

Where the Elderly Die: The Influence of Socio-Demographic Factors and Cause of Death on People Dying at Home

Arthur KL Beng,¹*MBBS, MMed*, Chee Weng Fong,²*MSc, MSocSc*, Eugene Shum,³*MBBS, MPH*, Cynthia R Goh,⁴*PhD, FRCP, FAMS*, Kee Tai Goh,⁵*MSc, MD, FAMS*, Suok Kai Chew,⁶*MBBS, MSc, FAMS*

Abstract

Introduction: The place of death of the elderly has implications on the overall healthcare delivery system. The aim of this study is to describe where deaths of elderly occur in Singapore and to determine the association of socio-demographic characteristics and the causes of death on dying at home. **Materials and Methods:** Data of 10,399 Singapore resident decedents aged 65 years and above in 2006 were obtained from the national Registry of Births and Deaths. Distributions of socio-demographic characteristics and causes of death by place of death were analysed, and associations between socio-demographic characteristics and home death for major causes of death were assessed by logistic regression models controlling for age, gender and ethnic group. **Results:** Most elderly deaths occurred in hospitals (57%), followed by deaths at home (31%). The proportion of deaths at home increased with age while deaths in hospital declined with age. Significantly more elderly women died at home compared to men. Malay elderly had the highest proportion of home deaths (49%), and the lowest proportion of hospital deaths (47%). Elderly persons who died from stroke were most likely to die at home [odds ratio (OR) 2.8, 95% confidence interval (CI), 2.3-3.3] while those who died from lung and respiratory system diseases were less likely to die at home (OR, 0.7; 95% CI, 0.6-0.8). **Conclusion:** Elderly people in Singapore die mainly in hospitals. About a third of them die at home. The proportion of decedents dying at home increased with age. Home deaths among the elderly are most likely in those aged 85 years and above, females, Malays, and those who die of stroke.

Ann Acad Med Singapore 2009;38:676-83

Key words: Ethnicity, Gender, Hospital, Place of death, Singapore

Introduction

The subject of place of death was brought to the forefront of the medical community in July 2004 when 2 important publications were released; one by the World Health Organization¹ and another from the House of Commons Select Committee on Health.² Both reports highlighted that the proportion of deaths at home has been decreasing while that of hospital deaths has been increasing. The reports also pointed out a lack of congruence in that many patients died in hospitals, even though their expressed wishes were to spend their final days at home.^{1,2} The reports also discussed the wider implications on healthcare services, and the urgency to tackle the issues, as the place of death is where the patient will receive the care in his final illness.

A study in the UK projected that deaths at home was likely to reduce by 24%, with fewer than 1 in 10 dying at home by 2030.³ In the USA, place of death was brought to public attention by the SUPPORT STUDY (Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatment published in 1995⁴ and the Institute of Medicine report "Approaching death: Improving care at the end of life" in 1997.⁵

Many studies have been done to understand the factors influencing where people die and especially those factors affecting home deaths.⁵ Studies⁶⁻⁹ in the UK, Europe, and the USA show that many factors influence the place of death: demographic factors⁴ (ethnicity, age, gender), social, cultural, and religious factors, the disease and its therapy,

¹ Healthcare Finance and Corporate Services Division, Ministry of Health, Singapore

² Epidemiology & Disease Control Division, Ministry of Health, Singapore

³ Clinical Services, Alexandra Hospital, Singapore

⁴ Lien Centre for Palliative Care, Duke-NUS Graduate Medical School & Head, Department of Palliative Medicine, National Cancer Centre, Singapore

⁵ Office of the Director of Medical Services, Ministry of Health, Singapore

⁶ Health Services Group, Ministry of Health, Singapore

Address for Correspondence: Dr Arthur Kian Lam Beng, Senior Consultant, Army-Human Resource, HQ Army Medical Services (HQ AMS), AFPN 0047, 27 Medical Drive #08-01, Singapore 117510.

Email: bengkla@pacific.net.sg, BENG_Kian_Lam_Arthur@starnet.gov.sg

having a caregiver, and the home environment or place of care. Van Rensbergen et al⁸ refer to these collectively as the “social-contextual” factors, contextual referring to the disease, the disease stage, and the healthcare services available. Gruneir et al¹¹ showed the importance of both “social and structural characteristics” in influencing the end of life experience. “Structural” is used to refer to the healthcare system, including the facilities and the payment system. Studies have also been done in Taiwan, a predominantly Chinese population, which showed that although “cultural concerns”¹² ranked high in influencing the patient’s decision, family caregivers give higher priority to quality of healthcare and the availability and ability of family caregivers when considering death at home.

