascular diseases or injuries were more likely to occur in locations other than hospitals or LTC facilities, reflecting more sudden deaths.

Location of death is not related to wealth or poverty in Manitoba.

- While it is important to know what factors are related to location of death, equally interesting is to know what is not related to it. Income quintiles—a measure of the average household income of the neighbourhoods in which decedents lived—was one factor that was consistently not related to location of death. Thus, the good news is that in Manitoba, how wealthy (or poor) people are does not determine where they die. While income quintiles were not related to location of death, it should be noted that that they were consistently related to health care use at the end of life. Individuals who lived in poorer neighbourhoods used more health care services (hospital days, LTC days, home care days, physician visits, number of prescription drugs) than those living in wealthier neighbourhoods. This is entirely consistent with research on the general population (not just decedents) (Roos and Mustard, 1997), and suggests that income is a major predictor of health status.

83% of those living in a LTC facility six months prior to death also died in the LTC facility. However, some PCHs were much more likely than others to transfer residents to hospital at the end of life.

- An encouraging finding is that most LTC residents died "in place"—83% of individuals who lived in a LTC setting six months before death also died in a LTC facility. The proportion of individuals who were never hospitalized in the last six months of life was lower, however: 63% of LTC residents were never hospitalized in the last six months of life, with the remaining individuals being hospitalized at least once (16% died in hospital, and an additional 21% were hospitalized at least once in the last six months of life, although they later died in a LTC facility). That about two-thirds of LTC residents were not hospitalized in the last six months of life is a positive sign; however, there is room for improvement. Indeed, when we look at individual PCHs (we did this for Winnipeg and Brandon only), we find that the proportion of residents who were hospitalized at least once in the last six months of life varied dramatically: from 7% to 58%. In other words, some PCHs were much more likely than others to transfer residents to hospital at the end of life. This finding clearly warrants further investigation into the reasons why this is the case.

- A large proportion—70%—of individuals who received home care services six months before death died in an acute care hospital and an even greater proportion (86%) were hospitalized at least once in the last six

Home care recipients consumed a large proportion of hospital days in the last six months of life.

months before death, although they did not necessarily die there; 43% were hospitalized two or more times. Home care recipients therefore consumed a large proportion of hospital days in the last six months of life. Almost two-thirds of home care recipient who were hospitalized two or more times in the last six months of life were 75 years or older. An issue that needs to be examined relates to the care options for such relatively frail elderly individuals. For instance, what were the reasons for these hospitalizations? Did they allow individuals to remain in their own homes longer, thereby potentially contributing to quality of life? What was the care burden on informal caregivers, such as spouses? These are just some of the issues that need to be explored.

- Decedents used more health care services than survivors—a finding that does not come as a surprise. Concerns are sometimes voiced that heroic (and inappropriate) measures are increasingly used at the end of life, particularly for very old individuals with little chance of survival, thereby placing considerable strain on the health care system. The question of the "aggressiveness" of treatment and whether the services provided at the end of life were appropriate was beyond the scope of the present report. However, the report shows that decedents did not use an inordinate proportion of services in the last year of life: about 20% of hospital days and LTC days, respectively, about 10% of home care days, and less than 5% of physician visits and (out-of-hospital) prescription drugs.

The findings are that decedents did not use an inordinate proportion of services in the last year of life.

- Patterns of use differed quite substantially across different types of health care services. While much of hospital use was condensed into the last month before death—indeed hospital days (per decedent) nearly doubled in the last month before death, compared to the month prior to that—LTC days, home care days, physician visits, and drug use were relatively stable across the last six months of life. Factors that predicted health care use included cause of death, location of death, region of residence, neighbourhood-level income, and age. For example, cancer deaths were related to more hospital days, LTC days, home care days, physician visits and prescription drugs (per decedent) than cardiovascular disease deaths among younger adults; the opposite was true among 65+ year old decedents. Thus, overall, the system appears to be responsive to people's needs. For instance, more resources are allocated to individuals from poorer neighbourhoods who are known to have greater health care needs.

Overall, the system appears to be responsive to people's needs.

- Much has been made of the so-called "high cost of dying"; the assumption seems to be that because decedents incur a high proportion of health care costs, too many unnecessary services are provided at the end of life. Our data show that decedents, who constitute only 1.1% of the population, indeed incur quite a substantial proportion of health care

costs—21%. This proportion is similar to what has been found in the U.S. (Lubitz and Riley, 1993; Hogan et al., 2001) A large proportion—almost three-quarters—of decedents' health care costs were incurred by 75+ year olds. Costs for these individuals were high because, on the one hand, 75+ year olds constitute a large proportion of decedents (about two-thirds of decedents are in that age bracket) and, on the other hand, because the average cost per 75+ year old decedent is higher than for younger individuals. Does this mean that costs are high because of inappropriately aggressive treatment for very elderly individuals at the end life? Not necessarily. First of all, among frail elderly individuals, it is difficult to predict who will die and when death will occur; there do not seem to be clear signals that would suggest impending death (Covinsky et al., 2003). This makes it difficult to know when life-prolonging care should be stopped. Also, the present report shows that a large proportion of the cost incurred at the end of life is due to LTC costs, particularly among 85+ year old decedents. Among these very elderly decedents, LTC costs constituted 41% of their total health care cost in the last six months of life. Thus, the high cost of dying among the very old is, to a large extent, related to the costs of caring for frail individuals with high care needs over an extended period of time.

The high cost of dying among the very old is related to the cost of caring for frail individuals with high care needs over an extended period of time.

