Place of Death of People with Cancer in NSW

A Population Based Study

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EXECUTIVE SUMMARY

This report presents an analysis of the place of death of people with cancer in New South Wales from 1972 to 2003, with particular emphasis on the period 1999 to 2003. The report uses data collected by the NSW Central Cancer Registry on notifiable cancers since 1972, which allow a population based analysis of the factors underlying place of death and identification of trends.

- For this analysis, place of death has been categorised into private residential (home) deaths, deaths in nursing homes and dedicated palliative care institutions (hospices) and deaths in principal referral, other public and private hospitals.

- Explanatory factors found that may influence place of death were considered. These were geographical Area Health Service of residence at the time of diagnosis (AHS), Accessibility/Remoteness Index of Australia (ARIA), socio economic status (SES), age at death and site of cancer.

- A descriptive analysis follows on how various factors are related to place of death, a logistic statistical model explains and predicts how these factors influence the place of death of cancer patients in NSW.

- Cancer deaths in NSW have increased from 7,000 in 1972 to almost 12,500 in 2003, yet the proportion of deaths occurring in various settings has remained relatively stable over time.

- Analysis of the last five years of data revealed that for those patients dying in an institutional setting (over 80% of all cancer deaths), 85% died in an institution in the same Area Health Service (AHS) in which they were diagnosed, even though substantial time may elapse between diagnosis and death.

  – Area Health Service of residence at diagnosis was the strongest predictor of place of death. This is because the types of institutions in which terminal care takes place are not evenly distributed among areas.

  – Although a home death is most often the preference of the sufferer, nearly two thirds of cancer patients die in public hospitals. Fewer than 20% die at home, a statistic that fails well below some of the other states, most notably Queensland and Western Australia [Palliative Care Australia, 1999].

  – Dedicated palliative care institutions (hospices) are effectively restricted to two Area Health Services. Principal referral hospitals are concentrated in large urban areas; and private hospitals and nursing homes have a distinct distribution that appears to be related to socio economic factors.

  – For example more than 91% of people diagnosed while resident in the Southern AHS died in a non principal referral public hospital or at home. (Less than 2% died in a principal referral hospital.)

  – A further 5% died in nursing homes with less than 1% dying in a private hospital or hospice. In contrast, 38% of those diagnosed in Northern Sydney AHS died at home or in a non principal referral public hospital, 14% in a principal referral hospital, 22% in a private hospital, 12% in a nursing home and 13% in a hospice.

  – After controlling for AHS of residence at diagnosis and other variables, the next most important explanatory variable was index of relative socio economic disadvantage (IRSD) of the postal area of residence of the patient at diagnosis, here used as a proxy for the patient's socio economic status (SES).

- People in the least disadvantaged quintile of socio economic status were more likely to die in a private rather than a principal referral or other public hospital.

- Increasing age at diagnosis increased the probability that cancer patients died in nursing homes, but this affect did not influence other institutions and home deaths. The median age at death was 73 for males and 74 for females.

- Overall about 9% of cancer patients died in a nursing home, but 21% of those were aged 80 years and older, 35% of those over 90 and 51% of those over 100 died in a nursing home. Younger people were more likely to die at home or in principal referral hospitals.

- The median time of survival from diagnosis to death was 10 months, with 90% dead by 6.5 years (78 months)

- Type of cancer was also a variable in determining place of death, but only for certain cancers. In particular, patients with cancers of haematopoietic origin (malignancies of blood cells) were much more likely to die in principal referral hospitals than any other setting, while patients with brain cancer were more likely to die in nursing homes. This finding possibly reflects the type of care required in patients with these cancers.

• Several other variables were found to have a statistically significant effect in the model. They were: indigenous status, country of birth, the patient's sex, remoteness of residence, survival from diagnosis, and disease stage at diagnosis.

• The impact of Area Health Service on place of death of cancer patients reflects proximity to the different types of institutions: dedicated palliative care units, major teaching hospitals and nursing homes.

• The less disadvantaged a patient is, the more likely they will die at home or in a private hospital.

• Older patients are more likely to die in nursing homes and less likely to die in major hospitals.

• Patients with hematologic malignancies are more likely to die in a hospital than at home, and patients with brain tumours are more likely to die in nursing homes or hospices.

• Otherwise, site of cancer and stage of cancer at diagnosis does not have much effect on place of death.

• Patients with a very short survival (< 3months) are more likely to die in hospital.

• These results are similar to those found in SA, with the exception that there has been a rise in hospice deaths compared to a fall in NSW. This may be partly explained by the fact that in NSW palliative care beds have been created in institutions not coded as dedicated palliative care institutions.

• However these and other factors explain < 20% of the variance in place of death. Many other factors are operating and further research is needed to identify them.

A comparison of this study in NSW with a similar population based study of place of death from cancer in South Australia [Hunt, 2001] showed the following:

- The South Australian findings were broadly similar to the present study, with a few differences.
- The South Australian study occurred over a period during which there was a marked shift of terminal care patients out of acute care settings into dedicated hospices.
- In South Australia there has been a corresponding decline in the proportion of cancer patients dying in metropolitan public hospitals, something that is not seen in NSW, perhaps because of the inability to distinguish deaths from a specialist palliative unit in a hospital versus and acute bed in a hospital.

INTRODUCTION

Place of death is an important consideration in maximising the quality of the final days of a person's life, and of the experience of their relatives and carers, [Palliative Care Australia, 2005]. Across Australia, deaths attributable to malignant diagnoses are of particular concern for palliative care services (PCSs), because approximately 90% of deaths under the care of PCSs are due to cancer, accounting for approximately 62% of all cancer deaths [Palliative Care Australia, 1999].

Although up to 90% of terminally ill patients spend the majority of their final year at home, only about a third of patients receiving palliative care services actually die at home [Palliative Care Australia, 2004]. This is in spite of evidence that the majority of terminally ill patients, including those dying from cancer, would prefer to die at home [Grande, 1998], although there appears to be a lack of published Australian data on the subject.

A number of international studies have investigated the determinants of place of death of cancer patients including population based and case controlled studies [Thomas , 2005; McCusker. 1983; Moinpour, 1989; Catalan-Fernandez, 1991; Fukui, 2004, 2003; Tang, 2003, 2002, 2001; Bruera, 2003; Gatrell, 2003; Burge, 2003; Cantwell, 2000; Costantini, 2000; Higginson, 1998; Lee, 1998; Karlsen, 1998; Sims, 1997; Gilbar, 1996; Jordhoy, 2000]. Population based studies of the determinants of place of death from cancer appear to be limited to South Australia [Hunt, 2001 & 1993], although smaller studies were carried out in New South Wales (NSW) some time ago [Malden, 1984; Woo, 1991].

The NSW Central Cancer Registry (CCR) has collected data on notifiable cancers since 1972 and is responsible for registering all new cases of cancer and deaths from cancer. Demographic and case information, date, cause and place of death are recorded for those dying of cancer. The aim of this report is to provide both a quantitative description of place of death from cancer and allow an investigation of some of the determinants of place of death using CCR data. This report provides a limited analysis of how place of death has changed over time.

METHODS

The dataset:

The composite de-identified CCR dataset used for this analysis contained 686,660 cancer cases representing 640,470 people, some with multiple types of cancer (and hence multiple records), registered between 1972 and 2003 in New South Wales. Of these, 322,484 people were registered as having died of cancer. Where a person had two or more cancers, only the cancer that the person actually died from was selected.

Survival time between diagnosis and death (in months) was calculated by subtracting the date of diagnosis (recorded to the nearest month) from the date of death (to the nearest month).

Coding of place of death:

Deaths of registered NSW cancer cases occurring outside New South Wales were excluded from further analysis. Deaths reported without a defined place of death by morgues, pathology services, outpatient services and hospital oncology units; or with a missing or undefined place of death, were excluded from the dataset. This left 317,513 cancer deaths in NSW with a known place of death, or 98.5% of the total registered deaths.

The CCR dataset contained a field that codes the place of death as an institution code or that indicates a "home death". Closure of institutions, as well as changes in names and status over the past 32 years frequently required an historical search to identify the identity of the institutions corresponding to codes in the dataset. The institutions were then grouped into public hospitals, private hospitals and nursing homes. An additional field was created to identify institutional deaths occurring in principal referral hospitals, other public hospitals, private hospitals, dedicated palliative care institutions (hospices), private nursing homes and public nursing homes, with a separate coding for home deaths. The relatively small number of public nursing home deaths was later pooled with private nursing home deaths to create a single nursing home category.

The seventeen area health services in existence immediately prior to 2005 were used as a basis for regional analysis. Facilities identified as dedicated palliative care institutions were: the Sacred Heart Hospice, Darlinghurst; Calvary Hospital, Kogarah; Neringah Hospital (Home of Peace), Wahroonga; and Bear Cottage, Westmead. Facilities coded as principal referral hospitals were: Royal Prince Alfred, St Vincent's, Concord, Royal North Shore, Prince Henry (now closed), Prince of Wales, St George, Liverpool, Westmead, John Hunter, Gosford, Nepean and Wollongong hospitals. Data are presented at this level of breakdown only for 1999 to 2003 due to the historical reclassification of hospitals.

Data on remoteness (ARIA) and index of relative socio-economic disadvantage (IRSD) by postal area in 2001 were obtained from the Australian Bureau of Statistics (ABS). Postal areas were divided into quintiles after ranking by postal area IRSD. For remoteness, post areas were divided into major city (ARIA<0.2), inner regional (0.2<ARIA<2.4), outer regional (2.4<ARIA<5.92), remote (5.92<ARIA<10.53) and very remote (ARIA>10.53) using ABS guidelines. ARIA measures the remoteness of a point based on the physical road distance to the nearest urban centre [Australian Bureau of Statistics, 2001]. Of the total NSW population of 6,682,053 at 30 June 2003, approximately 0.1%, 0.6%, 7.3%, 20.6% and 71.4% lived in areas classified as very remote, remote, inner regional, outer regional and major cities, respectively [online ABS data, 2001 census]. Subsequently, the very remote category was pooled with the remote category due to lack of observations. IRSD is a broad measure of socio-economic disadvantage and includes measures of income, education, occupation and wealth.

ARIA and IRSD data were merged with the CCR dataset by postal area at the time of diagnosis. Postal areas are approximations of postcodes created by the ABS by pooling collection districts and are numbered in the same way. Missing postal area information, the creation of new postcodes and the discontinuation of older ones resulted in 172 deaths being excluded from further analysis in the period 1999 to 2003; 367 excluded from 1994 to 1998; and 772 excluded from 1989 to 1993.

The final dataset contained 60,234 deaths in 1999-2003, 56551 deaths in 1994-1998 and 53,312 deaths in 1989-1993.

Descriptive Analysis:

For those who died in the five year period between 1999 and 2003, cancer deaths were subdivided into 6 categories: deaths in a private residence (home), a principal referral hospital, a dedicated palliative care institution, a public hospital (other than principal referral), a private hospital or a nursing home. These were further subdivided based on age of death, sex, aboriginality, country of birth grouping, socio-economic index (IRSD), remoteness of residence (ARIA), survival from diagnosis, area health service of residence, stage at diagnosis, and cancer site. The 25 cancers with the highest number of cancer deaths (for 1999-2003) were presented individually, with the remaining cancers grouped together with cancer of unknown primary site.

For comparative purposes analysis was also undertaken using cancer deaths from 1989 to 2003 replicating a recent South Australian study of place of death of cancer patients [Hunt, 2001]. Principal referral and metropolitan public hospital deaths were pooled; "country hospitals" were defined as a category and "metropolitan private hospitals" formed a category by itself. Stage of disease at diagnosis and area health service were not included as variables in the model. NSW was divided into four regions: the upper and lower quintiles of socio-economic status for Sydney, the middle three quintiles and country areas.

For the comparison with South Australian study, country areas were defined as the rural area health services of Far Western, Greater Murray, Macquarie, Mid North Coast, Mid Western, New England, Northern Rivers, and Southern Area Health Services. The remaining area health services were defined as Greater Sydney, and included the cities of Newcastle and Wollongong. Descriptive analysis was done using Statistical Analysis Software (SAS) and Excel, while the statistical analysis was done using Stata, except for the predicted probabilities, where SAS was used.

Statistical Analysis:

Separate analyses were performed on deaths between 1999 and 2003 and between 1989 and 2003. This later period was divided into three five year periods and analysed using the same format as the South Australian data.

For the latest five year period (1999-2003), crude odds ratios were estimated using multinomial logistic regression and each predictor variable alone. A significant likelihood test indicated that a predictor variable should be entered into the full model.

Multinomial multivariate logistic regression with place of death as the outcome and all ten predictor variables was used to estimate logistic coefficients and odds ratios adjusted for the presence of all predictors in the model [Hosmer and Lemeshow, 2000]. Private residence/ home deaths was used as the reference category.

The model was refined using likelihood ratio tests to determine whether age of death and survival from diagnosis were better fitted as a continuous or categorical variables and to determine whether pooling of categories to produce a more parsimonious model would be adequate for explaining the variation between place of death with country of birth, socio-economic status, remoteness of residence and survival from diagnosis.

Age was modelled as a continuous variable and expressed in decades. All other variables were modelled as categorical.

Hosmer-Lemeshow (chi-squared) goodness of fit tests with 10 approximately equally sized groups were done using for each separate place of death against the reference category (private residence/ home deaths) [Hosmer and Lemeshow, 2000].