As the social contextual and social structural factors in Singapore may differ, the purpose of this study is to identify the factors that are associated with the place of death, and especially deaths at home, in Singapore, a multiracial society.

Materials and Methods

Data on age, gender, ethnic group, underlying cause of death, and place of death for the 12-month period (January to December) in 2006 were obtained from the Registry of Births and Deaths, the national agency which collects the vital statistics of Singapore. As the focus of this study was on the elderly, only data on decedents aged 65 years and above were extracted. The elderly were divided into 3 age bands, namely, 65 to 74 years (young-old), 75 to 84 years (medium-old) and 85 years and above (oldest-old). This elderly age cut-off of 65 years and the age band classifications are in line with that used by the Department of Statistics.¹³

Racial information was grouped into 4 main ethnic groups: Chinese, Malays, Indians and others. Decedents who were Singapore citizens or permanent residents were identified based on their residential status. Foreigners were excluded from the study. Place of death was classified into 3 groups: (i) hospitals (government restructured and private hospitals), (ii) homes (place of residence), (iii) All Others (nursing homes, charitable institutions, hospices, including licensed sick receiving houses, and other locations).

Cause of death was based on the underlying cause and grouped using the International Classification of Diseases, Ninth Revision (ICD-9) into 5 categories, namely, cancer (ICD-9: 140 to 208), heart and hypertensive diseases (ICD-9: 390 to 429), stroke (ICD-9: 430 to 438), lung and respiratory diseases (ICD-9: 460 to 519) and other diseases (all remaining ICD-9 codes). The first 4 cause-of-death categories accounted for more than 85% of all elderly resident deaths in Singapore in 2006.

Distributions of socio-demographic variables and cause of death by place of death were analysed. In order to determine which of the socio-demographic variables

had any significant correlation with home as the place of death for the elderly, Pearson’s chi-square tests were first performed. Variables that demonstrated significance at $P < 0.01$ in the Pearson tests were included in the logistic regression analysis. Logistic regression models controlling for age, gender and ethnic group were separately done for all causes of death, heart and hypertensive diseases, stroke, lung and respiratory system diseases and other diseases. All statistical analyses were performed using the Statistical Package for Social Science (SPSS), version 15.0 (SPSS Inc., Chicago, Illinois, USA). A 2-sided P value of < 0.01 was considered to be statistically significant.

Results

Table 1 shows the percentage breakdown of the socio-demographic characteristics and cause of death by place of death of the elderly decedents. Most elderly deaths occurred between 75 and 84 years (40.3%) and approximately a quarter each was due to cancer (26.0%), heart and hypertensive diseases (25.2%), and lung and respiratory system diseases (23.3%). Stroke accounted for 10.7% of the elderly deaths.

Of the 10,399 deaths in 2006, more than half (57.4%) occurred in hospitals, followed by a third (31.3%) at home. The same ranking order of the place of death was observed across the different age groups, genders, ethnic groups except for Malays, and causes of death except for stroke. The proportion of deaths in hospitals declined with increasing age. However, the proportion of deaths at home rose with increasing age.

Between the genders, female elderly had a higher proportion of home deaths (female: 33.1%, male: 29.5%). Among the ethnic groups, the Malay elderly had the highest proportion of home deaths (49.1%), and the lowest proportion of hospital deaths (47.4%). The Indian elderly, on the other hand, had the highest proportion of hospital deaths (66.6%) and lowest proportion of home deaths (24.6%).

Stroke was the only major cause of death for which a majority of decedents (50.3%) died at home. All the other diseases had a larger proportion of deaths in hospital: cancer (43.8%), heart and hypertensive diseases (63.1%), lung and respiratory system diseases (68.0%).

Table 2 summarises the socio-demographic characteristics and place of death among the elderly decedents. All the characteristics (age, gender, ethnic group and cause of death) were significantly associated with place of death ($P < 0.01$).

