

Trends in the Place of Death of British Columbian Cancer Patients, 1997-2003

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Background

- If given the choice, 88% of cancer patients would choose to die at home
- In Nova Scotia approximately 25% of cancer patients die out of hospital (1992 to 1997)
- In Ontario, out of hospital cancer deaths ranged from 31% in 1980 to 21.5% in 1994 to 34% in 1997
- In Manitoba, 42.6% of cancer patients died out of hospital in 2000/01 fiscal year
- In Vancouver, non-institutional cancer deaths ranged from 15% in 1990 to approximately 30% in 1993

Objectives

- To analyze the trend in the place of death for British Columbia cancer patients
- To understand which factors were predictive of dying out of hospital

Methodology

Study Population

All adults, age 18 years and older who died of cancer, in British Columbia as identified from the death certificates, from 1997 to 2003

Database Linkages

The British Columbia Cancer Registry and the British Columbia Vital Statistics databases were probabilistically linked. The Postal Code Conversion Program from Statistics Canada was used to assign each patient to an enumeration area (1996 Census) or a dissemination area (2001 Census) based upon the place of usual residence at the time of death. The enumeration area and dissemination area designation was used to associate Census based data to each patient.

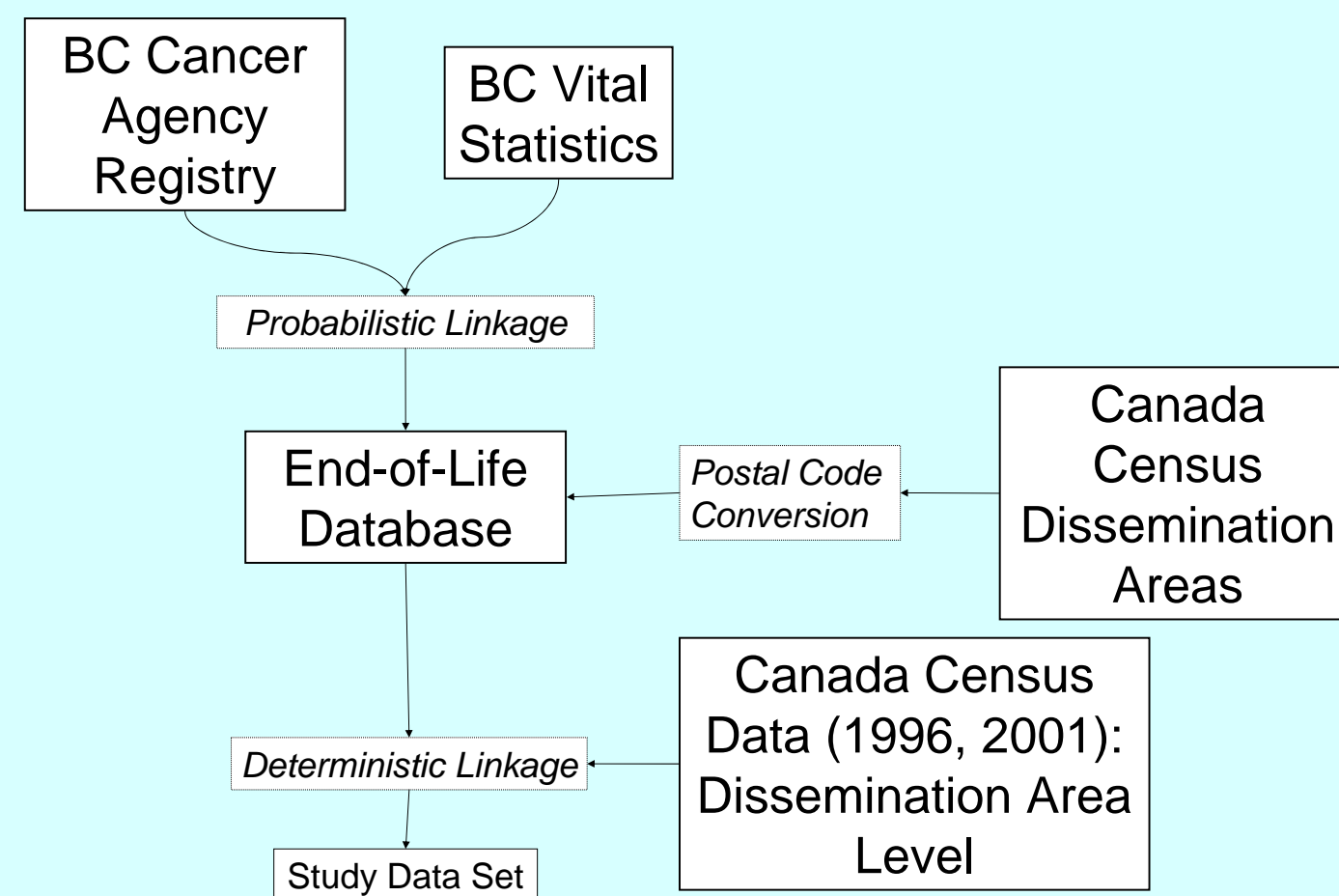


Figure 1: Database linkages and linkage methods for the creation of the End-of-life database and subsequent study dataset.