Multinomial multivariate logistic regression with place of death as the outcome and predictor variables approximating those in the South Australian study was done for comparative purposes [Hunt, 2001].

RESULTS

Variation of place-of-death with time:

The total number of deaths due to cancer has been rising since 1972 when cancer registration commenced in NSW (Figure 1). The percentage of those deaths occurring in each of four major categories has been remarkably stable over that time, with 2003 values being very similar to those in 1972 despite departures in the intervening period (Figure 2), with about 63% of cancer patients dying in public hospitals and 15-20% deaths at home.

A more detailed breakdown of recent years shows more change over time with absolute and relative declines in the numbers dying in dedicated palliative care institutions and concomitant rises in deaths at home, private country hospitals and to some extent, metropolitan private hospitals (Figures 3 and 4). The proportion of deaths in country private hospitals has grown from 1.9% in 1989 to 3.4% in 2003. In subsequent analysis deaths in public nursing homes were pooled with private nursing homes because public nursing homes account for only about 0.5% of all deaths. Country public and other metropolitan public hospitals were later pooled, as were country and metropolitan private hospitals.

Figure 1: Cancer Deaths in NSW by Place and Year

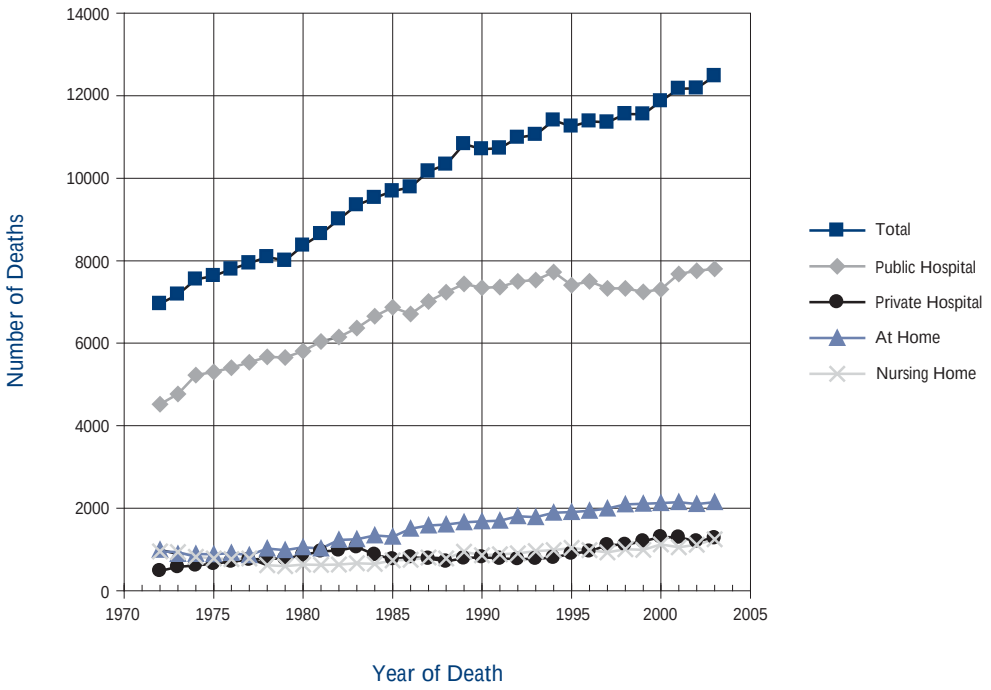


Figure 2: Cancer Deaths in NSW by Place and Year

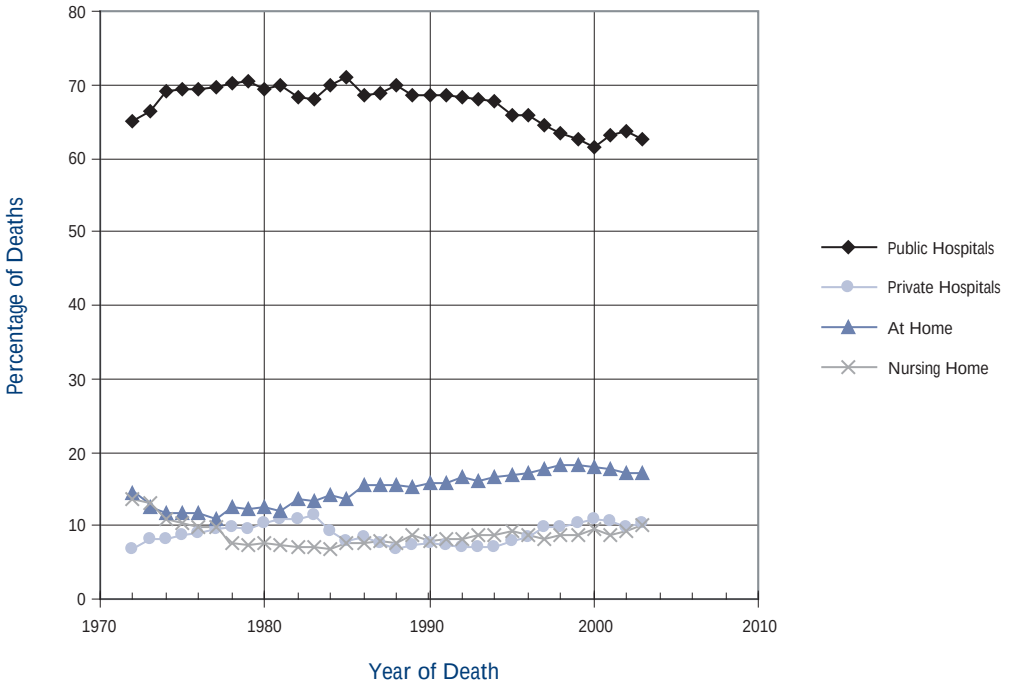


Figure 3: Cancer Deaths in NSW by Place and Year

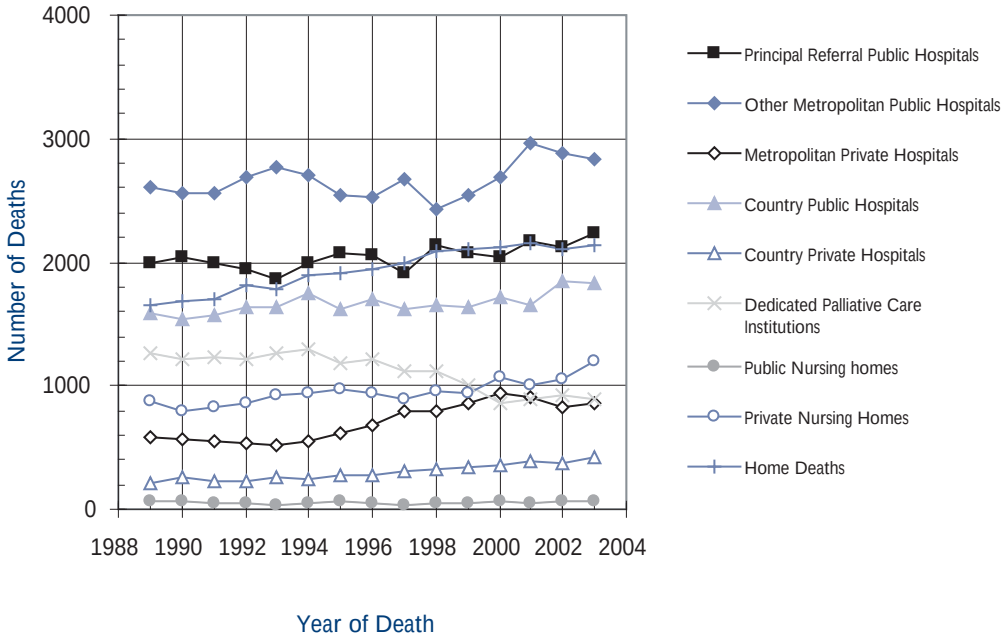
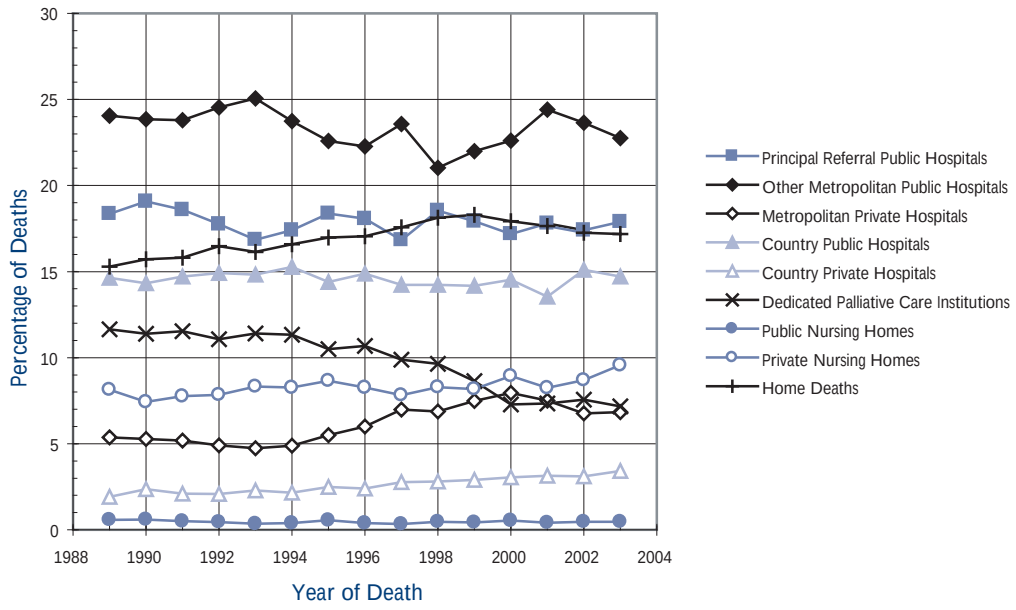


Figure 4: Cancer Deaths in NSW by Place and Year



Place-of-death by Sociodemographic and Tumour Characteristics:

Table 1 shows the number of cancer deaths by place of death, while Table 2 shows the proportion of these occurring in each place of death (row percentages). The overall percentage of patients dying in each place is shown at the top of the table. Where a row percentage for a particular characteristic deviates substantially from this, that characteristic is associated positively or negatively with the place of death. For example, overall 9.2% of deaths occur in nursing homes, but for the under 60's the proportion is 1.5% and for the over 80's it is 20.7%. The two age groups therefore respectively have a negative and positive association with death from cancer in a nursing home, before considering if other characteristics of these patients may account for this relationship.

All of the logistic regressions of place-of-death by each of the 10 predictor variables were highly significant ($p<0.001$), suggesting that all should be entered into the multinomial regression model. A likelihood ratio test indicated that age was better treated as a continuous variable rather than a categorical variable in the full model, and hence the effect of age is presented as change in odds ratio per decade of age (Table 3). No such simplification was possible with survival since diagnoses, and likelihood ratio tests suggested that all attempts to pool other predictor variables resulted in significantly reduced capacity to account for variation in place of death.

Multinomial logistic regression was used to adjust odds ratios for the presence of all other variables in the model. Due to poor fit the original model was reduced from 8 outcomes (with separate country and metropolitan private and public hospitals) to a 6 outcome model (with no distinction between country and metropolitan hospitals) (Table 4). Interactions between the 10 main predictor variables were not included in the final model to reduce the complexity involved and concern that little would be gained in explaining the outcome.

Goodness of fit tests of the 5 logistic regressions of place of death against the reference category (home) each showed no evidence of departure between the models predicted outcomes and the data itself (HL Goodness of Fit, $p>0.05$), indicating the model successfully accounts for variation in place of death.

A comparison of raw and adjusted odds ratios for each characteristic indicates whether the apparent associations between predictor variables and place of death in the univariate analysis were confounded by other variables (Tables 3 & 4 and Figures 5 to 14). Odds ratios , such as age and area health services, are not affected by confounding. In contrast, a difference between raw and adjusted odds ratios occurred for socio-economic status, remoteness, aboriginality and to a lesser extent, sex; indicating confounding during the initial univariate analysis.

Comparison with South Australia:

A total of 170,097 records of deaths between 1989 and 2003 with the socio-economic data grouped consistent with the model of Hunt et al [2001] were analysed by multinomial logistic regression (Table 6).

Goodness of Fit Tests indicated poor fit of the model to the data in three of the binomial regressions (each of hospice, nursing home and private residence versus metropolitan public hospital, $p<0.001$).

Effect of Age:

There was little difference between raw odds ratios and odds ratios adjusted for other variables using the multinomial regression (Figure 5). In the multivariate analysis the evidence for an age effect was very strong for all places-of-death ($p<0.001$).

The age effect is interpreted as the change in odds ratio per decade increase in age. As age of death increases, the likelihood of dying in a principal referral hospital compared to at home declines (OR=0.93/decade). In contrast, the odds of dying in all other institutions increase with increasing age, with nursing homes having by far the strongest age effect (OR=2.88/decade, 95%CI 2.77-2.99). The median age at death for people with cancer was 74 years for women and 73 years for men in the period 1999 to 2003.

Although only 9.2% of all cancer deaths occurred in nursing homes, 20.7% of those over 80, 35.1% of those over 90 (966 of 2,755 patients), and 51% of those over 100 (26 of 51 patients) died there. The likelihood of dying in a nursing home increases with age at diagnosis.