- Given the aging population, health care costs incurred by older adults are an important issue. In Manitoba, population projections suggest that the population aged 75+ will increase by 12% by 2020, relative to 2000. Although seniors are living longer than ever, the number of decedents in the 75+ year age range will therefore also rise substantially in the next 20 years. The health care costs incurred by these elderly decedents are a concern that will have to be addressed. The present report shows that a high proportion of health care costs among 75+ year old decedents was due to hospital costs. Hospital use among these individuals should therefore be examined in more detail in further research. For example, as noted above, there was up to an eightfold difference between PCHs in terms of the proportion of residents admitted to hospital at the end of life. Similarly, home care recipients incurred a major proportion of hospital days. Why these admissions occurred and how appropriate they are should be explored.

There was an eightfold difference between PCHs in terms of the proportion of residents admitted to hospital at the end of life. Similarly, home care residents incurred a major proportion of hospital days. Why these admissions occurred and how appropriate they are should be explored.

- Health care cost varied substantially by location of death. Average costs of both hospital and LTC deaths (which did not differ significantly from each other) were about twice as high as costs for decedents who died while on home care. Costs for decedents on home care were, in turn, much higher than those for decedents in Other Locations. An important question that could not be addressed in the present report, but needs to be explored in the future, relates to the cost of palliative care. On the one hand, it will be important to calculate costs for hospital palliative

care units which, in the present report, were excluded from the analyses because we could not reliably estimate costs. On the other hand, knowing the costs for the provision of palliative care in people's homes will be important. Thus, while our data show that the average cost for decedents on home care is about half of that for individuals who died in hospital, the findings may be very different in the future. If palliative care is provided at home right up to death, with the often high drug costs being covered through the new Palliative Care Drug Access Program, costs may rise substantially.

- Last, but not least, a comment is warranted regarding data issues. In order to be able to conduct research on end-of-life issues, it is critical that palliative care patients can be reliably identified in the administrative data. This will mean, for example, that as new palliative care hospices are opened (e.g., the new Grace General Hospital hospice which opened in 2003), a code is introduced in administrative files to capture these patients. Similarly, it is important that palliative care patients who die at home with the aid of home care are reliably coded in the Home Care database throughout Manitoba. This is currently not the case. Moreover, the palliative care provided by physicians (typically on a salary rather than fee-for-service basis) must be captured. In this respect the care provided in a palliative care context is quite different than that provided to other patients. Considerable time, for example, is spent not with the patient per se, but with family members. Such activities cannot be captured in the physician claims data as they are currently set up. Lastly, being able to determine the costs of palliative care, be it hospital-based or home-based, will be an important task for the future. Data need to be available that will allow such cost calculation.

In order to be able to conduct research on end-of-life issues, it is critical that palliative care patients be reliably identified in the administrative data.

9.0 WHAT NEXT?

End-of-life care—and costs—are clearly important issues that are receiving increasing attention. In order to make informed policy decisions, many issues need further exploration. We list here just a few of them:

- Although we examined patterns of health care use at the end of life, we did not focus on the kinds of treatments individuals received at the end of life, for example, surgical and non-surgical procedures, drugs, etc. Examining such specific aspects of health care use, and exploring what factors are related to them, would start to shed light on how aggressively individuals are treated at the end of life and, potentially, can address which—and for whom—specific treatments are most appropriate.

- Earlier we recommended that patterns of hospital admissions for PCH residents at the end of life should be explored. Given the large variability we found in the present report, further research should explore why this is the case, such as characteristics of the PCH (e.g., location, physician complements, resources, for profit or not, religious-based, etc.), severity of residents' illness, reasons for hospitalizations, and so forth.

- More broadly, care options for frail elderly individuals need exploring. Most older adults do not die suddenly; instead, most experience a slow decline and steadily progressive disability, until death occurs as a result of complications associated with conditions such as stroke or dementia (Lunney et al., 2002). Gaining an understanding of what types of care are most appropriate throughout this functional decline will be important.

- In the present report we were able to identify palliative care patients only if they died in one of two hospital-based palliative care units. Research is needed to systematically examine other palliative care options, including palliative care provided in acute care and long-term care settings. Moreover, it will be important to examine what palliative care models might be most suitable for rural areas.

- Manitoba Health has instituted some important enhancements to the provincial palliative care program in the last few years. In 1999/00, funding was provided to the rural and Northern RHAs for palliative care coordinator positions. In 2000/01, specific funding was provided to the WRHA for additional programs, such as a 24-hour response team. In December of 2002, the Palliative Care Drug Access Program was introduced, which provides drug coverage for palliative care patients. Given these positive steps to improving end-of-life care in Manitoba, a task for the future will be to examine their effects on health care use—and

cost—at the end of life. In this respect, the present report can be considered a baseline study to which subsequent analyses can be compared.

- Examining patterns of health care use (and cost) at the end of life is one important issue. Administrative data lend themselves extremely well to addressing these issues by allowing population-based analyses and detailed analysis of patterns over time. Equally important, however, is to conduct research on issues that cannot be captured with administrative data, such as palliative care patients' or care providers' perceptions of the quality of end-of-life care.