Table 3 shows the adjusted results of the logistic regression analysis examining whether socio-demographic characteristics were associated with dying at home for the major causes of death. For all causes of death, elderly who died at home were more likely to be 75 years or older, female and Malay. Elderly who died from stroke, cancer,

Table 1. Distribution (%) of Socio-demographic Characteristics and Cause of Death by Place of Death Among Elderly Singapore Resident Decedents, 2006

Characteristics	% of all deaths (n = 10,399)	Percentage of deaths (accruing to characteristic) that occurred in					All Places
		Hospital	Home	Nursing Home & Charitable Institution	Hospice & Licensed Sick Receiving Home	Other Locations	
<i>Age</i>							
Young-old (65 to 74 years)	31.6	61.4	27.9	10.7	5.6	0.6	100.0
Medium-old (75 to 84 years)	40.3	57.9	32.1	6.3	3.5	0.2	100.0
Oldest-old (85 years & above)	28.1	52.3	33.9	11.6	2.2	0.0	100.0
	100.0	57.4	31.3	7.3	3.8	0.3	100.0
<i>Gender</i>							
Male	50.7	59.3	29.5	6.5	4.3	0.5	100.0
Female	49.3	55.5	33.1	8.0	3.3	0.1	100.0
	100.0	57.4	31.3	7.3	3.8	0.3	100.0
<i>Ethnic Group</i>							
Chinese	80.1	58.4	28.9	8.2	4.3	0.3	100.0
Malay	12.9	47.4	49.1	2.4	1.0	0.1	100.0
Indian	5.7	66.6	24.6	4.9	3.0	0.8	100.0
Others	1.3	59.7	29.5	5.8	5.0	0.0	100.0
	100.0	57.4	31.3	7.3	3.8	0.3	100.0
<i>Cause of Death</i>							
Cancer (ICD9: 140-208)	26.0	43.8	35.8	8.0	12.4	0.0	100.0
Heart and Hypertensive Diseases (ICD9: 390-429)	25.2	63.1	31.5	4.1	0.3	0.9	100.0
Stroke (ICD9: 430-438)	10.7	41.8	50.3	7.4	0.5	0.0	100.0
Lung and Respiratory System Diseases (ICD9: 460-519)	23.3	68.0	20.5	10.8	0.6	0.1	100.0
Other Diseases	14.9	66.4	26.1	5.8	1.8	0.1	100.0
	100.0	57.4	31.3	7.3	3.8	0.3	100.0

Table 2. Socio-demographic Characteristics of Elderly Singapore Resident Decedents by Place of Death, 2006

Characteristics	Place of death		P value*
	Home (n = 3252)	Other locations (n = 7147)	
<i>Age</i>			
Young-old (65 to 74 years)	28.2	33.2	<0.01
Medium-old (75 to 84 years)	41.3	39.8	
Oldest-old (85 years & above)	30.5	27.0	
<i>Gender</i>			
Male	47.7	52.0	<0.01
Female	52.3	48.0	
<i>Ethnic Group</i>			
Chinese	74.0	82.8	<0.01
Malay	20.2	9.5	
Indian	4.5	6.3	
Others	1.3	1.4	
<i>Cause of Death</i>			
Cancer	29.7	24.2	<0.01
Heart and Hypertensive Diseases	25.4	25.1	
Stroke	17.3	7.8	
Lung and Respiratory System Diseases	15.3	26.9	
Other Diseases	12.4	16.0	

* Pearson's χ^2 test

Table 3. Multivariate Associations Between Socio-demographic Characteristics and Home Death by Cause of Death Among Elderly Singapore Resident Decedents, 2006