Effect of Sex:

After adjusting for other variables in the model, sex was a weak predictor of place-of death (Table 4 and Figure 6). Compared to dying at home, females were less likely than males to die in all institutions with the exceptions of nursing homes.

The greater likelihood of females dying in nursing homes exists after adjusting for greater longevity in females, as age has already been controlled for in the logistic model. The explanation for this effect must be found in variables not included in the model. One possibility is the absence of a carer at home. As women are more likely to survive their husbands, they may be less likely to have a home carer during their terminal illness. The reason for the discrepancy between men and women dying in nursing homes after adjusting for age is unclear.

Effect of Aboriginality:

After controlling for other variables, Aboriginal people and Torres Strait Islanders were more likely to die in institutional settings than non-Aboriginies, with the exception of private hospitals (Table 4 and Figure 7). In all cases however the evidence was weak because of the small number of people identified as Aboriginal or Torres Strait Islanders. The odds ratio was highest for dedicated palliative care institutions (OR=1.92, CI95% 1.09-3.39), but this was a result of only 22 deaths and should be interpreted with caution.

Of all the cancer deaths from 1999 until 2003, only 0.78% (470 of 60234) were identified as being Aboriginal or Torres Strait Islander people. The national census of 2001 reported that 1.88% of the NSW population were Aboriginal or Torres Strait Islander people. The reasons for this discrepancy are unclear. One possibility is a high mortality of Aboriginal people due to other causes – Aboriginal people are known to have a shorter life expectancy than non-Aboriginals. Even for deaths from cancer the median age of death for Aboriginal and Torres Strait Islander men and women was 65 and 62 years respectively, 9 and 12 years shorter (respectively) than the median for non-Aboriginal people.

Effect of Country of Birth:

The effect of country of birth after adjusting for other variables is generally small, with the exception of those whose place of birth is unknown (Table 4 and Figure 8).

Those born in UK and Ireland, as well as New Zealand (and a small number of otherwise ungrouped people) tended to be less likely to die in institutions (and so more likely to die at home) compared to Australian born people.

Those born in Western Europe, the Middle East and Africa were also less likely to die in institutions than the Australian born, with the exception of principal referral hospitals, where the odds ratios were greater than 1, but not significant. Those born elsewhere in Europe were clearly more likely to die in principle referral hospitals and slightly more likely to die in other public hospitals, but less likely to die in private hospitals.

There is marginal evidence that South and East Asian people were more likely to die in principal referral hospitals, but less likely to die in private hospitals or nursing homes.

East Asians were more likely to die in principal referral hospitals ($p<0.001$), other public hospitals ($p<0.01$) or nursing homes ($p=0.008$). Only 10.7% of East Asian born people died at home compared with 17.7% overall. There was no statistically significant difference in the place of death of those born in North and South America compared to Australian born.

Those whose place of birth was unknown had the strongest effect on place of death. They were much more likely to die at home than in all institutions except nursing homes, and this result was highly significant ($p<0.001$ for all institutions except nursing homes $p=0.075$).

Effect of Socio-Economic Status:

The index of relative socio-economic disadvantage (IRSD) calculated by the ABS was used as a proxy for socio-economic status. Consistent trends were observed between place of death and IRSD in this study (Table 4 and Figure 9).

The least disadvantaged were progressively more likely to die in private hospitals and progressively less likely to die in other public hospitals compared to the most disadvantaged (lowest 20%). The effects became quite strong for the least disadvantaged group (upper 20%).

Those in the two quintiles of least disadvantage (mid-upper 20% and upper 20% socio-economic status) were significantly less likely to die in principal referral hospitals and nursing homes than the most disadvantaged quintile.

After adjusting for other variables, the model predicted that members of the highest socio-economic status group were significantly more likely to die at home than members of the lowest (Figure 18).

Effect of Remoteness:

Remoteness of residence can vary within area health services, and the effect of remoteness on place of death presented here is a residual effect after the influence of area health service has been controlled for. It may be interpreted as how remoteness within an area health service influences the place of death.

The most pronounced changes between the raw and adjusted odds ratios for remoteness are for dedicated palliative care institutions, which strongly favour major cities in the raw analysis (Table 3), but are non-significant after adjusting for area health service in particular (Table 4).

In the adjusted analysis, those living in inner and outer regional areas are less likely to die in principal referral hospitals compared to those living in major cities. Those living in outer regional areas and remote areas are more likely to die in other public hospitals and less likely to die in private hospitals, while those living in inner regional areas are more likely to die in private hospitals.

Overall, a greater proportion of people in inner regional areas die at home (20.6% Table 2) compared to those in major cities (16.4%) and those in remote areas (16.0%). However, when other variables are controlled for, there is little difference in the probability of dying at home for those in inner regional areas and major cities, while those living in remote areas are significantly less likely to die at home (Figure 19).

Effect of Survival from Diagnosis:

For all institutions except nursing homes, a survival of less than three months has a different effect on diagnosis compared to the later five time period categories, which are similar to each other. For example, the odds ratios for dying in other public hospitals compared to at home, for the five survival categories versus less than 3 months category, cluster tightly between 0.74 and 0.79, indicating that you are 25% less likely to die at home.

Patients surviving longer than 3 months were less likely to die in principal referral hospitals, other public hospitals or private hospitals compared to at home. This effect was strongest for principal referral hospitals, suggesting that patients with aggressive cancers are more likely to be hospitalised in acute care settings until death.

In contrast, patients surviving for 3 months or more were significantly more likely to die in palliative care institutions (compared to at home), with the exception of those surviving for more than 60 months. Although the effect is small, this may reflect the greater difficulty in providing long-term palliative care in a home setting.

The reason for the return to an odds ratio close to one after 60 months is unclear. It may reflect recurrence of cancers in remission for a number of years.

It is important to note that survival between diagnosis and death is not the same as the normal measure of survival for cancers as it only considers patients who ultimately die from their disease. It might better be described as the time period between diagnosis and death.

In general, patients were no more or less likely to die in nursing homes (than at home) for any survival category ($p>0.05$).

Effect of Area Health Service of Residence:

Area health service of residence at diagnosis had the strongest effect on place of death (Table 4 and Figures 13a & b). Central Sydney Area Health Service has been used as the reference category as it is not at the extreme in terms of proportion of deaths in any of the places, and it is one of the few area health services (AHSs) with a full spectrum of socio-economic class.

The relationship between place of death and AHS is complex but several patterns are clear. The odds ratios for dying in principal referral hospitals (versus at home) are lower in rural AHSs (Figure 13b) compared to urban AHSs. This pattern is not as strong for the Hunter and Illawarra AHSs.

An explanation for this pattern may be found in the strong relationship between the AHS of residence at diagnosis and the AHS of the institution in which patients die (Tables 7 and 8). Even after those who die at home are excluded, approximately 85% of patients die in an institution in the same AHS they lived in at the time of diagnosis. This is more remarkable given that the median time between diagnosis and death is 10 months (the 90th percentile is 78 months). There is however some variability in those who die outside their AHS of residence.

For example, excluding home deaths, nearly 25.8% of patients diagnosed while residents of Central Sydney AHS subsequently die in the adjacent AHSs of South East Sydney, South West Sydney, Western Sydney or Northern Sydney. In contrast, relatively few patients diagnosed in the largely rural Northern Rivers AHS died outside the area. Again excluding home deaths, 2.1% die in the adjacent Mid North Coast or New England AHS, while most of the remainder who die outside this AHS die in institutions in urban AHSs.

The explanation for the strong association between place of death and AHS is therefore found in the distribution of institutions among the areas. Principal referral hospitals are located exclusively in metropolitan AHSs. Four are found in South East Sydney AHS (St. Vincents, Prince of Wales, St. George and Prince Henry (now closed). Two are found in Central Sydney AHS (Royal Prince Alfred and Concord). Liverpool, Westmead, Royal North Shore, John Hunter, Nepean, Gosford and Wollongong are located in South West Sydney, Western Sydney, Northern Sydney, Hunter, Wentworth, Central Coast and Illawarra AHSs respectively.

Similarly, dedicated palliative care institutions are tightly clustered. Sacred Heart Hospice and Calvary Hospital together accounted for nearly 78% of all deaths in palliative care institutions and are located in South Eastern Sydney Area Health Service. Neringah Home of Peace Hospital found in Northern Sydney AHS accounts for more than 22% of deaths in palliative care institutions, while Bear Cottage, a paediatric palliative care unit (grouped with Western Sydney AHS for this study), accounts for only 7 (0.15%) of palliative care deaths. Note that all 4 were publicly owned institutions during the period covered by this study.

Grouping of palliative care institutions is reflected in the likelihood of dying in a palliative care institution by AHS. The highest odds ratio for dying in a palliative care institution (compared to home) is found for people resident in South East Sydney AHS at diagnosis (OR=5.76, 95%CI 4.91-6.74), followed by residents in Northern Sydney AHS (OR=1.86, 95%CI 1.56-2.22), compared to Central Sydney AHS (the reference category, OR=1.00).

The odds ratios for dying in other public hospitals do not vary greatly from the reference category except for the Central Coast AHS and to a lesser extent, the South East Sydney AHS. In South East Sydney the presence of palliative care institutions explains this divergence. On the Central Coast however it appears patients are more likely to die in principal referral and private hospitals.

The pattern of deaths in private hospitals in the urban AHSs is less easily explained. The analysis has already controlled for the index of relative socio-economic disadvantage (IRSD). There may be some residual effect in the elevated odds ratios of Northern Sydney and South Eastern Sydney AHSs, but it is difficult to explain why residents of Wentworth and particularly Western Sydney are significantly more likely to die in private hospitals than those in Central Sydney.

It may be that Central Sydney is well catered for with public medical institutions – having two principal referral hospitals and being close to the dedicated palliative care institutions in South Eastern and Northern Sydney. Consequently, odds ratios of 2 to 3 appear to be the norm for private hospitals, and we are left to explain odds ratios more than 3 and those less than one.

The very high odds ratios for deaths in private hospitals in the Northern Rivers and particularly the Mid North Coast AHSs may be explained by these locations being the destination for retirees from Sydney. Such people may have previously had high incomes, but in retirement no longer stand out in IRSD measures because of reduced income. However, they probably retain sufficient resources to have private health care and use private hospitals.

In the remaining rural AHSs it is not obvious why residents of the Macquarie and New England AHSs are much more likely to die in private hospitals than residents of Central Sydney. It is not clear why these areas differ from the Greater Murray AHS. Nor is it clear why the Southern AHS has a very low odds ratio of dying in a private hospital (OR=0.17, 95%CI 0.09-0.30). Although it is not as popular as the north coast of New South Wales, this area is also a retirement destination for both Sydney and Melbourne residents.

Finally, the odds ratios for dying in nursing homes (compared with at home) are generally less than one, indicating less likelihood of dying in nursing homes for those diagnosed in AHSs other than Central Sydney. The exceptions are South Western Sydney AHS, Northern Sydney AHS and Macquarie AHS, which do not differ significantly from 1.0. The relatively high odds ratios for Central Sydney (the reference) and Northern Sydney can be explained by the greater number of nursing homes and nursing home beds – approximately 1.00 and 0.87 beds per institutional death of residents in the two respective AHSs. In contrast South Western Sydney AHS had 0.54 beds available per institutional death – comparable to the average of 0.59 beds per institutional death – while Macquarie AHS had only 0.36 nursing home beds per institutional death of residents diagnosed in that AHS, near the minimum of 0.33 beds per institutional death in the Mid North Coast AHS. These have been calculated using Health Information data on bed numbers.

Effect of Disease Stage at Diagnosis:

After adjusting for other variables in the model, stage of disease at diagnosis has a relatively weak, although still statistically significant, effect on the place of death of cancer patients (Table 4 and Figure 12). The strongest effects were found with dedicated palliative care institutions and private hospitals, where those diagnosed with regional or distant disease were more likely to die than those with localised disease.

Patients whose stage of disease is unknown were less likely to die in principle referral and public hospitals – although these effects were small (OR=0.88 for both), and more likely to die in nursing homes.

Patients diagnosed with distant (metastatic) disease were also more likely to die in other public hospitals (OR=1.14, 95%CI 1.06-1.23), while those diagnosed with regional disease were more likely to die in nursing homes, an effect that was both small and of marginal significance (OR=0.88, p=0.025).

The stage of disease at diagnosis may exert an effect on place of death through the pattern of care. For example, patients diagnosed with local disease are more likely to develop a relationship with their treating physician, due to the longer period from diagnosis to death. Overall, home deaths are more likely for those diagnosed with local disease.

In contrast, patients diagnosed with distant (metastatic) disease are more likely to be referred for immediate palliative care. Although this hypothesis explains the results for dedicated palliative care institutions, it is not so convincing for other places of death.

Effect of Type of Cancer:

After adjusting for other variables in the model, the strongest effects of type of cancer (referenced to others and unknown) were seen with the haematopoietic cancers and brain cancer (Table 4 and Figures 14a to c). Patients with leukaemia, Non-Hodgkin's Lymphoma, and multiple myeloma were much more likely than those with an unknown cancer to die in a principal referral hospital (OR=4.00, 3.02 and 2.96 respectively), and also more likely to die in other public hospitals or a private hospital than at home. This finding probably reflects the medical complexity of treating these malignancies. In particular, such patients frequently receive bone marrow transplants and require treatments to avoid rejection.