Variables and Data Sources

Outcome Variable	Data Source
Place of death (In hospital/Out of hospital)	Vital Statistics
Predictor Variable	
Year of Death	BC Cancer Registry
Age	BC Cancer Registry
Income Quintiles	Canada Census
Aggregate Tumour group	BC Cancer Registry/Vital Statistics
Region of Death (Health Authority)	BC Cancer Registry/Vital Statistics
Residence (Rural/Urban) [‡]	BC Cancer Registry/Vital Statistics
Survival	BC Cancer Registry

[‡]Postal Code indicated: 0 in second position indicates rural point of service

Analysis

Chi-squared test of homogeneity was used to identify predictors associated with the outcome. Variables that had a statistically significant association with the outcome were entered into the logistic regression model. This included all predictors except the indicator of residence (urban/rural). Backwards stepwise selection with an exclusion p-value of 0.05.

Results

- Over the study period, 1997 to 2003 inclusive, 67% of cancer patients died in hospital.
- The indicator of residence (urban/rural) had insufficient evidence for association with location of death ($p=0.24$), thus it was not entered into the logistic regression model. All other predictor variables had statistically significant associations with place of death ($p<0.01$).

Table 1: Characteristics of adults in British Columbia who died of cancer, 1997 to 2003, by place of death

Characteristic	In Hospital	Out of Hospital	Percent out of Hospital
Sex			
Male	18079	8434	31.81%
Female	15330	8034	34.39%
Age, yr			
18-44	1275	537	29.64%
45-64	8283	3815	31.53%
65-74	9641	4278	30.73%
75-84	10297	5179	33.46%
≥ 85	3913	2711	40.93%
Neighbourhood IPPE			
Low	8353	3870	31.66%
Lower Middle	6990	3306	32.11%
Middle	6520	3218	33.05%
Upper Middle	5992	3054	33.76%
Upper	5554	3074	35.63%
Aggregate Tumour Group			
Breast	2492	1464	37.01%
Colorectal	3019	1709	36.15%
Lung	8931	4209	32.03%
Prostate	2050	1272	38.29%
Region of Death			
Interior Health Authority	6379	3561	35.82%
Fraser Health Authority	11307	4163	26.91%
Vancouver Coastal Health Authority	7455	3528	32.12%
Vancouver Island Health Authority	6688	4323	39.26%
Northern Health Authority	1580	945	37.43%
Residence			
Urban	29077	14316	32.99%
Rural	4332	2204	33.72%
Length of Survival			
≤ 60	8367	2514	23.10%
61-120	3391	1732	33.81%
≥ 121	21651	12274	36.18%

• Figure 2 shows a general increasing trend in the proportion of deaths occurring out of hospital with a peak in 1999 consistent across all Health Authorities. Table 2 supports this observation as a gradient due to year of death can be seen.

• Figure 2 shows a general increasing trend in the proportion of deaths occurring out of hospital for each of the Health Authorities. The Vancouver Coastal Health Authority is a notable exception.

• Place-of-death gradients can be observed for age, income, length of survival (Table 2).