Characteristics	Adjusted Odd Ratio (OR) and 95% Confidence Interval (95% CI) pertaining to					
	All causes of death ¹	Cancer ²	Heart and Hypertensive Diseases ²	Stroke ²	Lung and Respiratory System Diseases ²	Other Diseases ²
<i>Age</i>						
Young-old (65 to 74 years)	1.00	1.00	1.00	1.00	1.00	1.00
Medium-old (75 to 84 years)	1.28* (1.15, 1.42)	1.18 (0.99, 1.40)	1.31* (1.07, 1.60)	1.80* (1.31, 2.48)	1.33 (1.00, 1.77)	1.07 (0.81, 1.41)
Oldest-old (85 years & above)	1.61* (1.43, 1.81)	1.33* (1.05, 1.67)	1.87* (1.49, 2.36)	3.50* (2.51, 4.89)	1.40* (1.05, 1.86)	1.12 (0.83, 1.52)
<i>Gender</i>						
Male	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.12* (1.03, 1.23)	1.19* (1.01, 1.40)	1.06 (0.90, 1.26)	0.98 (0.76, 1.27)	1.08 (0.88, 1.33)	1.31* (1.03, 1.67)
<i>Ethnic Group</i>						
Chinese	1.00	1.00	1.00	1.00	1.00	1.00
Malay	2.62* (2.32, 2.96)	2.46* (1.81, 3.35)	2.29* (1.84, 2.85)	3.30* (2.35, 4.61)	3.16* (2.43, 4.13)	2.32* (1.71, 3.14)
Indian	0.87 (0.72, 1.07)	0.77 (0.51, 1.17)	0.89 (0.64, 1.23)	0.95 (0.53, 1.72)	0.68 (0.40, 1.17)	1.14 (0.67, 1.93)
Others	1.08 (0.74, 1.57)	1.24 (0.61, 2.50)	0.91 (0.45, 1.84)	1.72 (0.56, 5.30)	1.14 (0.50, 2.64)	0.73 (0.21, 2.59)
<i>Cause of Death</i>						
Other Diseases	1.00					
Cancer	1.89* (1.64, 2.18)					
Heart and Hypertensive Diseases	1.33* (1.15, 1.54)					
Stroke	2.76* (2.34, 3.26)					
Lung and Respiratory System Diseases	0.72* (0.62, 0.84)					

¹ Adjusted for age, gender, ethnic group and cause of death² Adjusted for age, gender and ethnic group* $P < 0.05$

and heart and hypertensive diseases were 2.8 times (95% CI, 2.3-3.3), 1.9 times (95% CI, 1.6-2.2) and 1.3 times (95% CI, 1.2-1.5) respectively more likely to pass away at home relative to those who died from other diseases. Elderly who died from lung and respiratory system diseases were less likely to die at home (adjusted OR, 0.7; 95% CI, 0.6-0.8). For the major causes of death, home deaths among the elderly were more likely to be among those aged 85 years and above, females and the Malays.

Discussion

The 2004 WHO Report¹ compared the proportion of hospital and home deaths in different countries, in particular in the USA (1993) where 60% of the elderly died in hospital and 20% died at their home/nursing home, and in England and Wales (2000), where 65% died in hospital and 19% died at home. Goh¹⁴ reported a growing trend of patients dying in hospital in Singapore, rising from 53% in 1985 to 58% in 2003 and a decline in deaths at home from 38% in 1985 to 30% in 2003. In this 2006 study, the figures are similar: 31.3% of the elderly died at home while more than 57.4% died in hospital. This makes the proportion of home deaths in Singapore equivalent to those in the Netherlands, and Germany.¹

Three of the socio-demographic findings in this study are in contrast^{7,11,15} to that of the studies in the west (UK³ and USA⁷). These are: (i) the proportion of home deaths increases with age (in the west it decreases with age); (ii) the oldest-old may be more likely to die at home (in the west

they are more likely to die in hospital) and (iii) females are more likely to die at home (in the west females are more likely to die in hospital). There is no one single reason to explain the contrasting observations, but a common major contributory explanation is that of Asian cultural values¹⁶ and especially that of strong family ties, filial piety, and the extended household structure in Singapore.

The Census 2000 Report¹⁷ states that “the family remained a strong social unit”. The proportion of extended family household remains high at 87% for the Chinese and Indians, and is highest in the Malays at 94%. Another report¹⁸ states that the “inter-generational ties between the elderly and their children remain strong”. In 2000, 88% of the elderly lived with their spouse or children as compared to 85% in 1990.¹⁸

In addition to Asian cultural values, it is postulated that 2 other factors play an important role – the availability of foreign domestic workers as caregivers, and the government’s deliberate policy in limiting support for nursing homes. In Singapore, many of the elderly women had been housewives all their life. They have an especially close relationship with their children, and grandchildren (being children of working parents). As we move up the age ladder, there is feminisation of the elderly population as males tend to die earlier. While the wife is the caregiver for the husband, the foreign domestic worker will be the likely caregiver for the mother (with other family members). When the elderly mother/grandmother is ill, care at home is made possible with the availability of foreign domestic worker. This is a very important “intervention” to make

death at home possible.¹⁹ The regulations relating to the employment of foreign domestic workers now allow for a pooling of financial resources in the extended family to employ a foreign domestic worker to provide homecare for an aged sick, or frail parent/relative in the home. To send the sick elderly to a nursing home is frowned upon, and regarded as an un-filial act. In studies done regarding the principal caregivers for the elderly in Singapore,²⁰ the principal caregivers comprised children (35%), spouses (23%), relatives (14%), foreign domestic workers (25%) and others (3%). For those aged 65 years and above but without a spouse, 39.6% were staying with their children and/or grandchildren, and another 10.7% with spouse, children and/or grandchildren. Another study⁹ also made the observation that there was a higher frequency of foreign domestic workers caring for those aged 75 years and above, and female senior citizens. In contrast, about 70% to 80% of Americans and Europeans depend on friends and relatives for primary assistance when they require long-term care.²¹