In contrast, patients dying of brain cancer had the lowest odds ratio of all cancers for dying in a principal referral hospital (OR=0.55, 95%CI 0.45-0.68) and the highest odds ratios for dying in a nursing home (OR=2.74, 95%CI 2.19-3.43) or dedicated palliative care institutions (OR=2.03, 95%CI 1.58-2.61). This may well reflect the physical care needs required due to loss of cognitive function so common with this illness. The cancer with the shortest survival in the study period, lung cancer, showed little departure from the reference category in the pattern of place of death. Only for other public hospitals was the odds ratio significant, and in that case the effect is so small and significance so marginal that it can be considered to be effectively equivalent to the reference category (OR=1.10, p=0.033).

Other cancers that did not differ significantly from the reference category for any place of death were oesophageal, laryngeal and tongue cancer, while cancer of the mouth, uterus and rectum differed in only one place of death by a small amount or had a low statistical significance (rectum, principal referral, OR=0.82, p=0.016; uterus, private hospitals, OR=1.46, p=0.044; and mouth, private hospitals, OR=0.52, p=0.028). Finally, cancer of the kidney differed from the reference category by a small amount with low significance for two places of death (principal referral, OR=0.81, p=0.031; and nursing homes, OR=0.75, p=0.020).

Patients with some cancers (colon, pancreas, stomach and melanoma) were more likely to die at home than in an institutional setting as evidence by odds ratios significantly lower than 1.0, particularly in the principal referral and other public hospital categories, and no category having odds ratios significantly greater than 1.0. Three cancers – pancreas, stomach and mesothelioma – are characterised by short time periods between diagnosis and death (mean time to death was 7.3, 15.6 and 10.9 months respectively, compared to 27.9 months for all cancers). Furthermore, although the effect for colon cancer is significant (particularly with respect to principal referral hospitals), the size of the effect is not as great as for the other cancers. Colon cancer has a mean time from diagnosis to death of 25.5 months.

Conversely, patients with some cancers (prostate, breast, cervix and bladder) were more likely to die in an institutional setting, but with no particular emphasis on the type of institution. These cancers typically point estimates for odds ratios of between 1.0 and 2.0 in all categories, with several categories being statistically significant. Consistent with the above explanation for home deaths, cancers of the prostate, breast and cervix have longer mean times from diagnosis to death of 54.2, 73.2 and 40.7 months, compared to the average for all cancers. Cancer of the bladder has a mean time from diagnosis to death of 35.1 months and also has the weakest effect – odds ratios are significantly elevated only in principal referral and private hospital categories.

A small number of cancers show statistically significant effects in only one category and are not significant in the others. Melanoma patients are more likely to die in dedicated palliative care institutions (OR=1.52, p=0.001), but do not differ significantly from the reference category for other institutions. Liver and gallbladder cancer patients are less likely to die in nursing homes (OR=0.53, p<0.001 and OR=0.42, p<0.001) but do not differ significantly from the reference in other categories. Finally, patients with ovarian cancer are also significantly less likely to die in nursing homes (OR=0.63, p=0.002), but are also more likely to die in private hospitals (OR=1.34), although the evidence for the latter effect is weaker (p=0.015).

Comparison with the South Australian Place of Death Study:

The study of place of death for cancer patients in South Australia (SA) during the period 1990 to 1999 shows some similarities and a few differences with this analysis in New South Wales (NSW) for 1989 to 2003 [Hunt, 2001].

South Australia has worked to develop its hospice system since the early 1980s. As a consequence the proportion of cancer patients dying in hospices has climbed from as little as 5% in 1981 [South Australian Cancer Registry, 1999] to stabilise at approximately 20% from 1990 to 1999 (overall 19.9%) [Hunt, 2001]. In contrast the proportion of cancer patients dying in dedicated palliative care institutions in NSW has declined from nearly 12% in 1989 to less than 7.5% in 2003 and continues to trend downwards. Unfortunately it is not possible to account for palliative care wards in public hospitals in NSW because deaths in palliative care beds and acute care beds in the same institution cannot be determined. It is difficult to know how much this blurring of the distinction between hospices and hospitals affects the comparison of place of death between the two states, as the number of palliative care beds in public hospitals is not known.

Descriptive Analysis:

From 1990 to 1999 15.8% of cancer deaths in SA occurred at home, little different from the 16.9% in NSW from 1989 to 2003. Similarly in SA 25.0% of patients died in a metropolitan public hospital (41.1% in NSW), 16.9% in a country hospital (17.2% in NSW), 12.7% in metropolitan private hospitals (6.2% in NSW) and 9.7% in nursing homes (8.8% in NSW). (See Table 5 for the NSW figures and Hunt et al for the SA results) The difference in these figures is due to the greater proportion of SA cancer patients dying in metropolitan private hospitals.

Limitations of the Model:

The requirement to produce a logistic model that compares to another limits the scope for modifying the model to obtain the best fit. The implications are not immediately apparent, as the model clearly reflects the general pattern seen in the 1999-2003 period, however, caution is required in drawing any detailed conclusions because the model exhibits poor fit to the observed data. The model approximates the data and can be compared in broad terms with the South Australian model.

Effect of Age:

As in South Australia, elderly patients were more likely to die in metropolitan private hospitals, country hospitals, dedicated palliative care institutions (hospices) and nursing homes and less likely to die at home when compared to younger patients (Table 6). The odds ratios for each category were similar in NSW and SA, except for dedicated palliative care institutions (hospices), where NSW has a stronger age effect.

Effect of Sex:

The direction of the effect of sex was the same in both states, however the size of the effect was greater in South Australia for all categories except home deaths, where there is little difference with odds ratios at 1.0.

Effect of Aboriginality/Race:

The effect of aboriginality was not significant in the SA study for any place of death and is only significant for country hospitals in NSW, so there is little scope for comparison.

Effect of Country of Birth:

As in SA, NSW cancer patients born in the United Kingdom and Ireland or Southern Europe were less likely to die in institutions other than a major metropolitan hospital compared to Australian born patients. Unlike South Australia, NSW cancer patients born in the United Kingdom or Ireland were more likely than their Australian-born counterparts to die at home. Southern European-born in the SA study, were less likely than Australian-born patients to die at home. Those born in "other" countries were less likely to die in institutions other than major metropolitan hospitals than the Australian-born and equally likely to die at home.

Effect of Socio-economic Status and Remoteness:

Broadly similar patterns were seen in the combined effect of socio-economic status and urban versus rural residence for the two states. The NSW analysis had a much higher odds ratio than the SA study for high SES people dying in a dedicated palliative care institution (OR=8.14 vs OR=1.69 respectively), however the NSW result is almost certainly confounded by the location of palliative care institutions in the area health service of residence as the analysis of the 1999-2003 data shows. Similarly the NSW results indicate country people are much more likely to die in nursing homes and private residences (OR=11.4 and 15.5 respectively) when compared to the SA results (OR=2.48 and 3.50). This is almost certainly due to the absence of metropolitan public hospitals (the reference category) in country areas.

Effect of Survival from Diagnosis:

The effects of survival from diagnosis on place of death are in the same direction as in NSW, but much stronger. Odds ratios of more than 50% greater for metropolitan private hospitals and around double for all other categories. The explanation is probably found in the reference category, which are those surviving less than 3 months after diagnosis. Such patients would likely be acute care patients from diagnosis until death. In South Australia it appears that metropolitan hospitals treat mainly acute care patients rather than the tendency for NSW hospitals to have their own palliative care and acute wards in the same hospital. Another explanation may be that in South Australia there are more hospice beds.

Effect of Year of Death:

The time trend in place of death in NSW and SA is difficult to compare because of the decline in the proportion of patients dying in the reference place of death in South Australia. In NSW the proportion of cancer patients dying in metropolitan public hospitals has declined from 42.4% to 40.7% from 1989 to 2003. In South Australia the proportion dying in metropolitan public hospitals was 28.2% in 1990 and 23.4% in 1999, a much faster rate of decline in proportional terms. The different behaviour of the odds ratios in the various places of death over time in SA and NSW most probably reflects the different behaviour of the reference category more than any other factor. For example, the more rapid increase of odds ratios with time for private hospitals in South Australia (versus NSW) and for home deaths (except for 1998-99 in SA) is probably due to a fall in the reference category. Odds ratios for country hospitals, hospices and nursing homes are generally stable or slightly greater than 1.0 in later years in SA, whereas in NSW they tend to decline, a pattern that also reflects a fall in the proportion of deaths in the reference category in SA.

If the change in proportion of deaths in each place of death with time is directly compared (Figure 4 and the graph in Hunt et al.) absolute trends in the two states can be compared. As well as the more rapid decline in the proportion of deaths in metropolitan public hospitals in South Australia, there is a faster rise in the absolute proportion of deaths in private hospitals and a slower decline in the proportion of deaths in dedicated palliative care units (hospices). In New South Wales the proportion of people dying in metropolitan private hospitals has risen from 5.4% to 6.8% from 1989 to 2003. In South Australia the proportion has risen from 10.6% to 15.1% from 1990 to 1999. The proportion of home deaths is rising slowly in NSW, but is approximately stable in South Australia. The

proportion of nursing home deaths is rising slowly in both states. The proportion of deaths in country hospitals are rising very slowly in NSW, but are flat or possibly falling in South Australia. Overall the view is that South Australia has undergone a period of much more rapid change in place of death in the 1990s than New South Wales.

Effect of Cancer Site:

A similarity in the results for New South Wales and South Australia is the tendency for deaths from hematopoietic cancers (Non-Hodgkin's Lymphoma, leukaemia and multiple myeloma) to occur in metropolitan public hospitals, again reflecting the type of treatment required for these malignancies. In South Australia, the odds ratios for other categories are smaller than in New South Wales, which may reflect that metropolitan public hospitals in South Australia are only acute care whereas New South Wales hospitals may have palliative care wards included.

The Results in Table 6 may appear different from those in Table 4 not only because of the poor model fit and the different time period involved, but also because the model in Table 4 has been more comprehensively adjusted for confounding. For example cancers that previously differed little between places of death; such as lung, oesophageal, laryngeal, tongue, mouth, uterus, rectum and kidney; now show greater variation. Sometimes the pattern is similar in the two tables after taking into account the change in reference category (eg. mouth, rectum). For other cancers the pattern can be quite different. Moreover, where it is possible to compare the NSW results directly with those from SA (lung, oesophagus and mouth), patients dying from these cancers appear more likely to die in principal referral hospitals in South Australia. Hunt et al suggest that the nature of the malignancies (along with breast, pharynx and haematological cancers) leads patients to develop closer relationships with specialist hospital services, which leads them to return there when their disease reaches its terminal phase. The evidence for this having an effect of the place of death in New South Wales is weak in Table 6 and even weaker in the full model (Table 4).

The tendency for patients with cancers of the prostate, breast and bladder to die in an institutional setting (Table 4) is still present in Table 6, although less clear.

Patients with liver and ovarian cancer are less likely to die in nursing homes (above) which is found in Table 6 and in the South Australian study.

Finally, in Table 4, patients with mesothelioma and cancers of the pancreas, stomach and to some extent, colon, were more likely to die at home than in an institution. This is reflected to some extent in Table 6, but is more clearly seen (especially for stomach and pancreatic cancer) in the South Australian data, where the home category is the only one with an odds ratio significantly exceeding 1.0. Even for cancer of the colon only one other category (country hospitals) has an odds ratio greater than 1.

The 1999-2003 Model: Explanatory and Predictive Power

Explanatory Power of the Model:

A multinomial logistic regression model was able to explain 19.6% of the variation in place of death, based on the pseudo-R^2 statistic. Univariate models had the following explanatory powers:

Variable	Pseudo-R^2
Area Health Service of Residence	13.8%
Remoteness of Residence	4.1%
Index of Relative Socioeconomic Disadvantage	3.4%
Age at death	2.8%
Cancer	1.1%
Country of Birth	0.93%
Survival from Diagnosis	0.42%
Disease Stage at Diagnosis	0.34%
Sex	0.11%
Aboriginality	0.04%

The univariate pseudo-R^2 statistics confirm the general impression of the relative strengths of the effect of each variable. In the multivariate model, area health service of residence (AHS) had the greatest effect; having the most influence on the place of death outcome. Remoteness was strongly confounded with AHS of residence, and after fitting the multivariate model remoteness of residence has a much-reduced effect, being confined to explaining the effect of remoteness within each area health service.

Index of socio-economic disadvantage and age were next in effect with the type of cancer being moderate, especially when there are 24 categories of site (other than the reference group). The effect of sex is small.

Predictive Power of the Model:

The model is able to predict the frequency of deaths in each place of death for variables explicitly coded by the model (Table 9), but only approximate frequencies for combinations of these variables (Tables 10a to 12b), or for age, which was modelled as a continuous variable but tabulated as a categorical variable (compare Table 9 and Table 1).

The model assumes (for example) that the effects of sex, socio-economic status or age are constant across each cancer. There may be an interaction effect (not modelled due to the complexity of the resulting model). The true frequencies are close to the predicted frequencies (Compare Tables 10a &b, 11a & b and 12a & b), even for relatively rare cancers, such as mouth cancer (Table 12a & b).

Predictions Using the Model:

A major difficulty with multinomial logistic models is in their interpretation, especially by those unfamiliar with the concept of odds ratios and statistical techniques. It is easy to assume that a large odds ratio for a particular place of death for a particular value for a variable implies a large number of people dying in the corresponding place. However, it implies only that it is more likely for patients with that value of a variable to die in that place of death than for patients with the reference value of the variable to die in that place of death. If very few patients die in that place of death under the reference conditions, a large increase in likelihood will still mean only a few patients dying in that place of death. To bring some sense to the numbers it is helpful to look at what the model says about the proportion of patients that are predicted to die in each place of death under various circumstances.