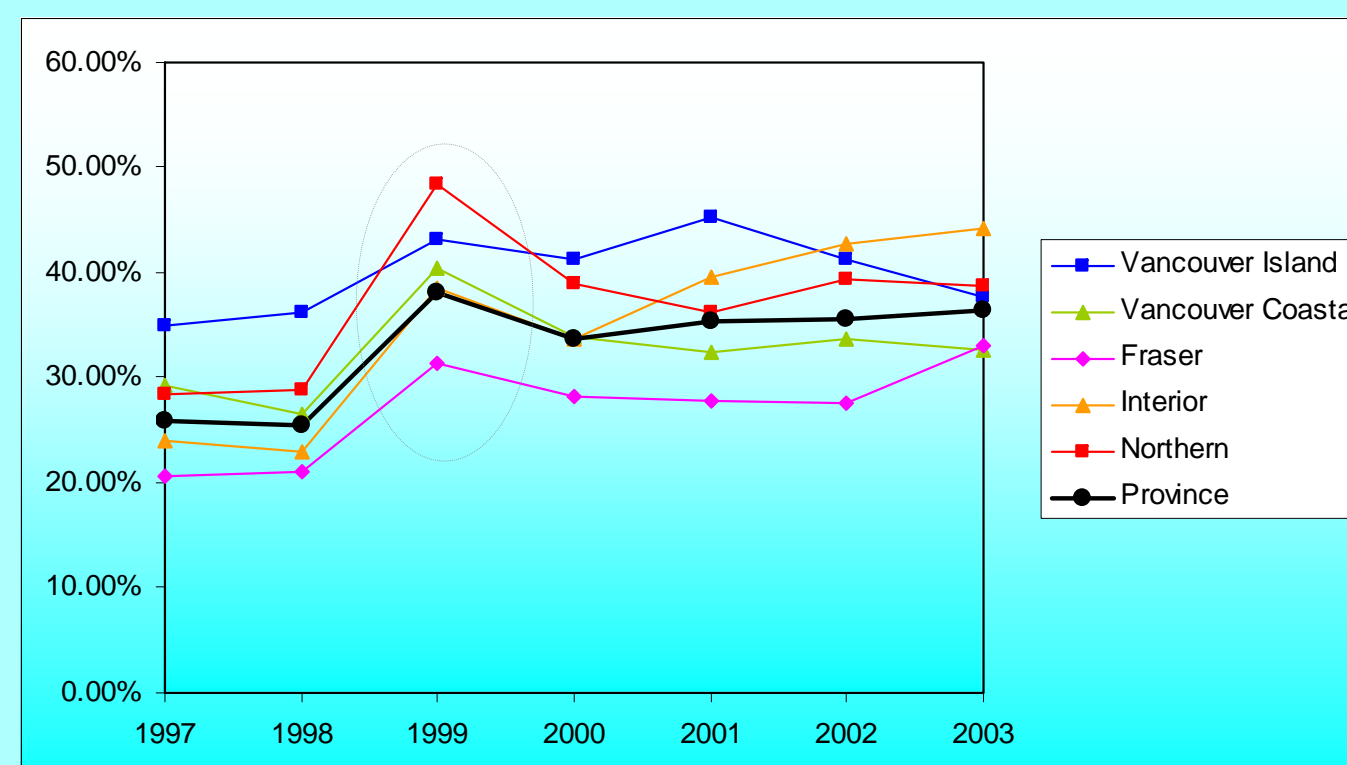


Figure 2: Proportion of out of hospital and in hospital deaths among British Columbia adults who died of cancer, 1997-2003

Table 2: Adjusted odds of dying out of hospital, by predictors, for British Columbia, 1997-2003

Demographic Predictors	British Columbia		
	Adjusted OR [†]	Lower	Upper
Sex			
Male*	1.00		
Female	1.12	1.07	1.16
Age, yr			
18-44*	1.00		
45-64	1.09	0.98	1.22
65-74	1.09	0.97	1.21
75-84	1.24	1.12	1.39
≥ 85	1.75	1.56	1.96

Socioeconomic Predictors			
Neighbourhood IPPE [‡]			
Low*	1.00		
Lower Middle	1.03	0.97	1.09
Middle	1.07	1.01	1.13
Upper Middle	1.12	1.05	1.19
Upper	1.18	1.11	1.25
Region of Death			
Interior Health Authority	1.22	1.15	1.29
Fraser Health Authority	0.79	0.75	0.83
Vancouver Coastal Health Authority	1.00		
Vancouver Island Health Authority	1.94	1.32	1.47
Northern Health Authority	1.39	1.24	1.52

Clinical Predictors			
Aggregate Tumour Group			
Breast	0.98	0.91	1.06
Colorectal	1.05	0.98	1.13
Lung*	1.00		
Prostate	0.92	0.88	0.97
Other	1.03	0.95	1.12
Length of Survival			
≤ 60*	1.00		
61-120	1.78	1.65	1.92
≥ 121	1.96	1.86	2.06

Temporal Predictor			
Year			
1997*	1.00		
1998	0.99	0.92	1.07
1999	1.81	1.68	1.95
2000	1.45	1.35	1.57
2001	1.57	1.45	1.69
2002	1.56	1.45	1.68
2003	1.61	1.50	1.73

[‡] IPPE: Income Per Person Equivalent; * Reference Group, [†] Adjusted for year of death, sex, age, income, aggregate tumour group, region of death, and length of survival

Limitations

- Use of health administrative databases restricts research to predefined fields, constructs and codes. These may change over time and may not be reconciled.
- Routinely collected data in health administrative databases do not contain socioeconomic data, thus ecological variables are used.
- The response, death out of hospital may be too general as it includes non-hospital institutional deaths (e.g. independent nursing home, hospice).
- The use of the postal code to derive residence (rural/urban) is questionable as a rural point of service can serve urban addresses and vice versa. BC has re-used postal codes which could compound this problem.
- A linear relationship is assumed among the predictor variables

Conclusion

• Women, patients over 45 years of age, patients in middle to high income quintile neighbourhoods, patients with colorectal cancer, patients who lived outside the Fraser Valley, and patients with survival times greater than 60 days were more likely to die out of hospital.

• A shift has occurred in the place-of-death for BC cancer patients between 1997 and 2003. As the population of BC continues to age, understanding the nature of the choices surrounding the location of death will be an essential component of meeting the needs of those who are completing their life.

Acknowledgements

Funding was provided by "Palliative Care in a Cross-Cultural Context: A New and Emerging Team (NET) for equitable and quality cancer care for culturally diverse populations" a CIHR funded five year grant.

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