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APPENDIX A

Appendix Table 1: Multinomial regression results for type of hospital at death

Factor	Odds Ratio	2	P
	Teaching Hospitals vs. Rural Hospitals		
Cause of Death			
Cancer	0.46	25.7	<.0001
Cardiovascular Diseases	1.4	4.39	0.0362
Respiratory Disease	0.74	1.72	0.1903
Injuries	2.06	4.94	0.0263
All Other Causes (comparison group)	--	--	--
Age Group			
19 - 44 years	3.53	29.42	<.0001
45 - 64 years	2.21	41.56	<.0001
65 - 74 years	1.16	1.77	0.1839
75 - 84 years	0.59	26.2	<.0001
85+ years (comparison group)	--	--	--
Sex			
Men	1.04	0.5	0.481
Women (comparison group)	--	--	--
Region of Residence			
Non-Winnipeg	0.1	453.94	<.0001
Winnipeg (comparison group)	--	--	--
	Community Hospitals vs. Rural Hospitals		
Cause of Death			
Cancer	0.73	4.75	0.0292
Cardiovascular Diseases	1.23	1.78	0.1817
Respiratory Disease	1.09	0.19	0.6658
Injuries	1.2	0.31	0.5751
All Other Causes (comparison group)	--	--	--
Age Group			
19 - 44 years	0.75	1.13	0.2872
45 - 64 years	1.44	8.06	0.0045
65 - 74 years	1.3	5	0.0253
75 - 84 years	1.02	0.03	0.8597
85+ years (comparison group)	--	--	--
Sex			
Males	1.01	0.05	0.8179
Females (comparison group)	--	--	--
Region of Residence			
Non-Winnipeg	0.1	489.72	<.0001
Winnipeg (comparison group)	--	--	--

Odds Ratios >1 indicate an increased likelihood of dying in a particular type of hospital. Odds Ratios <1 indicate a decreased likelihood of dying in a particular type of hospital (relative to dying in a rural hospital).

Note: 2=chi-square statistic; P=p-value

Appendix Table 2A: Factors related to location of death among individuals who died of cancer (excluding palliative care units)

	Hospital (vs. Other Location)	LTC (vs. Other Location)	Home Care (vs. Other Location)
Factors	**Odds Ratio**	**Odds Ratio**	**Odds Ratio**
Cause of Death			
Lung Cancer	1.06	0.59	1.15
Colorectal Cancer	0.78	0.83	0.66
Breast Cancer	1.87	3.18*	1.87
Prostate Cancer	0.86	1.17	1.01
All Other Cancers (comparison group)	–	–	–
Age Group			
85+ years	2.68*	16.28*	2.51*
75 - 84 years	1.03	1.64	1.14
65 - 74 years	0.70	0.27*	0.64
Under 65 years (comparison group)	–	–	–
Region of Residence			
Non-Winnipeg	1.08	0.91	0.95
Winnipeg (comparison group)	–	–	–

Odds Ratios >1 indicate an increased likelihood of dying in a particular location; Odds Ratios <1 indicate a decreased likelihood of dying in a particular location (relative to dying in Other Locations). A star (*) beside the Odds Ratio denotes statistical significance.

Appendix Table 2B: Where do cancer deaths occur? Winnipeg facilities

	Palliative Care Unit (vs. Other Hospital Ward)	ICU (vs. Other Hospital Ward)
Factors	**Odds Ratio**	**Odds Ratio**
Cause of Death		
Lung Cancer	0.87	0.65
Colorectal Cancer	1.14	1.34
All Other Cancers (comparison group)	–	–
Age Group		
85+ years	0.48*	0.61
75 - 84 years	1.06	1.05
65 - 74 years	1.50*	1.26
Under 65 years (comparison group)	–	–
Region of Residence		
Non-Winnipeg	0.94	1.51*
Winnipeg (comparison group)	–	–

Odds Ratios >1 indicate an increased likelihood of dying in a particular location; Odds Ratios <1 indicate a decreased likelihood of dying in a particular location (relative to dying in Other Hospital Wards). A star (*) beside the Odds Ratios denotes statistical significance.

A subsequent analysis also showed that income quintiles were not related to where cancer deaths occurred.

Appendix Table 3A: Regression model for hospital days in the last six months prior to death, 19-44 years

Factor	Relative Rate	^{2}	P
Cause of Death			
Cardiovascular Diseases	0.11	24.25	<.0001
Injuries	0.32	6.51	0.0107
All Other Causes	1.78	2.00	0.1573
Cancer (comparison group)	–	--	--
Location of Death			
Hospital	2.10	0.85	0.3554
LTC/Home care	0.14	5.28	0.0215
Other Location (comparison group)	–	--	--
Sex			
Men	1.21	0.35	0.5551
Women (comparison group)	–	--	--
Time Period			
Period 1	6.75	12.68	0.0004
Period 2	3.63	6.16	0.0131
Period 3	2.60	3.71	0.0540
Period 4	1.32	0.31	0.5797
Period 5	1.07	0.02	0.8899
Period 6 (comparison group)	–	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. ^{2} =chi-square statistic; P=p-value

Appendix Table 3B: Regression model for hospital days in the last six months prior to death, 45-64 years

Factor	Relative Rate	^{2}	P
Cause of Death			
Cardiovascular Diseases	0.71	3.22	0.0279
Injuries	0.09	135.32	<.0001
All Other Causes	0.79	1.49	0.2221
Cancer (comparison group)	–	--	–
Location of Death			
Hospital	11.59	196.25	<.0001
LTC/Home care	1.60	7.41	0.0065
Other Location (comparison group)	–	--	–
Sex			
Men	1.41	6.12	0.0134
Women (comparison group)	–	--	–
Time Period			
Period 1	2.74	17.05	<.0001
Period 2	1.95	7.82	0.0052
Period 3	1.55	3.40	0.0651
Period 4	1.22	0.67	0.4123
Period 5	1.57	3.26	0.0708
Period 6 (comparison group)	–	--	–

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. ^{2} =chi-square statistic; P=p-value

Appendix Table 3C: Regression model for hospital days in the last six months prior to death, 65+ years