A further difficulty in interpreting multinomial logistic models is the process of referencing many outcomes to one category because it is difficult to compare the probabilities of an outcome for two or more values of an explanatory variable. Even if the odds ratios for the two explanatory variables are the same in one outcome category, the actual probability of the outcome for each explanatory variable depends on the value of the odds ratios in all the categories for each value of the explanatory variable.

For example the adjusted odds ratio for someone dying from leukaemia in a dedicated palliative care institution is 1.10, somewhat greater than the adjusted odds ratio of 0.85 for someone dying of stomach cancer in a dedicated palliative care institution (See Table 4 and Figure 14a). But the probability of someone with stomach cancer dying in a dedicated palliative care institution will almost always exceed that for someone with leukaemia. This is illustrated for a chosen set of values of other variables in Figure 23a, where the predicted probability of a woman dying from stomach cancer in a dedicated palliative care institution is 9.4%, but for leukaemia is only 4.5%, less than half. This discrepancy is due to the high proportions (and odds ratios) of all patients with leukaemia dying in institutions, because few die at home. In contrast, people with stomach cancer have low odds ratios for dying in institutions, and many die at home. The odds ratios for dedicated palliative care institutions are referenced to home deaths.

The good overall fit and predictive power of the model allows the prediction of the probability that patients with a particular set of characteristics will die in each place (Figures 15 to 23). The predictions estimate the proportion of a large number of patients who share the particular set of characteristics who will die in each place-of death. The predictions are subject to error, indicated by a 95% confidence interval on the prediction. This should under no circumstances be interpreted as a 95% confidence interval on where a particular patient will die. In no case is the probability of a patient dying in any particular place of death exactly zero (or exactly one).

The model variables explain only about 20% of the variation in place of death. Factors such as a person may want to die at home, a home carer willing to support them, a physician willing to facilitate a home death, and community palliative care services available in their area are likely to play a much more important role in the ultimate place of death and are not included in the model.

The predictions are applicable only for the study period of 1999-2003 for the study population.

In most instances for predictions showing the effect of one variable, all other variables have held at their median values or their reference category values (Figures 15 to 23). One exception to this is for sex, where predictions have been made for both males and females.

Predicted Effect of Age:

Age has been modelled as a continuous rather than a categorical variable. To estimate the predicted effect three ages have been chosen for each sex (Figure 15). The median age of death for males was 73 and for females it was 74. In addition the model was used to predict place of death for young patients dying at 55 years and old patients dying at 85 years. As area health service of residence exerts such a large influence on place of death, the place of death was predicted for four area health services. In all cases the effect of increasing age is to the predicted probability of dying in a principal referral hospital and increase the probability of dying in a nursing home.

Predicted Effect of Aboriginality:

Female aboriginies who die of cancer die at a median age of only 62, while males die at a median age of 65. Aboriginal people tend to be concentrated in low SES areas, which increases the probability that they will die in public hospitals. Predictions were made for three area health services with relatively high numbers of aboriginal deaths from cancer (Figure 16).

Predicted Effect of Country of Birth:

The predicted effect of country of birth is much larger for "unknown country of birth", which is affected by people whose country of birth is unknown concentrated in these places (Figure 17) whether a cancer requires diagnosis and treatment in a hospital.

For the predicted effect of country of birth, only the median ages of death for all males and females are used. This approach is adopted hereafter. Central Sydney AHS (the reference category) was used for these predictions, due to its cosmopolitan nature.

Predicted Effect of Socio-Economic Status:

A higher proportion of people living in low SES postal areas are predicted to die in public hospitals (Figure 18), while a lower proportion are predicted to die in private hospitals. Less easy to explain is the greater probability of people in upper SES postal areas dying at home. SES (or strictly index of relative socio-economic) is also a measure of education, which may indicate a greater awareness of the availability of community palliative care services or a greater willingness to insist on them.

In this analysis the Central Sydney Area Health Service has been used, as it has a reasonable number of people living in postal areas in all 5 levels of the IRSD index.

Predicted Effect of Remoteness:

Those living in remote or very remote regions of each area health service are predicted to be more likely to die in public hospitals and less likely to die at home or in private hospitals (Figure 19). Given that other variables have been controlled for, this may reflect a lack of community palliative care services and private hospitals in remote regions. The Mid-Western Area Health Service was used for these predictions as it has sub-regions in all categories of remoteness.

Predicted Effect of Survival from Diagnosis:

The predicted effect of survival is largely confined to those surviving less than 3 months from diagnosis (Figure 20). These patients have a higher probability of dying in principal referral hospitals and a lower probability of dying at home or in a nursing home. Short survival times suggest cancers that may require intensive treatment in an acute care setting often only available in principal referral hospitals.

Predicted Effect of Area Health Service of Residence:

The strong effect of area health service of residence on predicted place of death is clear. It is worth pointing to some of the extremes when other variables are held at their median or reference values (Figures 22a and 22b). The predicted probability of dying in a principle referral hospital varies from 0.8% for a male resident in Northern Rivers Area Health Service to 53% for a male resident in Central Coast AHS.

The predicted probability of dying in a dedicated palliative care institution varies from 0.1% for someone resident in Northern Rivers AHS to 43% for someone resident in South East Sydney AHS.

The predicted probability of dying in another public hospital varies from 3% for a male resident in the Central Coast AHS to 71% for a male resident in the Southern AHS.

The predicted probability of dying in a private hospital varies from 0.4% for a male resident in the Southern AHS to 26% for a male resident in the Northern Rivers AHS. Note that this prediction has been made for a person of average SES.

The predicted probability of dying in a nursing home varies from 4% for a female resident in the Far West AHS at the time of diagnosis to 27% for a female resident in the Macquarie AHS. Males resident in the Macquarie AHS have only a 19% probability of dying in a nursing home.

The predicted probability of dying at home varies from 14% and 15% for a male and female (respectively) resident in Northern Sydney AHS to 29% and 30% for a male and female resident in the Far West AHS.

It is interesting to note that after controlling for all other factors the predicted probability of dying at home is almost identical for males and females. This suggests that it is not the absence of a home carer that leads more women to die in nursing homes, but some other factor. Age has also been accounted for by the model.

A further interesting point is that the predicted probability of dying at home is greatest in the Far West AHS, precisely where one would expect community palliative care services to be absent. The reasons for this are unclear.

Predicted Effect of Disease Stage at Diagnosis:

Explaining the predicted effect of stage of disease at diagnosis is difficult, except for the unknown category, where the less reliable data gathering environment of nursing homes may lead to the artefact of a higher probability of dying there (Figure 21). Otherwise, stage of disease at diagnosis has such a small (although still statistically significant) effect that it little alters the overall pattern of predicted place of death.

Predicted Effect of Type of Cancer:

People with haematopoietic cancers are have a higher predicted probability of dying in a principal referral hospital, while people with brain tumours have a greater probability of dying in a nursing home. Other cancers have some effect for particular institutions, for example people with mesothelioma have a lower predicted probability of dying in nursing homes and a higher probability of dying at home.

Limitations of the Present Model:

Lack of computing power and concern that the resulting model would be too complex dissuaded us from fitting interaction terms. In general individual interaction terms added to the full model were statistically significant, normally the criterion for adding them to the model. However, with 10 higher level variables, there are 45 higher level interaction terms – far more when the multiple levels of each major variable are considered. Also the interaction terms generally contribute relatively small explanatory power (on the order of gender), but may still be important in isolated cases, eg. when the place of death of women with a particular cancer differs significantly from that of men with that cancer etc. (Note that breast cancer does not fit this description and the prediction for men with this cancer are similar to the observations).

A consequence of not fitting interaction terms is that a uniform effect is assumed to apply across all variables. For example, the effect of sex or age will be the same for all cancers or area health services. Although this is unlikely in practice, gross deviations from the assumption of non interaction will result in poor goodness of fit. Limited exploration of particular cases (Figures 10 to 12) shows the typical magnitude of the errors introduced by this assumption.

Although goodness of fit is excellent overall, good overall fit may hide poor fit when numbers are relatively small. It is also important to remember that the result of fitting numerous interaction terms would be a loss of precision in estimating individual effects as a trade off for greater accuracy in estimating final probabilities.

The major shortcoming of the model has been mentioned earlier: that is the inability to include the variables most likely to influence place of death. These include the availability of the following; a carer at home; of community palliative care services in the area of residence of the patient; and the availability of beds in institutions in the area where the patient lives and patient preference determines whether a death occurs at home or in an institutional setting.

DISCUSSION

There is a broad similarity between places of death of NSW cancer patients in 1999 and 2003 and those of SA cancer patients between 2000 and 2002, with most dying in a hospital setting (around 60%). This compares with only about 28% of SA residents of similar age declaring a preference for death in a hospital setting. By comparison, relatively few cancer patients actually died at a private residence (18% in NSW and 14% in SA), although approximately 58% of SA residents of similar age declare a preference for dying at home.

Other studies of cancer patients also have found that the majority prefer to die at home [Tang 2003, Tiernan 2002, Dunlop 1989]. Prospective studies of cancer patients suggest, however, that some patients change their preferences as the cancer progresses, and concerns increase about being a burden on home carers [Tang 2003, Tieman 2002, Dunlop 1989, Townsend 1990, Steinhauser 2000]. With progression of the cancer, medical complications would tend to increase, with greater care needs that may make care at home more difficult.

NSW cancer deaths were less likely to occur at home when the patient was older. These results are consistent with other studies showing that older people with cancer are less likely to die at home. [Higginson 1998, Hunt 2001, Grande 1998]. A less common preference is also expressed by older than younger respondents in population surveys to die at home. These observations may reflect a lower availability of home support for elderly people (i.e., people whose partners may be debilitated or deceased partners), a stronger awareness of the difficulties of terminal care at home, more concern about being a burden on family members, and a greater acceptance of inpatient settings due to more direct exposure to them. [Bass 1984]

NSW cancer deaths were more likely to occur in dedicated palliative care institutions among those of higher socio economic status. SA population survey data also show that among those preferring to die in an institution, a preference for death in a hospice was more common among respondents from higher than lower socio economic groups.

This may reflect a greater knowledge in the upper socio economic groups of hospice care, plus their access to wider health care options.

The greater likelihood of Aboriginal patients in NSW to die in hospital settings may reflect cultural factors, together with a lack of access to supportive home care services. Aboriginal patients have low cancer survivals, with many dying soon after diagnosis. This would predispose to them dying in acute hospital settings. Furthermore, Aboriginal patients frequently come from remote areas where public hospital care generally is more readily available than nursing homes or dedicated palliative care institutions.

CONCLUSIONS

The present study provides a description of the present state of affairs of the place of death from cancer in New South Wales and explored the variables that explain the pattern of such deaths. It does assume that for the majority of patients a home death is preferable to an institutional death, and hence the logistic regression has been done using home deaths as a reference. It is important to note that the best model explains less than 20% in variabiltiy of place of death and many other factors contribute.

It is clear from comparisons with South Australia that the New South Wales situation is not that different, but it is also clear that other states and other regions achieve a higher proportion of home deaths for cancer patients. If facilitation of home deaths (where desired) for the terminally ill is a policy objective, much more work needs to be done to investigate how this can be achieved. A first step would be to examine how this is done in regions of Australia and overseas that are successful in this area.

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TABLES AND FIGURES

Table 1: Frequency of Cancer Deaths by Place and Sociodemographic and Tumour Characteristics (1999-2003)

Place	Private Residence	Principal Referral Hospital	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Characteristic:							
Total	10630	10626	4570	22596	6276	5536	60234
Aged at Death							
less than 60	2402	2664	779	3959	893	163	10860
60 to 69	2463	2431	876	5009	1112	388	12279
70 to 79	3393	3443	1622	7915	2304	1488	20165
more than 80	2372	2088	1293	5713	1967	3497	16930
Sex							
Male	5946	6106	2498	13145	3596	2645	33936
Female	4684	4520	2072	9451	2680	2891	26298
Aboriginality							
Non-Aboriginal	10561	10564	4548	22327	6253	5511	59764
Aboriginal or Torres Strait Islander	69	62	22	269	23	25	470
Country of Birth							
Australia	7286	6567	2971	16723	4869	3917	42333
UK & Republic of Ireland	1086	1023	485	1952	545	577	5668
Western Europe excl. British Isles	797	1038	376	1382	274	268	4135
Other Europe	344	594	283	892	146	231	2490
Middle East and Africa	204	353	105	336	66	54	1118
South and SE Asia	179	333	89	440	44	50	1135
East Asia	98	259	100	312	56	93	918
North and South America	80	109	53	152	42	30	466
Others incl. New Zealand	190	185	95	258	83	65	876
Unknown	366	165	13	149	151	251	1095
Index of Relative Socioeconomic Disadvantage							
Lowest 20% (most disadvantaged)	2026	2161	192	6424	578	1024	12405
Mid-lower 20%	2547	2124	270	6155	1490	1076	13662
Middle 20%	2107	1935	736	4428	1191	1145	11542
Mid-upper 20%	2058	2530	1306	3447	1040	1138	11519
Upper 20% (least disadvantaged)	1892	1876	2066	2142	1977	1153	11106

Table 1: Frequency of Cancer Deaths by Place and Sociodemographic and Tumour Characteristics (1999-2003) (cont.)