Practices differ in various socio-cultural settings. In a study of the oldest-old in mainland China,²² it was found that those who were in contact with social workers or had hired help were more likely to die in hospital compared to those who had children or grandchildren as caregivers. In China, the availability and accessibility of social services are important factors influencing the place of death. For the oldest-old, those who had access to medication, were more likely to die in hospital. Those who were entitled to free medical care were 68% more likely to die in hospital.²² In this study, having one child co-residing or living nearby reduces the odds of dying in hospital by 74%.²²

Another important factor affecting death at home is the underlying cause of death. In this study, patients with stroke are most likely to die at home, being 3 times more likely to die at home. It is also the only disease of the group where the majority die at home (50.3%). Stroke is the third leading cause of death in Singapore after cancer and heart disease.²³ As deaths from stroke has been reduced markedly, many more stroke patients are discharged back to the community and to home.²⁴ The more severe 20% will go to nursing homes, and others to their own homes with or without a period in step-down care, depending on the severity. As the patient may recover, they may die many years later, gradually deteriorating from repeated strokes (and multiple diseases). Many of these cases will die at home. Singapore has one of the highest stroke prevalence in the world, higher than in the UK, USA, and Taiwan.²³ Prevalence is highest among Chinese men (1.5 times compared to women) and lowest among Malay women. Prevalence rises with age (for both men and women), and in those >85 years, the prevalence is 22 times that of those aged 50 to 54 years.²³ Malay women have the highest stroke incidence among adults <65 years, and the highest stroke mortality.²³ Malays

also have the highest smoking and obesity rates amongst the races.²³

Patients with cancer form the next most likely group to die at home (twice more likely). Cancer is a cause of death in which the prognosis is well established²⁵ with a clear disease trajectory. Understanding the disease trajectory is important if a person wants to plan for his end of life medical care, especially if he wants to be able to make an informed decision of where he wants to be cared for in the last days of his life.²⁵ The success in managing cancer patients at home has important lessons for managing the end of life issues of patients dying from other causes. In the 1980s and 1990s in Singapore, many of the cancer patients died in hospitals as palliative support was not available in the community. With the impact and good work of the hospice movement and hospice home care, many realised their wish to die at home. Goh²⁶ reported that in 1993, with hospice home care, 74% of cancer patients were able to die at home, while the overall cancer deaths occurring at home was 34%. McNamara⁹ found that patients who had accessed community palliative care services were 7 times more likely to die at home. One of the major goals of hospice care is to allow terminal cancer patients to remain at home as long as possible.²⁷ Tang and McCorkle²⁸ strongly advocated home palliative care for cancer patients and cited many studies to support their premise that with provision of home palliative care, many more cancer patients would be able to die at home.

Both cardiac and the respiratory diseases have in common the difficulty of predicting the trajectory of the illness.²⁵ While cancer patients are twice more likely to die at home, cardiac patients are only 33% (OR, 1.33) more likely to die at home, and respiratory patients are about 40% (OR, 0.72) less likely to die at home.

Congestive heart failure accounts for 4.5% of all hospital admissions and 2.5% of the intensive care unit and “hi-tech” medicine. The result is recurrent admissions until terminal end organ failure. This same trajectory also extends to the patient with respiratory and lung diseases.²⁵ It is very difficult to prognosticate accurately in these 2 groups.²⁵ In end stage cardiac and respiratory disease, the patient suffers from dyspnoea at the end of life. This is very distressing for the patient, caregivers and family. This may result in the patient being admitted to hospital and dying in hospital. Furthermore, palliative care for cardiac and respiratory cases is just being introduced in Singapore, and we will have to wait to see whether results similar to that for cancer patients can be achieved.