Factor	Relative Rate	2	P
Cause of Death			
Cardiovascular Diseases	0.30	5.58	0.0182
Respiratory Diseases	-1.46	125.67	<.0001
Injuries	-2.58	360.22	<.0001
All Other Causes	-0.10	0.61	0.4367
Cancer (comparison group)	--	--	--
Location of Death			
Hospital	19.24	775.56	<.0001
LTC	8.82	184.75	<.0001
Home care	2.15	9.69	0.0019
Other Location (comparison group)	--	--	--
Sex			
Men	1.27	7.60	0.0058
Women (comparison group)	--	--	--
Marital Status			
Not Married/Unknown	2.09	65.89	<.0001
Married (comparison group)	--	--	--
Time Period			
Period 1	2.27	32.09	<.0001
Period 2	1.62	11.53	0.0007
Period 3	1.31	3.63	0.0567
Period 4	1.07	0.24	0.6245
Period 5	1.08	0.27	0.6034
Period 6 (comparison group)	--	--	--
Age Group			
85+ years	1.23	3.58	0.0586
75 - 84 years	1.63	23.45	<.0001
65 - 74 years (comparison group)	--	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. 2 =chi-square statistic; P=p-value

Appendix Table 4A: Regression model for long-term care days in the last six months prior to death, 45-64 years

Factor	Relative Rate	χ^2	P
Cause of Death			
All Other Causes	2.97	6.14	0.0132
Respiratory Diseases	0.22	11.18	0.0008
Cardiovascular Diseases	0.58	1.15	0.2832
Cancer (comparison group)	--	--	--
Location of Death			
LTC	6.29	32.38	<.0001
Hospital (comparison group)	--	--	--
Sex			
Men	1.39	0.72	0.3965
Women (comparison group)	--	--	--
Time Period			
Period 1	1.75	0.98	0.3219
Period 2	1.45	0.45	0.5038
Period 3	1.18	0.09	0.7649
Period 4	1.23	0.15	0.6988
Period 5	1.21	0.12	0.7291
Period 6 (comparison group)	--	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. χ^2 =chi-square statistic; P=p-value

Appendix Table 4B: Regression model for long-term care days in the last six months prior to death, 65+ years

Factor	Relative Rate	χ^2	P
Cause of Death			
Cardiovascular Diseases	4.22	201.23	<.0001
Respiratory Diseases	1.28	5.98	0.0144
All Other Causes	5.42	277.61	<.0001
Cancer (comparison group)	--	--	--
Location of Death			
LTC	4.54	439.84	<.0001
Hospital (comparison group)	--	--	--
Sex			
Men	0.99	0.02	0.8854
Women (comparison group)	--	--	--
Marital Status			
Not Married/Unknown	3.12	235.48	<.0001
Married (comparison group)	--	--	--
Time Period			
Period 1	1.15	1.23	0.2672
Period 2	1.24	3.06	0.0803
Period 3	1.19	1.90	0.1681
Period 4	1.14	1.06	0.3042
Period 5	1.05	0.14	0.7082
Period 6 (comparison group)	--	--	--
Age Group			
85+ years	10.00	661.92	<.0001
75 - 84 years	4.95	326.02	<.0001
65 - 74 years (comparison group)	--	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. χ^2 =chi-square statistic; P=p-value

Appendix Table 5A: Regression model for home care days in the last six months prior to death, 45-64 years

Factor	Relative Rate	χ^2	P
Cause of Death			
Cardiovascular Diseases	0.35	16.62	<.0001
Respiratory Diseases	0.86	0.34	0.5606
All Other Causes	0.50	7.53	0.0061
Cancer (comparison group)	--	--	--
Sex			
Men	1.20	0.96	0.3281
Women (comparison group)	--	--	--
Location of Death			
Home care	0.53	8.98	0.0027
LTC	0.01	291.88	<.0001
Hospital (comparison group)	--	--	--
Time Period			
Period 1	1.02	0.01	0.9382
Period 2	1.17	0.27	0.6057
Period 3	0.98	0.00	0.9593
Period 4	0.97	0.01	0.9244
Period 5	0.94	0.04	0.8425
Period 6 (comparison group)	--	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. χ^2 =chi-square statistic; P=p-value

Appendix Table 5B: Regression model for home care days in the last six months prior to death, 65+ years

Factor	Relative Rate	χ^2	P
Cause of Death			
Cardiovascular Diseases	1.85	31.02	<.0001
Respiratory Diseases	0.44	54.16	<.0001
All Other Causes	1.03	0.08	0.7828
Cancer (comparison group)	--	--	--
Location of Death			
Home care	0.23	240.84	<.0001
LTC	0.09	593.61	<.0001
Hospital (comparison group)	--	--	--
Sex			
Men	1.05	0.37	0.5447
Women (comparison group)	--	--	--
Marital Status			
Not Married/Unknown	1.90	55.15	<.0001
Married (comparison group)	--	--	--
Time Period			
Period 1	0.75	4.36	0.0368
Period 2	0.82	2.22	0.1365
Period 3	0.87	1.03	0.3097
Period 4	0.94	0.25	0.6194
Period 5	0.97	0.04	0.8426
Period 6 (comparison group)	--	--	--
Age Group			
85+ years	0.67	23.13	<.0001
65 - 84 years (comparison group)	--	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. χ^2 =chi-square statistic; P=p-value

Appendix Table 6A: Regression model for physician visits in the last six months prior to death, 19-44 years

Factor	Relative Rate	^{2}	P
Cause of Death			
Cardiovascular Diseases	0.35	16.66	<.0001
Injuries	0.60	3.03	0.0816
All Other Causes	0.89	0.23	0.6280
Cancer (comparison group)	--	--	--
Location of Death			
Hospital	0.76	1.43	0.2312
LTC/Home care	0.14	58.92	<.0001
Other Location (comparison group)	--	--	--
Sex			
Men	1.46	4.65	0.0311
Women (comparison group)	--	--	--
Time Period			
Period 1	1.56	2.26	0.1331
Period 2	1.31	0.80	0.3725
Period 3	1.16	0.24	0.6224
Period 4	1.43	1.42	0.2326
Period 5	1.14	0.19	0.6645
Period 6 (comparison group)	--	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. 2 =chi-square statistic; P=p-value