Place	Private Residence	Principal Referral Hospital	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Remoteness of Residence:							
Major City	6275	9017	4290	11261	3629	3765	38237
Inner Regional	2711	1334	239	5809	2046	1036	13175
Outer Regional	1497	240	35	4853	588	691	7904
Remote to Very Remote	147	35	6	673	13	44	918
Survival from Diagnosis							
less than 3 months	2067	3247	742	5469	1462	1390	14377
3 to 5 months	1389	1273	635	2917	790	657	7661
6 to 11 months	1879	1586	836	3804	927	729	9761
12 to 23 months	1963	1555	871	3723	1000	767	9879
24 to 59 months	1915	1654	855	3761	1130	874	10189
more than 60 months	1417	1311	631	2922	967	1119	8367
Area Health Service of Residence							
Central Sydney AHS	656	1443	322	1201	146	561	4329
South Eastern Sydney AHS	1058	1491	2961	512	496	671	7189
South Western Sydney AHS	857	1188	78	2847	183	634	5787
Western Sydney AHS	761	1423	94	2082	288	456	5104
Wentworth AHS	396	810	17	560	235	140	2158
Northern Sydney AHS	1087	1023	928	1657	1599	823	7117
Central Coast AHS	786	1830	51	115	513	371	3666
Hunter AHS	1208	516	17	3126	613	476	5956
Illawarra AHS	871	498	31	1860	314	224	3798
Far West AHS	99	7	2	303	3	13	427
Greater Murray AHS	554	32	7	1506	133	169	2401
Macquarie AHS	164	58	8	542	65	191	1028
Mid North Coast AHS	829	114	12	1344	985	252	3536
Mid Western AHS	232	82	19	1130	106	132	1701
New England AHS	217	51	7	1143	129	153	1700
Northern Rivers AHS	434	26	3	1440	454	180	2537
Southern AHS	421	34	13	1228	14	90	1800
Disease Stage at Diagnosis							
Localised	2263	2080	997	4700	1223	1298	12561
Regional	2323	2052	1028	4578	1390	858	12229
Distant	2842	2975	1542	6699	1740	1134	16932
Unknown	3202	3519	1003	6619	1923	2246	18512

Table 1: Frequency of Cancer Deaths by Place and Sociodemographic and Tumour Characteristics (1999-2003) (cont.)

Place	Private Residence	Principal Referral Hospital	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Cancer Site							
Others and unknown	1329	1446	548	2856	699	739	7617
Lung	1968	1998	770	4615	995	797	11143
Colon	995	678	384	1899	602	508	5066
Prostate	657	494	302	1666	568	783	4470
Breast	710	751	327	1450	515	515	4268
Rectum	553	395	263	1040	313	281	2845
Pancreas	577	394	253	1097	319	162	2802
Non-Hodgkin's Lymphoma	318	723	173	904	281	205	2604
Leukaemia	272	902	93	703	228	141	2339
Stomach	507	334	186	824	228	142	2221
Melanoma	376	271	197	722	211	167	1944
Brain	343	204	183	627	139	201	1697
Kidney	317	230	133	599	154	122	1555
Bladder	210	235	106	505	185	176	1417
Oesophagus	233	213	91	565	120	105	1327
Multiple Myeloma	152	327	73	390	147	103	1192
Ovary	231	179	105	442	151	78	1186
Liver	202	246	90	388	110	52	1088
Gallbladder	161	148	54	280	75	45	763
Mesothelioma	190	110	76	254	106	21	757
Uterus	77	86	40	192	51	60	506
Cervix	59	73	35	163	27	39	396
Larynx	69	81	28	163	20	33	394
Tongue	59	56	31	132	17	32	327
Mouth	65	52	29	120	15	29	310

Table 2: Proportion of Cancer Deaths by Place and Sociodemographic and Tumour Characteristics (1999-2003)

Place	Private Residence	Principle Referal Hospital	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Characteristic							
Overall	17.65	17.64	7.59	37.51	10.42	9.19	100
Aged at death							
less than 60	22.12	24.53	7.17	36.45	8.22	1.50	100
60 to 69	20.06	19.80	7.13	40.79	9.06	3.16	100
70 to 79	16.83	17.07	8.04	39.25	11.43	7.38	100
more than 80	14.01	12.33	7.64	33.74	11.62	20.66	100
Sex							
Male	17.52	17.99	7.36	38.73	10.60	7.79	100
Female	17.81	17.19	7.88	35.94	10.19	10.99	100
Aboriginality							
Non-Aboriginal	17.67	17.68	7.61	37.36	10.46	9.22	100
Aboriginal or Torres Strait Islander	14.68	13.19	4.68	57.23	4.89	5.32	100
Country of Birth							
Australia	17.21	15.51	7.02	39.50	11.50	9.25	100
UK & Republic of Ireland	19.16	18.05	8.56	34.44	9.62	10.18	100
Western Europe excl. British Isles	19.27	25.10	9.09	33.42	6.63	6.48	100
Other Europe	13.82	23.86	11.37	35.82	5.86	9.28	100
Middle East and Africa	18.25	31.57	9.39	30.05	5.90	4.83	100
South and SE Asia	15.77	29.34	7.84	38.77	3.88	4.41	100
East Asia	10.68	28.21	10.89	33.99	6.10	10.13	100
North and South America	17.17	23.39	11.37	32.62	9.01	6.44	100
Others incl. New Zealand	21.69	21.12	10.84	29.45	9.47	7.42	100
Unknown	33.42	15.07	1.19	13.61	13.79	22.92	100
Index of Relative Socioeconomic Disadvantage							
Lowest 20% (most disadvantaged)	16.33	17.42	1.55	51.79	4.66	8.25	100
Mid-lower 20%	18.64	15.55	1.98	45.05	10.91	7.88	100
Middle 20%	18.26	16.76	6.38	38.36	10.32	9.92	100
Mid-upper 20%	17.87	21.96	11.34	29.92	9.03	9.88	100
Upper 20% (least disadvantaged)	17.04	16.89	18.60	19.29	17.80	10.38	100
Mid-upper 20%	17.87	21.96	11.34	29.92	9.03	9.88	100
Upper 20% (least disadvantaged)	17.04	16.89	18.60	19.29	17.80	10.38	100

Table 2: Proportion of Cancer Deaths by Place and Sociodemographic and Tumour Characteristics (1999-2003) (cont.)

Place	Private Residence	Principal Referral Hospital	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Characteristic							
Remoteness of residence:							
Major City	16.41	23.58	11.22	29.45	9.49	9.85	100
Inner Regional	20.58	10.13	1.81	44.09	15.53	7.86	100
Outer Regional	18.94	3.04	0.44	61.40	7.44	8.74	100
Remote to Very Remote	16.01	3.81	0.65	73.31	1.42	4.79	100
Survival from Diagnosis							
less than 3 months	14.38	22.58	5.16	38.04	10.17	9.67	100
3 to 5 months	18.13	16.62	8.29	38.08	10.31	8.58	100
6 to 11 months	19.25	16.25	8.56	38.97	9.50	7.47	100
12 to 23 months	19.87	15.74	8.82	37.69	10.12	7.76	100
24 to 59 months	18.79	16.23	8.39	36.91	11.09	8.58	100
more than 60 months	16.94	15.67	7.54	34.92	11.56	13.37	100
Area Health Service of Residence							
Central Sydney AHS	15.15	33.33	7.44	27.74	3.37	12.96	100
South Eastern Sydney AHS	14.72	20.74	41.19	7.12	6.90	9.33	100
South Western Sydney AHS	14.81	20.53	1.35	49.20	3.16	10.96	100
Western Sydney AHS	14.91	27.88	1.84	40.79	5.64	8.93	100
Wentworth AHS	18.35	37.53	0.79	25.95	10.89	6.49	100
Northern Sydney AHS	15.27	14.37	13.04	23.28	22.47	11.56	100
Central Coast AHS	21.44	49.92	1.39	3.14	13.99	10.12	100
Hunter AHS	20.28	8.66	0.29	52.48	10.29	7.99	100
Illawarra AHS	22.93	13.11	0.82	48.97	8.27	5.90	100
Far West AHS	23.19	1.64	0.47	70.96	0.70	3.04	100
Greater Murray AHS	23.07	1.33	0.29	62.72	5.54	7.04	100
Macquarie AHS	15.95	5.64	0.78	52.72	6.32	18.58	100
Mid North Coast AHS	23.44	3.22	0.34	38.01	27.86	7.13	100
Mid Western AHS	13.64	4.82	1.12	66.43	6.23	7.76	100
New England AHS	12.76	3.00	0.41	67.24	7.59	9.00	100
Northern Rivers AHS	17.11	1.02	0.12	56.76	17.90	7.09	100
Southern AHS	23.39	1.89	0.72	68.22	0.78	5.00	100
Disease Stage at Diagnosis							
Localised	18.02	16.56	7.94	37.42	9.74	10.33	100
Regional	19.00	16.78	8.41	37.44	11.37	7.02	100
Distant	16.78	17.57	9.11	39.56	10.28	6.70	100
Unknown	17.30	19.01	5.42	35.76	10.39	12.13	100

Table 2: Proportion of Cancer Deaths by Place and Sociodemographic and Tumour Characteristics (1999-2003) (cont.)

Place	Private Residence	Principal Referral Hospital	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Characteristic:							
Cancer Site							
Others and unknown	17.45	18.98	7.19	37.50	9.18	9.70	100
Lung	17.66	17.93	6.91	41.42	8.93	7.15	100
Colon	19.64	13.38	7.58	37.49	11.88	10.03	100
Prostate	14.70	11.05	6.76	37.27	12.71	17.52	100
Breast	16.64	17.60	7.66	33.97	12.07	12.07	100
Rectum	19.44	13.88	9.24	36.56	11.00	9.88	100
Pancreas	20.59	14.06	9.03	39.15	11.38	5.78	100
Non-Hodgkin's Lymphoma	12.21	27.76	6.64	34.72	10.79	7.87	100
Leukaemia	11.63	38.56	3.98	30.06	9.75	6.03	100
Stomach	22.83	15.04	8.37	37.10	10.27	6.39	100
Melanoma	19.34	13.94	10.13	37.14	10.85	8.59	100
Brain	20.21	12.02	10.78	36.95	8.19	11.84	100
Kidney	20.39	14.79	8.55	38.52	9.90	7.85	100
Bladder	14.82	16.58	7.48	35.64	13.06	12.42	100
Oesophagus	17.56	16.05	6.86	42.58	9.04	7.91	100
Multiple Myeloma	12.75	27.43	6.12	32.72	12.33	8.64	100
Ovary	19.48	15.09	8.85	37.27	12.73	6.58	100
Liver	18.57	22.61	8.27	35.66	10.11	4.78	100
Gallbladder	21.10	19.40	7.08	36.70	9.83	5.90	100
Mesothelioma	25.10	14.53	10.04	33.55	14.00	2.77	100
Uterus	15.22	17.00	7.91	37.94	10.08	11.86	100
Cervix	14.90	18.43	8.84	41.16	6.82	9.85	100
Larynx	17.51	20.56	7.11	41.37	5.08	8.38	100
Tongue	18.04	17.13	9.48	40.37	5.20	9.79	100
Mouth	20.97	16.77	9.35	38.71	4.84	9.35	100

Table 3. Raw Odds Ratios from Individual Multinomial Logistic Regressions on Each Predictor Variable, 1999-2003