This study shows a strong correlation between ethnicity and home deaths. The highest proportion of elderly home deaths is seen in the Malays (49%), and the lowest proportion of hospital deaths is also found in the Malays

(47%). Multivariate analysis shows that the probability of a Malay dying at home is 2.6 times that of a Chinese, regardless of the underlying cause of death.

The Malays constitute 13.9% of the population of Singapore and the vast majority of Malays are Muslims.¹⁸ Muslims,¹⁸ regardless of race, make up 14.9% of the population. In Singapore, strong family bonds exist and is highest in the multigenerational Malay household (94%) followed by that of the Chinese and Indians⁶ (87%). The strong family ties together with the social, cultural and religious beliefs and practices, contribute to the high proportion of Malay/Muslim deaths at home.

Muslims prefer to die in their own home.²⁹ The Muslim's attitude to illness, hospital and institutional care and end of life practices contribute to this. For the Muslim, visiting the sick in hospital is not reserved for friends and family but is regarded as a "form of worship".²⁹ Thus, it is common for the sick Muslim to have many visitors.²⁹ Nearer death, those around are called upon to give comfort, read the Quran to the patient, give reminders of God's forgiveness and mercy, and urge the patient to recite words of remembrance and prayers.³⁰ These practices are best done in the privacy and comfort of the home.

Death in the Muslim tradition is followed by very important rites. For the Muslim, the body, even after death, is sacred. There are 5 important rituals after death,²⁹⁻³¹ and the body must be buried as soon as possible.²⁷ In the reports quoted, it is stated that dying in hospital "may be a time of anxiety"²⁹⁻³¹ for the Muslim family. There is anxiety because of fear that the rites will not, or cannot be adhered to in the hospital. How this anxiety contributes to the observation that Muslims prefer to die at home will vary in different countries or societies, and even in different families in the same socio cultural context. While the issue of anxiety is more likely to be present in situations where the Muslim community may be very small and the religious practices less understood, it is perhaps strong family ties that are the predominant factor at play in the Singapore situation. There is little evidence in the clinical setting to suggest that the Muslim rituals surrounding death is the reason to refuse hospital admission, or is the reason to request discharge. The observation is rather that it is the strong family ties, which has led to a predominance of home deaths in the Malay/Muslim community. This observation requires more study.

When ethnic differences are observed in medicine, ethnic variation in patho-physiology, type and number of co-morbidities,³² therapeutic interventions and responsiveness to treatment must be considered.²⁸ These may be confounders in this study, although multivariate analysis may have mitigated somewhat. Compared to the Chinese, the Malays and Indians have higher rates of hypertension and diabetes. The proportion of poorly controlled hypertension

and diabetes is higher in the Malays.³³ Also, Indians and Malays have a higher incidence of cardiovascular disease. Malay women have the highest stroke incidence among adults <65 years, and the highest stroke mortality. Malays also have the highest smoking and obesity rates.²³

Implications

Knowing the place of death is important as it is where the relevant health services need to be provided.³³ It allows the choice of the patient to be respected and to give him comfort in his last days. There are also important public health considerations. If more patients die in hospitals, the costly beds will be filled by patients who actually require palliative care. There is a waste of expensive resources (manpower and equipment), and a mismatch of needs and resources. Both patients and their family, and the healthcare staff will be frustrated and unhappy.

The provision of palliative home care has reduced cancer deaths in hospitals and increased deaths at home. This is now being introduced to cardiac and respiratory patients in Singapore.

Limitations of Study

This is a retrospective study and the information available is limited to that which was collected. A limitation when extracting data from death certificates is the problem of the accuracy of the cause of death recorded by the doctor. This is especially so in the elderly who may have multiple chronic diseases e.g. stroke, diabetes mellitus and hypertension. The cause of death e.g. cardiac event may be related or even unrelated to one of the pre-existing diseases. Other variables related to the place of death, like socio-economic status and educational level are not available.³³ It is known that education and income contribute to inequalities in health. It should also be noted that the place of death is not necessarily where the patient was cared for terminally. The patient may be cared for in hospital, and the family/patient may request for discharge when death is imminent. In one small Singapore study³⁴ these "terminal discharges" (defined as an explicit request to allow a patient to pass away at home when prognosis is estimated to be less than 48 hours) was estimated to be 6.6% of all discharges (35 of 525). This is the case in some Chinese because of beliefs that the soul may get lost when the body is moved.²⁴ Likewise, the patient may have been cared for at home for months, but may have been admitted to hospital due to an acute episode (for example, with pneumonia), and succumbs in hospital. It was not possible to verify either scenario from the data available. Other information that affects the decision of the place to die, like caregiver support, family support, accessibility of health services also cannot be evaluated as the information was not available. As this is also a study based on available

data, we were unable to control for confounding factors which may have influenced the results, such as disease patterns, and perhaps medical or other interventions in the course of patient care. Multivariate analysis has minimised and adjusted for some factors.