Appendix Table 6B: Regression model for physician visits in the last six months prior to death, 45-64 years

Factor	Relative Rate	^{2}	P
Cause of Death			
Cardiovascular Diseases	0.50	19.21	<.0001
Injuries	0.15	114.43	<.0001
All Other Causes	0.55	15.65	<.0001
Cancer (comparison group)	--	--	--
Location of Death			
Hospital	1.51	8.05	0.0046
LTC/Home care	0.34	54.89	<.0001
Other Location (comparison group)	--	--	--
Sex			
Men	1.41	9.84	0.0017
Women (comparison group)	--	--	--
Time Period			
Period 1	1.55	5.49	0.0192
Period 2	1.21	0.99	0.3186
Period 3	1.15	0.55	0.4599
Period 4	1.05	0.05	0.8146
Period 5	1.06	0.11	0.7411
Period 6 (comparison group)	--	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. 2 =chi-square statistic; P=p-value

Appendix Table 6C: Regression model for physician visits in the last six months prior to death, 65+ years

Factor	Relative Rate	^{2}	P
Cause of Death			
Cardiovascular Diseases	2.06	73.26	<.0001
Injuries	0.12	542.57	<.0001
All Other Causes	1.30	10.20	0.0014
Cancer (comparison group)	--	--	--
Location of Death			
Hospital	6.48	583.91	<.0001
LTC/Home care	3.81	271.22	<.0001
Other Location (comparison group)	--	--	--
Sex			
Men	1.28	15.05	0.0001
Women (comparison group)	--	--	--
Marital Status			
Not Married/Unknown	1.65	58.02	<.0001
Married (comparison group)	--	--	--
Time Period			
Period 1	1.72	28.15	<.0001
Period 2	1.23	4.23	0.0398
Period 3	1.14	1.71	0.1905
Period 4	1.01	0.01	0.9261
Period 5	1.03	0.09	0.7646
Period 6 (comparison group)	--	--	--
Age Group			
85+ years	1.27	8.49	0.0036
75 - 84 years	1.41	21.30	<.0001
65 - 74 years (comparison group)	--	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. 2 =chi-square statistic; P=p-value

Appendix Table 7A: Regression model for number of prescriptions in the last six months prior to death, 19-44 years

Factor	Relative Rate	^{2}	P
Cause of Death			
Cardiovascular Diseases	0.31	18.30	<.0001
Injuries	0.59	2.70	0.1005
All Other Causes	1.37	1.34	0.2476
Cancer (comparison group)	--	--	--
Location of Death			
Hospital	0.72	1.48	0.2244
LTC/Home care	0.20	33.93	<.0001
Other Location (comparison group)	--	--	--
Sex			
Men	1.86	10.73	0.0011
Women (comparison group)	--	--	--
Time Period			
Period 1	1.28	0.60	0.4389
Period 2	1.56	1.98	0.1599
Period 3	1.22	0.41	0.5244
Period 4	1.24	0.46	0.4985
Period 5	1.24	0.46	0.4972
Period 6 (comparison group)	--	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. ^{2} =chi-square statistic; P=p-value

Appendix Table 7B: Regression model for number of prescriptions in the last six months prior to death, 45-64 years

Factor	Relative Rate	^{2}	P
Cause of Death			
Cardiovascular Diseases	1.03	0.02	0.8877
Injuries	0.20	69.74	<.0001
All Other Causes	1.08	0.19	0.6670
Cancer (comparison group)	--	--	--
Location of Death			
Hospital	1.54	6.67	0.0098
LTC/Home care	0.50	19.46	<.0001
Other Location (comparison group)	--	--	--
Sex			
Men	1.01	0.01	0.9216
Women (comparison group)	--	--	--
Time Period			
Period 1	1.23	0.99	0.3194
Period 2	1.19	0.71	0.3980
Period 3	1.18	0.65	0.4210
Period 4	1.10	0.19	0.6602
Period 5	1.18	0.64	0.4229
Period 6 (comparison group)	--	--	--

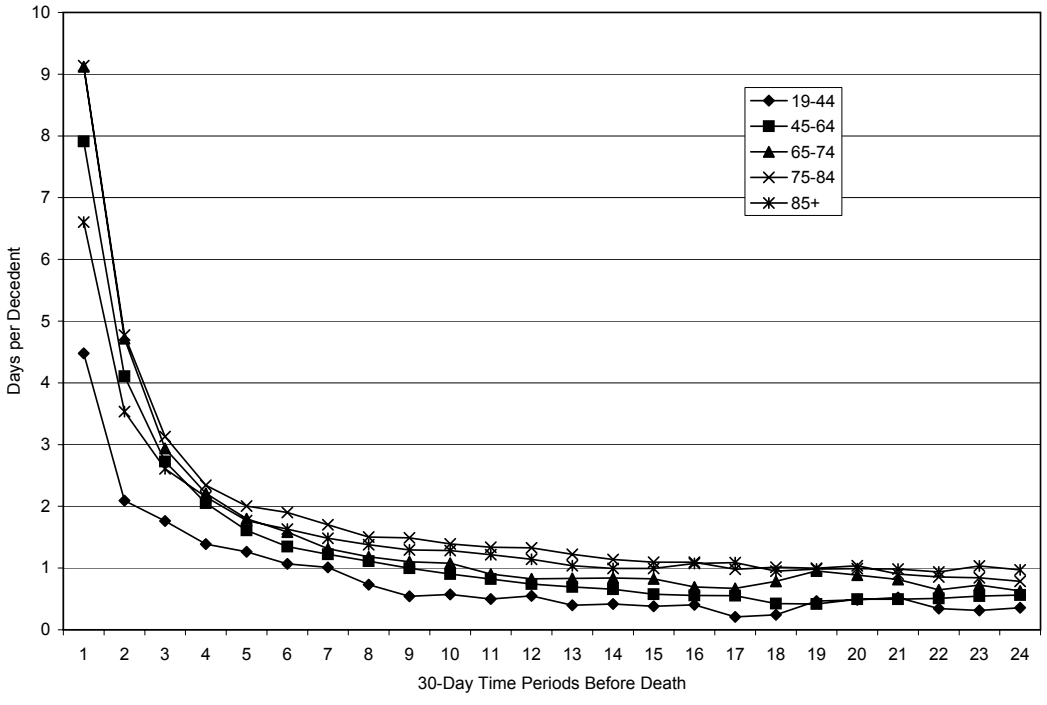
Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. ^{2} =chi-square statistic; P=p-value