Place:	Home	Principal Referral Hospitals			Dedicated Palliative Care Institution			Other Public Hospitals			Private Hospitals			Nursing Homes		
		OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U
Characteristic:																
Age at death																
(change / decade)	1.00	0.95	0.94	0.97	1.19	1.15	1.22	1.12	1.10	1.14	1.28	1.25	1.31	2.92	2.82	3.03
Sex																
Male	1.00	1.00			1.00			1.00			1.00			1.00		
Female	1.00	0.94	0.89	0.99	1.05	0.98	1.13	0.91	0.87	0.96	0.95	0.89	1.01	1.39	1.30	1.48
Aboriginality																
Non-Aboriginal	1.00	1.00			1.00			1.00			1.00					
Aboriginal or TSI	1.00	0.90	0.64	1.27	0.74	0.46	1.20	1.84	1.41	2.40	0.56	0.35	0.90	0.69	0.44	1.10
Country of Birth																
Australia	1.00	1.00			1.00			1.00			1.00			1.00		
UK & Ireland	1.00	1.05	0.95	1.15	1.10	0.98	1.23	0.78	0.72	0.85	0.75	0.67	0.84	0.99	0.89	1.10
Other Western Europe	1.00	1.44	1.31	1.59	1.16	1.02	1.32	0.76	0.69	0.83	0.51	0.45	0.59	0.63	0.54	0.72
Other Europe	1.00	1.92	1.67	2.20	2.02	1.71	2.37	1.13	0.99	1.28	0.64	0.52	0.77	1.25	1.05	1.48
Mid East & Africa	1.00	1.92	1.61	2.29	1.26	0.99	1.60	0.72	0.60	0.86	0.48	0.37	0.64	0.49	0.36	0.67
South and SE Asia	1.00	2.06	1.72	2.48	1.22	0.94	1.58	1.07	0.90	1.28	0.37	0.26	0.51	0.52	0.38	0.71
East Asia	1.00	2.93	2.32	3.71	2.50	1.89	3.32	1.39	1.10	1.74	0.86	0.61	1.19	1.77	1.33	2.35
Nth & Sth America	1.00	1.51	1.13	2.02	1.62	1.15	2.30	0.83	0.63	1.09	0.79	0.54	1.14	0.70	0.46	1.06
Others incl. NZ	1.00	1.08	0.88	1.33	1.23	0.96	1.57	0.59	0.49	0.71	0.65	0.50	0.85	0.64	0.48	0.85
Unknown	1.00	0.50	0.41	0.60	0.09	0.05	0.15	0.18	0.15	0.22	0.62	0.51	0.75	1.28	1.08	1.50
Index of Relative Socioeconomic Disadvantage																
Lowest 20%	1.00	1.00			1.00			1.00			1.00			1.00		
Mid-lower 20%	1.00	0.78	0.72	0.85	1.12	0.92	1.36	0.76	0.71	0.82	2.05	1.83	2.29	0.84	0.75	0.93
Middle 20%	1.00	0.86	0.79	0.94	3.69	3.11	4.37	0.66	0.62	0.71	1.98	1.76	2.23	1.08	0.97	1.19
Mid-upper 20%	1.00	1.15	1.06	1.25	6.70	5.69	7.89	0.53	0.49	0.57	1.77	1.57	1.99	1.09	0.99	1.21
Upper 20%	1.00	0.93	0.85	1.02	11.52	9.81	13.53	0.36	0.33	0.39	3.66	3.27	4.10	1.21	1.09	1.34
Remoteness																
Major City	1.00	1.00			1.00			1.00			1.00			1.00		
Inner Regional	1.00	0.34	0.32	0.37	0.13	0.11	0.15	1.19	1.13	1.26	1.30	1.22	1.40	0.64	0.59	0.69
Outer Regional	1.00	0.11	0.10	0.13	0.03	0.02	0.05	1.81	1.69	1.93	0.68	0.61	0.75	0.77	0.70	0.85
Remote to V. Remote	1.00	0.17	0.11	0.24	0.06	0.03	0.14	2.55	2.13	3.06	0.15	0.09	0.27	0.50	0.36	0.70

Table 3. Raw Odds Ratios from Individual Multinomial Logistic Regressions on Each Predictor Variable, 1999-2003 (cont.)

Place:	Home	Principal Referral Hospitals			Dedicated Palliative Care Institution			Other Public Hospitals			Private Hospitals			Nursing Homes		
		OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U
Characteristic:																
Survival																
< 3 months	1.00	1.00			1.00			1.00			1.00			1.00		
3 to 5 months	1.00	0.58	0.53	0.64	1.27	1.12	1.44	0.79	0.73	0.86	0.80	0.72	0.90	0.70	0.63	0.79
6 to 11 months	1.00	0.54	0.49	0.59	1.24	1.10	1.39	0.77	0.71	0.82	0.70	0.63	0.77	0.58	0.52	0.64
12 to 23 months	1.00	0.50	0.46	0.55	1.24	1.10	1.39	0.72	0.67	0.77	0.72	0.65	0.80	0.58	0.52	0.65
24 to 59 months	1.00	0.55	0.50	0.60	1.24	1.11	1.40	0.74	0.69	0.80	0.83	0.76	0.92	0.68	0.61	0.75
> 60 months	1.00	0.59	0.54	0.65	1.24	1.09	1.41	0.78	0.72	0.85	0.96	0.87	1.07	1.17	1.06	1.30
AHS of Residence																
Central Sydney AHS	1.00	1.00			1.00			1.00			1.00			1.00		
South Eastern Sydney	1.00	0.64	0.57	0.72	5.70	4.90	6.63	0.26	0.23	0.30	2.11	1.71	2.60	0.74	0.64	0.86
South Western Sydney	1.00	0.63	0.55	0.72	0.19	0.14	0.24	1.81	1.61	2.05	0.96	0.75	1.22	0.87	0.74	1.01
Western Sydney AHS	1.00	0.85	0.75	0.97	0.25	0.20	0.32	1.49	1.32	1.70	1.70	1.36	2.13	0.70	0.60	0.82
Wentworth AHS	1.00	0.93	0.80	1.08	0.09	0.05	0.14	0.77	0.66	0.91	2.67	2.09	3.39	0.41	0.33	0.52
Northern Sydney AHS	1.00	0.43	0.38	0.49	1.74	1.48	2.04	0.83	0.74	0.94	6.61	5.44	8.03	0.89	0.77	1.02
Central Coast AHS	1.00	1.06	0.93	1.20	0.13	0.10	0.18	0.08	0.06	0.10	2.93	2.37	3.62	0.55	0.47	0.65
Hunter AHS	1.00	0.19	0.17	0.22	0.03	0.02	0.05	1.41	1.26	1.59	2.28	1.86	2.80	0.46	0.39	0.54
Illawarra AHS	1.00	0.26	0.23	0.30	0.07	0.05	0.11	1.17	1.03	1.32	1.62	1.30	2.02	0.30	0.25	0.36
Far West AHS	1.00	0.03	0.01	0.07	0.04	0.01	0.17	1.67	1.31	2.14	0.14	0.04	0.44	0.15	0.09	0.28
Greater Murray AHS	1.00	0.03	0.02	0.04	0.03	0.01	0.05	1.48	1.30	1.70	1.08	0.83	1.40	0.36	0.29	0.44
Maquarie AHS	1.00	0.16	0.12	0.22	0.10	0.05	0.20	1.81	1.48	2.20	1.78	1.27	2.50	1.36	1.07	1.73
Mid North Coast AHS	1.00	0.06	0.05	0.08	0.03	0.02	0.05	0.89	0.78	1.01	5.34	4.36	6.53	0.36	0.30	0.43
Mid Western AHS	1.00	0.16	0.12	0.21	0.17	0.10	0.27	2.66	2.24	3.15	2.05	1.53	2.75	0.67	0.52	0.85
New England AHS	1.00	0.11	0.08	0.15	0.07	0.03	0.14	2.88	2.42	3.42	2.67	2.01	3.54	0.82	0.65	1.04
Northern Rivers AHS	1.00	0.03	0.02	0.04	0.01	0.00	0.04	1.81	1.57	2.09	4.70	3.76	5.87	0.48	0.39	0.60
Southern AHS	1.00	0.04	0.03	0.05	0.06	0.04	0.11	1.59	1.38	1.84	0.15	0.09	0.26	0.25	0.19	0.32

Table 3. Raw Odds Ratios from Individual Multinomial Logistic Regressions on Each Predictor Variable, 1999-2003 (cont.)

Place:	Home	Principal Referral Hospitals			Dedicated Palliative Care Institution			Other Public Hospitals			Private Hospitals			Nursing Homes		
		OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U
Characteristic:																
Stage																
Localised	1.00	1.00			1.00			1.00			1.00			1.00		
Regional	1.00	0.96	0.88	1.05	1.00	0.90	1.12	0.95	0.88	1.02	1.11	1.01	1.22	0.64	0.58	0.71
Distant	1.00	1.14	1.05	1.23	1.23	1.12	1.36	1.13	1.06	1.21	1.13	1.03	1.24	0.70	0.63	0.77
Unknown	1.00	1.20	1.11	1.29	0.71	0.64	0.79	1.00	0.93	1.06	1.11	1.02	1.22	1.22	1.12	1.33
Cancer Site																
Others and unkn.	1.00	1.00			1.00			1.00			1.00			1.00		
Lung	1.00	0.93	0.85	1.03	0.95	0.83	1.08	1.09	1.00	1.19	0.96	0.85	1.08	0.73	0.64	0.82
Colon	1.00	0.63	0.55	0.71	0.94	0.80	1.09	0.89	0.80	0.98	1.15	1.00	1.32	0.92	0.80	1.06
Prostate	1.00	0.69	0.60	0.79	1.11	0.94	1.32	1.18	1.06	1.32	1.64	1.42	1.90	2.14	1.87	2.46
Breast	1.00	0.97	0.86	1.10	1.12	0.95	1.32	0.95	0.85	1.06	1.38	1.19	1.60	1.30	1.13	1.51
Rectum	1.00	0.66	0.57	0.76	1.15	0.97	1.38	0.88	0.77	0.99	1.08	0.91	1.27	0.91	0.77	1.08
Pancreas	1.00	0.63	0.54	0.73	1.06	0.89	1.27	0.88	0.78	1.00	1.05	0.89	1.24	0.50	0.42	0.61
NH Lymphoma	1.00	2.09	1.80	2.43	1.32	1.07	1.63	1.32	1.15	1.53	1.68	1.40	2.02	1.16	0.95	1.41
Leukaemia	1.00	3.05	2.61	3.56	0.83	0.64	1.07	1.20	1.03	1.40	1.59	1.31	1.94	0.93	0.75	1.16
Stomach	1.00	0.61	0.52	0.71	0.89	0.73	1.08	0.76	0.67	0.86	0.86	0.71	1.02	0.50	0.41	0.62
Melanoma	1.00	0.66	0.56	0.79	1.27	1.04	1.55	0.89	0.78	1.03	1.07	0.88	1.29	0.80	0.65	0.98
Brain	1.00	0.55	0.45	0.66	1.29	1.05	1.59	0.85	0.73	0.99	0.77	0.62	0.96	1.05	0.87	1.28
Kidney	1.00	0.67	0.55	0.80	1.02	0.81	1.28	0.88	0.76	1.02	0.92	0.75	1.14	0.69	0.55	0.87
Bladder	1.00	1.03	0.84	1.26	1.22	0.95	1.58	1.12	0.94	1.33	1.67	1.35	2.08	1.51	1.21	1.88
Oesophagus	1.00	0.84	0.69	1.03	0.95	0.73	1.23	1.13	0.96	1.33	0.98	0.77	1.24	0.81	0.63	1.04
MultipleMyeloma	1.00	1.98	1.61	2.43	1.16	0.87	1.57	1.19	0.98	1.46	1.84	1.44	2.35	1.22	0.93	1.59
Ovary	1.00	0.71	0.58	0.88	1.10	0.86	1.42	0.89	0.75	1.06	1.24	0.99	1.56	0.61	0.46	0.80
Liver	1.00	1.12	0.92	1.37	1.08	0.83	1.41	0.89	0.75	1.07	1.04	0.81	1.33	0.46	0.34	0.64
Gallbladder	1.00	0.84	0.67	1.07	0.81	0.59	1.12	0.81	0.66	0.99	0.89	0.66	1.18	0.50	0.36	0.71
Mesothelioma	1.00	0.53	0.42	0.68	0.97	0.73	1.29	0.62	0.51	0.76	1.06	0.82	1.37	0.20	0.13	0.31
Uterus	1.00	1.03	0.75	1.41	1.26	0.85	1.87	1.16	0.88	1.52	1.26	0.87	1.81	1.40	0.99	1.99
Cervix	1.00	1.14	0.80	1.62	1.44	0.94	2.21	1.29	0.95	1.74	0.87	0.55	1.38	1.19	0.79	1.80
Larynx	1.00	1.08	0.78	1.50	0.98	0.63	1.54	1.10	0.82	1.47	0.55	0.33	0.91	0.86	0.56	1.31
Tongue	1.00	0.87	0.60	1.27	1.27	0.82	1.99	1.04	0.76	1.42	0.55	0.32	0.95	0.98	0.63	1.51
Mouth	1.00	0.74	0.51	1.07	1.08	0.69	1.69	0.86	0.63	1.17	0.44	0.25	0.77	0.80	0.51	1.25

Table 4. Odds Ratios Adjusted for Other Variables in the Model Using Multinomial Logistic Regression, 1999-2003 Model