Strength of Data

This study utilises readily available administrative data that include a complete whole population data and this completeness is a major strength.² It is reliable as it is based on professionally certified death certificates, with coding of disease based on the International Classification of Disease version 9 (ICD9).

Conclusion

In this paper, a complete whole population data for the year 2006 is analysed. Where the results of this study are different from that observed in other studies, an attempt has been made to provide some explanations.

To better understand the factors that affect the place of death, a well planned prospective study is required. The study should also look into the attitudes of the patient, the caregivers, and family members; the home care arrangements; the home care support made available to the family, and the financial cost (direct and indirect) of home care and dying at home. There is also a need to correlate the choice of the place to die with actual place of death, and to understand the factors that contributed to the discrepancy. This additional information will provide the basis upon which a strategy can be embarked upon to provide a systematic and sustainable solution within the existing integrated healthcare delivery system. One should also be aware that there is a downside to home care in that there is a severe burden on the caregiver. A study in Taiwan has reported a high risk of depression in caregivers.²¹

A study in the USA³⁵ makes reference to 4 contradictions in the “hospital culture” which the author claims are fundamental and difficult issues that must be addressed by healthcare professionals. End of life issues are at this time being addressed in Singapore by the healthcare community. A good starting point for the discussion is to start with these 4 contradictions, while more research studies are conducted. The challenge will be to provide “good death”, as we have succeeded to provide “good health” in Singapore.

Acknowledgments

The authors wish to thank Mr Ivan Woo Mun Hong, Senior Research Executive, and Dr Jissy Vijo Poulouse, Research Executive, both from the Lien Centre for Palliative Care, Duke-NUS Graduate Medical School Singapore, for their efficient and cheerful assistance. The first author also wishes to express his gratitude to Dr Arthur Chern, Director Health Regulation Branch, for his guidance and encouragement throughout the project.

REFERENCES

1. Davies E, Higginson J. The Solid Facts: Palliative Care. WHO Regional Office for Europe, 2004.
2. House of Commons Health Committee. Palliative care: Fourth Report of Session 2003-2004. Volume 1: Report, together with formal minutes London: The Stationery Office Limited, 2004; Jul 14.
3. Higginson IJ, Astin P, Dolan S. Where do cancer patients die? Ten-year trends in the place of death of cancer patients in England. *Palliat Med* 1998;12:353-63.
4. Covinsky KE, Fuller JD, Yaffe K, Johnston CB, Hamel MB, Lynn J, et al. Communication and decision-making in seriously ill patients: findings of the SUPPORT project. The Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments. *J Am Geriatr Soc* 2000;48(5 Suppl):S187-93.
5. Gomes B, Higginson IJ. Home or hospital? Choices at the end of life. *J R Soc Med* 2004;97:413-4.
6. Gomes B, Higginson IJ. Home or hospital? Choices at the end of life. *J R Soc Med* 2004;97:413-4. (Factors affecting place of death in terminally ill cancer patients. A systems review).
7. Weitzen S, Teno JM, Fennell M, Mor V. Factors associated with site of death: a national study of where people die. *Med Care* 2003;41:323-35.
8. Van Rensbergen G, Nawrot TS, Van Hecke E, Nemery B. Where do the elderly die? The impact of nursing home utilisation on the place of death. Observations from a mortality cohort study in Flanders. *BMC Public Health* 2006;6:178.
9. McNamara B, Rosenwax L. Factors affecting place of death in Western Australia. *Health Place* 2007;13:356-67.
10. Gomes B, Higginson IJ. Factors influencing death at home in terminally ill patients with cancer: systematic review. *BMJ* 2006;332:515-21.
11. Gruneir A, Mor V, Weitzen S, Truchil R, Teno J, Roy J. Where people die: a multilevel approach to understanding influences on site of death in America. *Med Care Res Rev* 2007;64:351-78.
12. Tang ST, Liu TW, Tsai CM, Chang GC, Liu LN. Patient awareness of prognosis, patient-family caregiver congruence on the preferred place of death, and caregiving burden of families contribute to the quality of life for terminally ill cancer patients in Taiwan. *Psycho-Oncology* 2008;17:1202-9
13. Singapore Department of Statistics. Singapore statistical standard for age. Available at: www.singstat.gov.sg.statres/ssc/nsa.pdf. Accessed 10 September 2008.
14. Goh CR. Care of the dying – whose job is it anyway? *Singapore Med J* 2005;46:204-7.
15. Gomes B, Higginson IJ. Where people die (1974-2030): past trends, future projections and implications for care. *Palliat Med* 2008;22:33-41.
16. Yick AG. Chinese cultural dimensions of death, dying, bereavement: focus group findings. *Journal of cultural diversity*. Summer, 2002. Available at: http://findarticles.com/p/articles/mi_m0MJU/is_2_9/ai_93610991/pg_1?tag=artBody;col1. Accessed 20 August 2008.
17. Leow BG, Superintendent of Census. Census of Population 2000 Households and Housing. Statistical Release 5, Aug 2001. Singapore: Department of Statistics, 2001:10.
18. Leow BG, Superintendent of Census. Census of Population 2000 Demographic Characteristics, Statistical Release 1, May 2001. Singapore: Department of Statistics, 2001:11-2.
19. Tang ST, Liu TW, Lai MS, McCorkle R. Discrepancy in the preferences of place of death between terminally ill cancer patients and their primary family caregivers in Taiwan. *Soc Sci Med* 2005;61:1560-6.
20. Ng GT, Mehta K, Rowlands A. National University of Singapore. Working Paper 2006-01, Family Caregiving in Singapore, Sept 2006. p2 & 14. Available at: http://www.fas.nus.edu.sg/rg/doc/family/family_wp.pdf