Appendix Table 7C: Regression model for number of prescriptions in the last six months prior to death, 65+ years

Factor	Relative Rate	^{2}	P
Cause of Death			
Cardiovascular Diseases	3.21	163.50	<.0001
Injuries	0.15	423.45	<.0001
All Other Causes	1.89	51.08	<.0001
Cancer (comparison group)	–	--	--
Location of Death			
Hospital	7.52	574.48	<.0001
LTC/Home care	4.63	296.82	<.0001
Other Location (comparison group)	–	--	--
Sex			
Men	1.23	9.26	0.0023
Women (comparison group)	–	--	--
Marital Status			
Not Married/Unknown	1.80	73.05	<.0001
Married (comparison group)	–	--	--
Time Period			
Period 1	1.14	1.48	0.2241
Period 2	1.17	2.07	0.1502
Period 3	1.11	0.88	0.3474
Period 4	1.08	0.52	0.4719
Period 5	1.03	0.09	0.7670
Period 6 (comparison group)	–	--	--
Age Group			
85+ years	1.20	4.07	0.0436
75 - 84 years	1.31	11.31	0.0008
65 - 74 years (comparison group)	–	--	--

Note: Period 1 is the first 30-day period prior to death, Period 2 is the next 30-day period prior to death, and so on. ^{2} =chi-square statistic; P=p-value

Appendix Figure 1: Hospital Days (per Decedent) by Time Period



APPENDIX B

Analytic Techniques for End-of-Life Setting

We performed logistic and multinomial regression analyses using the end-of-life setting as the outcome. A multinomial regression model is similar to a logistic regression model, but is appropriate when there are three or more categories of the outcome variable rather than just two categories as in the logistic model. Three different outcome variables were used to define the end-of-life setting: (1) location of death, (2) hospital unit of death, and (3) type of hospital at death.

The location of death categories were: (1) hospital, (2) LTC facility, (3) home care, and (4) Other Locations. Cause of death, region of residence, sex, marital status, and income quintiles were the predictor variables. Separate models were defined for the 19-44, 45-64, and 65+ years age groups. For all three age groups, the first regression model included cause of death, region of residence, and sex as predictor variables. Two additional regression models were defined to investigate the relationship between location of death and income quintiles for rural and urban residents, respectively. As well, for the 65+ age group we examined a model that included all of the predictors for the first model, in addition to marital status.

The hospital unit categories were: (1) palliative care, (2) intensive care unit, and (3) other ward. The predictor variables were cause, age group, sex, region, and the two-way interaction of cause by region. Note that data for all age groups were included in this analysis because there were a smaller number of decedents included in this analysis than in the previous analysis. The interaction term was not significant in the model, indicating that death in a particular hospital unit did not vary by cause of death and region of residence.

The categories for type of hospital were: (1) teaching, (2) community, and (3) all others. This latter category was comprised of rural and Northern hospitals. The predictor variables were cause of death, age group, region of residence, sex, and the two-way interaction of cause by region. Again, the data for all age groups were included in this analysis. The interaction term was not significant in the model, indicating that death in a particular type of hospital did not vary by cause of death and region of residence.

A separate multinomial regression analysis was run for residents of Winnipeg, to identify the predictors of death in palliative care, home care, and Other Locations. The predictor variables in the first model were cause of death, age group, and sex. A second model also included income quintile.

Another set of analyses was run for decedents for whom cancer was identified as a cause of death. Multinomial regression was used to model location of death, unit of death, and hospital type as a function of the explanatory variables of type of cancer, age group, and region of residence. Type of cancer included lung, colorectal, breast, and prostate. A second model included these base terms, in addition to income quintile, which was defined separately for rural and urban regions.

Analytic Techniques for Days of Health Care Use

The number of decedent days of hospital care, long-term care, and home care were examined for six 30-day periods prior to the date of death. We looked at what factors were associated with use of these health services. In the first model, the predictor variables were cause of death, location of death, sex, and time period. Age group and marital status were also included for the 65+ population. A second model included these variables as well as region of residence (Winnipeg/non-Winnipeg for hospital days; Winnipeg, Northern RHAs, Central RHAs, and Southern RHAs for long-term care and home care days). The third set of models included the predictors for the base model, as well as income quintiles; they were defined separately for urban and rural residents. Days of care were assumed to follow a negative binomial distribution. This distribution is appropriate for data that consist of discrete counts, but are overdispersed (i.e., exhibit heterogeneity across levels of the predictor variables).

Analytic Techniques for Physician Visits

The number of physician visits for decedents for six 30-day periods prior to the date of death were examined. The data for generalist and specialist visits were combined. The predictor variables in the first regression model included cause of death, location of death, sex, and time period. Age group and marital status were included for the 65+ population. A second model included these variables as well as region of residence (Winnipeg, Northern RHAs, Central RHAs, and Southern RHAs). The third set of models included the predictors for the base model, as well as income quintiles; they were defined separately for urban and rural residents. Physician visits were assumed to follow a negative binomial distribution. This distribution is appropriate for data that consist of discrete counts, but are overdispersed (i.e., exhibit heterogeneity across levels of the predictor variables).

Analytic Techniques for Prescription Drugs

We examined the number of prescriptions for decedents for six 30-day periods prior to the date of death. The predictor variables in the first regression model included cause of death, location of death, sex, and time period. Age group and marital status were included for the 65+ population. A second

model included these variables as well as region of residence (Winnipeg, non-Winnipeg, or Winnipeg, Northern RHAs, Central RHAs, and Southern RHAs). The third set of models included the predictors for the base model, as well as income quintiles; these were defined separately for urban and rural residents. Prescriptions were assumed to follow a negative binomial distribution. This distribution is appropriate for data that consist of discrete counts, but are overdispersed (i.e., exhibit heterogeneity across levels of the predictor variables).

Analytic Techniques for Health Care Costs

Total costs of care in the last 180 days (i.e., six months) of life were examined. Total costs included hospital, physician, pharmaceutical, home care, and personal care home costs. All individuals with zero costs were excluded from the analysis; this resulted in 182 individuals being removed from the data set. To validate this exclusion, we confirmed that all of these individuals were assigned to the Other Location setting, and therefore we expected them to have no costs to the system in the last six months of life. Almost half of the excluded decedents (44.5%) died of circulatory disease, followed by injuries (34.6%), and other conditions (12.6%).

For the remainder of the decedent cohort, we developed regression models to examine the factors that predict costs of care. As with previous analyses, separate models were defined for the three age groups: 19-44, 45-64, and 65+ years. Then we looked at what factors were associated with total costs of care. In the first model, the predictor variables were cause of death, location of death, region (Winnipeg, Northern RHAs, Central RHAs, and Southern RHAs) and sex. Age group and marital status were included for the 65+ population. A second set of models included the predictors for the base model, as well as income quintiles; these models were defined separately for urban and rural residents.

Preliminary analyses revealed that the costs of care in the last six months of life are highly skewed, but that the degree of skewness varies with age groups. To analyze this continuous variable, we transformed it using a log-normal transformation, then modelled the transformed data assuming a normal distribution. We observed that this distribution was a better fit for the older age groups than the youngest age group. This is because the data are more highly skewed for the younger age group than for the older age groups.

GLOSSARY

Age Groups. Decedents were divided into the following age groups according to age at death: 19-44, 45-64, 65-74, and 85+. For some analyses, some age groups had to be combined or excluded because there were insufficient numbers of events in the outcome measure (e.g., location of death).

Causes of death. The following causes of death were identified from Vital Statistics data:

- Cardiovascular diseases (ICD-9 = 390-459)
- Cancer (ICD-9 = 140-239)
- Respiratory diseases (ICD-9 = 460-519)
- Injuries (ICD-9 = 800-999)
- All other causes (any remaining causes of death)

Cancer deaths were further divided into lung cancer (ICD-9 = 162), colorectal cancer (ICD-9 = 153, 154), breast cancer (ICD-9 = 174), prostate cancer (ICD-9 = 185), and all other cancers.

Health care costs. Total health care cost in the last six months before death were derived by summing costs for hospital use, PCH use, home care use, physician visits, and prescription drug use.

Home care days. Home care days were defined as the number of days "open" in the Home Care program as recorded in the Manitoba Support Services Payroll (MSSP) file. In the analyses, home care days were expressed as days per decedent.

Home care costs. Home care costs were estimated by multiplying the number of days "open" in the Home Care program by a per diem. The per diem was derived by taking Manitoba Health's expenditures on home care in 2000/01 (Manitoba Health, Annual Report, 2001) and dividing that amount by the total number of home care days in 2000/01, as obtained from the MSSP data file. The average per diem derived in this fashion was $24. The cost for home care services depends considerably depending on the nature of the service provided. For example, Jacobs et al. (1999) report that the cost per hour ranges from about $12 for a home support worker to $43 for a physiotherapist or occupational therapist. The $24 per diem estimate used in the present lies within this range. However, it may underestimate home care costs at the end of life, given that the need for home care services is likely to increase at the end of life.

Hospital beds. The number of acute care hospital beds in each RHA (per 1000 population) was obtained from the Manitoba Health Annual Statistics 1999/2000 (Manitoba Health, 2000). They reflect the number of beds set up as at March 31, 2000.

Hospital costs. All cases that are discharged from hospital are assigned a relative weight using an algorithm developed by the Canadian Institute for Health Information, such that cases that are more costly receive a higher weight than those that are less costly. The total cost of providing inpatient care in all hospitals in Manitoba is divided by the total weights for all cases—this results in the cost per weighted case. The estimated cost of a particular case (or group of cases) is calculated by multiplying the cost per weighted case by the weight that has been assigned to the case (or cases).

Hospital days. Hospital days for all acute care hospitals were derived from the Hospital Discharge Abstract file. In the analyses, days were expressed as a rate, i.e. days per decedent.

Hospitalizations in the last six months of life. Hospitalizations in the last six months of life are a count of the number of times decedents were admitted to hospitals. Note that transfers from one hospital to another were not counted as a "new" hospital episode. For example, an individual who was discharged from Hospital A and transferred to Hospital B would be classified as having one hospitalization only.

Hospitals. Hospitals were classified into three categories: teaching (St. Boniface General Hospital and Health Sciences Centre), urban community hospitals (Brandon and, in Winnipeg, Grace, Seven Oaks, Concordia, Victoria, and Misericordia), and rural hospitals.