Accessed 9 September 2006.

21. Tang ST, Chung YL, Liao YC. Factors associated with depressive distress among Taiwanese family caregivers of cancer patients at the end of life. *Palliat Med* 2007;21:249-57.
22. Gu D, Liu G, Viosky DA, Yi Z. Factors associated with place of death among the Chinese oldest old. *J Applied Gerontol* 2007;26:34-57. Available at: <http://jag.sagepub.com>. Accessed 20 August 2007.
23. Venketasubramanian N, Tan LC, Sahadevan S, Chin JJ, Krishnamoorthy ES, Hong CY, et al. Prevalence of stroke among Chinese, Malay, and Indian Singaporeans: a community based tri racial cross-sectional survey. *Stroke* 2005;36:551-6.
24. Venketasubramanian N. An overview of stroke. *Singapore Med J* 1999;40:0124.
25. Dyv S, Lynn J. Getting services right for those sick enough to die. *BMJ* 2007;334:511-3.
26. Goh C. Preferred place of death. *Singapore Med J* 1998;39:430-1.
27. Flory J, Yinong YX, Guroi I, Levinsky N, Ash A, Emanuel E. Place of death: US trends since 1980. *Health Aff (Millwood)* 2004;23:194-200.
28. Tang ST, McCorkle R. Determinants of place of death for terminal cancer patients. *Cancer Invest* 2001;19:165-80.
29. Gatrads AR. Muslim customs surrounding death, bereavement, postmortem examinations, and organ transplants. *BMJ* 1994;309:521-3.
30. Sarhill N, LeGrand S, Islambouli R, Davis MP, Walsh D. The terminally ill Muslim: death and dying from the Muslim perspective. *Am J Hosp Palliat Care* 2001;18:251-5.
31. Cheraghi MA, Payne S, Salsali M. Spiritual aspects of end-of-life care for Muslim patients: experiences from Iran. *Int J Palliat Nurs* 2005;11:9: 468-74.
32. Lock A, Higginson I. Patterns and predictors of place of cancer death for the oldest old. *BMC Palliat Care* 2005;8:4:6.
33. Ng TP, Niti M. Trends and ethnic differences in hospital admissions and mortality for congestive heart failure in the elderly in Singapore, 1991 to 1998. *Heart* 2003;89:865-70.
34. Wu HY, Lee AOK, Leong IYO, Koh MYH, Chan S. Older adults' attitudes to death, palliative treatment and hospice care: a view from Singapore. *Palliat Med* 2006;20:117-8.
35. Kaufman SR. *And A Time to Die: How American Hospitals Shape the End of Life*. New York: Simon & Schuster, 2005.