Income quintiles. Decedents were assigned to five income groups based on their postal codes. Briefly, the methodology involves sorting postal codes by average household income value (lowest to highest income), which was assigned based on publicly available Census data from 1996. Next, postal code population values (specific to year 1996) were classified by average income from lowest income to highest income, so that approximately 20% of the population were present in each class. Each class of postal codes formed an income quintile, with the lowest income quintile representing areas with the lowest average income, and the highest income quintile representing areas with the highest average income.

Location of death. Location of death was determined using a hierarchical approach in order to create five mutually exclusive categories: (1) If individuals were in a hospital on the date of death they were classified as having died in hospital, (2) if they were in a LTC facility on the date of death, which includes PCHs and, for Winnipeg only, chronic care facilities (Deer Lodge Centre and Riverview Health Centre) they were classified into the LTC category, (3) if they died while receiving home care (but were not in hospital or a LTC facility) they were classified into the "home care" group, (4) if none of the above applied, they were classified as having died in

"Other Locations". A fifth category was identified from the hospital discharge abstract, and included individuals who died in either of the two palliative care units, one of which is located in the St. Boniface General Hospital, the other in the Riverview Health Centre.

Location of residence six months before death. We determined location of residence of decedents 180 days (6 months) before the date of death using a hierarchical approach analogous to the one for determining location of death. We differentiated between individuals who were in hospital, LTC facilities, on home care or in Other Locations. The Other Location category was determined through a process of elimination (i.e. this includes individuals who were not in hospital, not a LTC facility and not on home care). For example, we went to the hospital data to see if an individual had a hospital record which spanned the 180th day before death—if admission was before or on 180 days before death and separation was on or after 180 days before death, then the person was classified as being in hospital 180 days before death.

Long-term care (LTC) days. Long-term care days included both days in PCHs and, for Winnipeg only, days in chronic care facilities (Deer Lodge Centre and Riverview Health Centre).

Marital status. Marital status was determined from the Manitoba Health Registry file, with decedents being classified as being married versus not married/unknown marital status.

Palliative care units. Two palliative care units can be identified in the Hospital Discharge Abstract file: those at the St. Boniface General Hospital and Riverview Health Centre.

RHA of residence. RHA of residence was determined at the date of death.

Region of residents. Regions of residence were defined based on previous work by Brownell et al. (2003). Briefly, Brownell et al. classified RHAs based on premature mortality rates (PMRs). RHAs whose populations had PMRs significantly higher than the provincial average (indicating poorer health) were classified into one group. This included Nor-Man, Burntwood, and Churchill. RHAs whose PMRs did not differ significantly from the provincial average were grouped into a second category: Marquette, Parkland, North Eastman, and Interlake. And RHAs whose PMRs were significantly lower than the provincial average were classified into a third group: South Eastman, South Westman, Brandon, and Central. These three regions are referred to as Northern, Central, and Southern. Winnipeg represented the fourth category in the present report.

Palliative care registry. The palliative care registry is a data file maintained by the Winnipeg Regional Health Authority. It started late in 2000 and contains all individuals identified as palliative care patients in Winnipeg. Special permission was obtained from the WRHA to use the registry (for 2001) for the present project, as it contains information that could not be captured with the administrative data, specifically, palliative care patients who did not die in the St. Boniface or Riverview palliative care units.

LTC beds. The number of LTC beds in each RHA (per population aged 75+) was obtained from a previous MCHP report by Martens et al. (2003).

PCH costs. PCH costs were estimated by multiplying the number of PCH days by a per diem. The per diem was derived by taking Manitoba Health's expenditures for PCHs in 2000/01 (Manitoba Health, Annual Report, 2001) and dividing that amount by the total number of PCH days in 2000/01, as obtained from the PCH file. This resulted in an average per diem of $110. We then subtracted an average residential charge of $35 (the average amount paid by PCH residents), resulting in an average net per diem of $75. This is the amount used in the present report. This per diem corresponded very closely to the average expenditures for Winnipeg PCH, which we obtained from the WRHA for comparison purposes. This suggests that our methodology for deriving a PCH per diem was reasonable.

Physician visits. Physician visits capture the total number of ambulatory physician visits—essentially all visits that occur outside the hospital. Physicians who are paid on a salary basis shadow-bill and should, therefore, be captured in the data. Discussion with the Working Group suggests that this may, however, not be the case for physicians specialising in palliative care. Thus, we likely do not capture the care provided by these physicians in the present report.

Physician costs. Physician costs were derived from the physician claims data. They reflect the costs incurred during ambulatory care physician visits.

Prescription drugs. Decedents' prescription drug use was derived from the Drug Program Information Network (DPIN) databases. The databases capture prescriptions under the provincial Pharmacare Program, the Nursing Home Drug Program, and the Department of Family Services Drug Benefits Program. Non-adjudicated data were also used. We identify in the present report the number of prescriptions per decedent. Drugs were limited to those in the master formulary.

Prescription drug costs. For Pharmacare and the Family Services data the costing of drugs was calculated by summing the ingredient cost paid and the professional fee paid. Costs were imputed for nursing home residents and for non-adjudicated prescriptions.

Survivor cohort. A survivor cohort was extracted and matched to the decedent cohort on age, sex, and region of residence. Age groups were: 19-24, 25-29, etc. up to 85+. Regions were Northern, Southern, Central, and Winnipeg. For every decedent three survivors (Manitoba residents) were identified who were known to be alive by June 2001.

Time periods (30-day time periods). Hospital days, LTC days, home care days, physician visits, and number of drugs (per decedent) were examined in 30-day time periods. As such, health service use was determined for the first 30 days before (and including) the date of death (period 1), the 30 days prior to that (period 2), etc.