Place:	Home	Principal Referral Hospitals			Dedicated Palliative Care Institution			Other Public Hospitals			Private Hospitals			Nursing Homes		
		OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U
Characteristic:																
Age at death																
(change/decade)	1.00	0.93	0.91	0.95	1.18	1.14	1.22	1.17	1.14	1.19	1.26	1.22	1.29	2.88	2.77	2.99
Sex																
Male	1.00	1.00			1.00			1.00			1.00			1.00		
Female	1.00	0.87	0.81	0.93	0.95	0.87	1.04	0.91	0.86	0.96	0.84	0.78	0.91	1.28	1.18	1.39
Aboriginality																
Non-Aboriginal	1.00	1.00			1.00			1.00			1.00			1.00		
Aboriginal or TSI	1.00	1.38	0.95	2.01	1.92	1.09	3.39	1.37	1.04	1.80	0.81	0.50	1.32	1.49	0.92	2.42
Country of Birth																
Australia	1.00	1.00			1.00			1.00			1.00			1.00		
UK & Ireland	1.00	0.89	0.80	0.98	1.00	0.88	1.14	0.85	0.79	0.93	0.67	0.60	0.75	0.87	0.78	0.98
Other Western Europe	1.00	1.08	0.97	1.20	0.70	0.60	0.81	0.79	0.72	0.87	0.62	0.54	0.72	0.63	0.54	0.73
Other Europe	1.00	1.42	1.23	1.64	1.08	0.90	1.30	1.16	1.02	1.33	0.76	0.62	0.93	1.03	0.86	1.23
Mid East & Africa	1.00	1.11	0.93	1.34	0.58	0.45	0.75	0.79	0.65	0.95	0.58	0.43	0.77	0.50	0.36	0.68
South and SE Asia	1.00	1.24	1.02	1.50	0.96	0.72	1.27	1.03	0.86	1.24	0.52	0.37	0.73	0.59	0.42	0.82
East Asia	1.00	1.82	1.43	2.32	1.16	0.86	1.56	1.63	1.28	2.06	0.90	0.64	1.26	1.51	1.11	2.05
Nth & Sth America	1.00	1.08	0.80	1.46	0.98	0.67	1.45	0.91	0.69	1.21	0.75	0.51	1.11	0.76	0.48	1.19
Others incl. NZ	1.00	0.79	0.63	0.98	0.80	0.60	1.05	0.69	0.56	0.84	0.66	0.50	0.86	0.80	0.59	1.09
Unknown	1.00	0.34	0.28	0.41	0.10	0.06	0.18	0.16	0.13	0.19	0.48	0.39	0.59	0.84	0.70	1.02
Index of Relative Socioeconomic Disadvantage																
Lowest 20%	1.00	1.00			1.00			1.00			1.00			1.00		
Mid-lower 20%	1.00	1.07	0.97	1.18	1.07	0.85	1.33	0.85	0.79	0.91	1.68	1.50	1.90	0.92	0.82	1.03
Middle 20%	1.00	1.00	0.91	1.11	1.06	0.87	1.30	0.68	0.62	0.73	2.08	1.83	2.36	1.09	0.96	1.22
Mid-upper 20%	1.00	0.86	0.78	0.95	1.03	0.85	1.25	0.67	0.61	0.72	2.07	1.81	2.36	0.84	0.74	0.95
Upper 20%	1.00	0.59	0.52	0.66	0.83	0.68	1.01	0.45	0.40	0.50	3.07	2.63	3.59	0.66	0.57	0.77
Remoteness																
Major City	1.00	1.00			1.00			1.00			1.00			1.00		
Inner Regional	1.00	0.66	0.60	0.72	1.15	0.95	1.39	1.06	0.98	1.15	1.23	1.11	1.37	1.03	0.92	1.16
Outer Regional	1.00	0.65	0.52	0.83	0.95	0.54	1.67	1.46	1.29	1.64	0.50	0.42	0.60	1.10	0.90	1.33
Remote to V. Remote	1.00	1.28	0.76	2.15	1.82	0.57	5.83	2.10	1.56	2.83	0.37	0.19	0.74	0.80	0.49	1.31

Table 4. Odds Ratios Adjusted for Other Variables in the Model Using Multinomial Logistic Regression, 1999-2003 Model (cont.)

Place:	Home	Principal Referral Hospitals			Dedicated Palliative Care Institution			Other Public Hospitals			Private Hospitals			Nursing Homes		
		OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U
Characteristic:																
Survival																
< 3 months	1.00	1.00			1.00			1.00			1.00			1.00		
3 to 5 months	1.00	0.50	0.45	0.56	1.20	1.04	1.39	0.78	0.72	0.85	0.84	0.75	0.95	1.04	0.92	1.17
6 to 11 months	1.00	0.44	0.40	0.49	1.25	1.09	1.43	0.79	0.73	0.85	0.75	0.67	0.84	0.97	0.86	1.09
12 to 23 months	1.00	0.39	0.35	0.43	1.28	1.11	1.46	0.74	0.68	0.81	0.76	0.68	0.85	0.95	0.84	1.07
24 to 59 months	1.00	0.41	0.37	0.45	1.19	1.03	1.38	0.76	0.70	0.83	0.80	0.71	0.90	0.96	0.84	1.08
> 60 months	1.00	0.42	0.37	0.47	1.04	0.88	1.22	0.75	0.68	0.82	0.84	0.74	0.96	1.14	1.00	1.29
AHS of Residence																
Central Sydney AHS	1.00	1.00			1.00			1.00			1.00			1.00		
South Eastern Sydney	1.00	0.73	0.64	0.82	5.76	4.91	6.74	0.31	0.27	0.36	1.54	1.24	1.90	0.70	0.59	0.82
South Western Sydney	1.00	0.62	0.54	0.71	0.17	0.13	0.23	1.56	1.37	1.78	1.19	0.93	1.52	1.02	0.86	1.21
Western Sydney AHS	1.00	0.85	0.74	0.97	0.26	0.20	0.33	1.50	1.32	1.71	1.73	1.37	2.17	0.77	0.65	0.92
Wentworth AHS	1.00	1.12	0.96	1.32	0.08	0.05	0.14	0.85	0.72	1.00	2.36	1.84	3.03	0.44	0.35	0.56
Northern Sydney AHS	1.00	0.61	0.53	0.71	1.86	1.56	2.22	1.17	1.02	1.34	4.17	3.38	5.14	0.94	0.79	1.12
Central Coast AHS	1.00	1.17	1.02	1.35	0.11	0.08	0.15	0.07	0.05	0.08	2.80	2.24	3.51	0.46	0.38	0.56
Hunter AHS	1.00	0.19	0.17	0.23	0.02	0.01	0.04	1.15	1.01	1.30	2.29	1.85	2.84	0.37	0.31	0.44
Illawarra AHS	1.00	0.30	0.25	0.35	0.06	0.04	0.09	1.02	0.89	1.17	1.53	1.21	1.93	0.28	0.23	0.34
Far West AHS	1.00	0.02	0.01	0.05	0.02	0.00	0.13	0.56	0.39	0.82	0.58	0.16	2.12	0.17	0.08	0.35
Greater Murray AHS	1.00	0.03	0.02	0.05	0.02	0.01	0.05	1.06	0.89	1.25	1.13	0.84	1.52	0.27	0.21	0.35
Macquarie AHS	1.00	0.17	0.11	0.26	0.08	0.03	0.21	0.95	0.75	1.21	3.97	2.67	5.90	1.32	0.95	1.84
Mid North Coast AHS	1.00	0.08	0.06	0.11	0.03	0.01	0.05	0.55	0.46	0.65	7.39	5.77	9.48	0.27	0.21	0.35
Mid Western AHS	1.00	0.20	0.15	0.27	0.14	0.08	0.24	1.89	1.55	2.30	2.13	1.54	2.94	0.54	0.40	0.72
New England AHS	1.00	0.13	0.09	0.19	0.06	0.02	0.15	1.60	1.29	1.98	5.48	3.92	7.68	0.71	0.52	0.98
Northern Rivers AHS	1.00	0.03	0.02	0.05	0.01	0.00	0.04	1.29	1.09	1.52	5.20	4.04	6.69	0.39	0.30	0.50
Southern AHS	1.00	0.05	0.03	0.07	0.05	0.03	0.10	1.14	0.95	1.36	0.17	0.09	0.30	0.20	0.15	0.27

Table 4. Odds Ratios Adjusted for Other Variables in the Model Using Multinomial Logistic Regression, 1999-2003 Model (cont.)

Place:	Home	Principal Referral Hospitals			Dedicated Palliative Care Institution			Other Public Hospitals			Private Hospitals			Nursing Homes		
		OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U
Characteristic:																
Stage																
Localised	1.00	1.00			1.00			1.00			1.00			1.00		
Regional	1.00	1.07	0.98	1.18	1.22	1.08	1.39	1.02	0.94	1.10	1.27	1.14	1.41	0.88	0.78	0.98
Distant	1.00	1.00	0.92	1.10	1.67	1.47	1.89	1.14	1.06	1.23	1.31	1.18	1.46	0.99	0.89	1.12
Unknown	1.00	0.88	0.81	0.97	0.88	0.78	1.00	0.88	0.82	0.95	0.96	0.87	1.06	1.17	1.06	1.29
Cancer Site																
Others and unkn.	1.00	1.00			1.00			1.00			1.00			1.00		
Lung	1.00	0.97	0.88	1.08	1.04	0.89	1.20	1.10	1.01	1.20	1.03	0.91	1.17	0.93	0.81	1.06
Colon	1.00	0.74	0.65	0.85	0.83	0.70	1.00	0.89	0.80	1.00	1.06	0.92	1.22	0.86	0.74	1.00
Prostate	1.00	1.04	0.89	1.22	1.25	1.02	1.53	1.17	1.04	1.33	1.47	1.25	1.73	1.57	1.34	1.85
Breast	1.00	1.30	1.13	1.51	1.20	0.98	1.47	1.21	1.07	1.37	1.79	1.52	2.12	1.58	1.33	1.87
Rectum	1.00	0.82	0.70	0.96	1.09	0.88	1.34	0.92	0.81	1.05	1.12	0.94	1.33	1.09	0.90	1.31
Pancreas	1.00	0.62	0.53	0.73	1.06	0.86	1.30	0.88	0.77	0.99	1.08	0.91	1.28	0.47	0.39	0.58
NH Lymphoma	1.00	3.02	2.55	3.58	1.64	1.28	2.09	1.57	1.35	1.83	1.98	1.62	2.42	1.01	0.82	1.25
Leukaemia	1.00	4.00	3.37	4.76	1.10	0.83	1.47	1.44	1.22	1.70	1.84	1.48	2.27	0.86	0.68	1.10
Stomach	1.00	0.62	0.53	0.74	0.85	0.68	1.06	0.75	0.65	0.86	0.93	0.77	1.12	0.49	0.39	0.61
Melanoma	1.00	0.89	0.73	1.07	1.52	1.20	1.93	1.04	0.89	1.21	1.12	0.92	1.38	1.03	0.82	1.29
Brain	1.00	0.55	0.45	0.68	2.03	1.58	2.61	1.11	0.95	1.31	1.17	0.93	1.48	2.74	2.19	3.43
Kidney	1.00	0.81	0.66	0.98	1.04	0.80	1.35	0.91	0.78	1.06	0.93	0.75	1.16	0.75	0.59	0.96
Bladder	1.00	1.30	1.05	1.60	1.31	0.98	1.74	1.12	0.93	1.34	1.60	1.27	2.01	1.10	0.87	1.39
Oesophagus	1.00	1.03	0.83	1.27	0.95	0.70	1.28	1.12	0.94	1.33	1.00	0.78	1.28	0.78	0.60	1.02
MultipleMyeloma	1.00	2.96	2.37	3.70	1.35	0.97	1.89	1.44	1.17	1.78	2.09	1.61	2.70	0.99	0.75	1.32
Ovary	1.00	0.88	0.71	1.10	0.90	0.67	1.20	0.98	0.82	1.18	1.34	1.06	1.70	0.63	0.47	0.85
Liver	1.00	0.89	0.72	1.10	1.12	0.83	1.53	0.93	0.77	1.13	1.27	0.97	1.65	0.52	0.37	0.73
Gallbladder	1.00	0.89	0.69	1.14	0.72	0.50	1.04	0.82	0.66	1.01	0.90	0.67	1.21	0.42	0.29	0.60
Mesothelioma	1.00	0.56	0.43	0.73	1.17	0.83	1.63	0.71	0.57	0.87	1.17	0.89	1.53	0.26	0.16	0.42
Uterus	1.00	1.33	0.95	1.86	1.30	0.83	2.04	1.27	0.96	1.68	1.46	1.00	2.14	1.26	0.87	1.82
Cervix	1.00	1.43	0.99	2.07	1.73	1.06	2.82	1.52	1.11	2.09	1.30	0.80	2.10	1.76	1.12	2.76
Larynx	1.00	1.29	0.91	1.83	0.96	0.58	1.60	1.08	0.80	1.45	0.66	0.39	1.11	1.13	0.72	1.77
Tongue	1.00	1.12	0.75	1.66	1.16	0.70	1.93	1.22	0.88	1.69	0.65	0.37	1.13	1.67	1.04	2.67
Mouth	1.00	1.05	0.70	1.55	1.41	0.83	2.38	0.87	0.63	1.20	0.52	0.29	0.93	0.99	0.62	1.59

Table 5. Frequencies of Deaths by Place of Death, New South Wales 1989-2003

Place:	Metropolitan Public Hospitals	Metropolitan Private Hospitals	Country Hospitals	Dedicated Palliative Care Institutions	Nursing Homes	Private Residence (Home)	Total
Characteristic:							
Age at death							
Under 60	15,394	1,557	4,931	2,744	453	7,188	32,267
60-69	17,743	2,178	7,267	3,782	1,289	7,667	39,926
70-79	23,236	3,790	10,138	5,964	4,127	8,846	56,101
80+	13,567	3,038	6,859	4,145	9,080	5,114	41,803
All Ages	69,940	10,563	29,195	16,635	14,949	28,815	170,097
Sex							
Male	40,535	5,737	17,466	8,942	7,115	16,506	96,301
Female	29,405	4,826	11,729	7,693	7,834	12,309	73,796
Both sexes	69,940	10,563	29,195	16,635	14,949	28,815	170,097
Aboriginality							
Non-Aboriginal	69,759	10,549	28,902	16,607	14,916	28,720	169,453
Aboriginal/Torres Strait Islander	181	14	293	28	33	95	644
Both Groups	69,940	10,563	29,195	16,635	14,949	28,815	170,097
Country of birth							
Australia	46,081	7,984	25,478	11,372	10,923	20,365	122,203
United Kingdom/ Ireland	7,615	970	1,948	1,827	1,782	3,151	17,293
Southern Europe	5,649	344	435	1,047	488	1,600	9,563
Other	10,595	1,265	1,334	2,389	1,756	3,699	21,038
All Countries	69,940	10,563	29,195	16,635	14,949	28,815	170,097
Residence at Diagnosis							
Greater Sydney low SES	17,810	1,038	199	1,333	2,328	4,385	27,093
Greater Sydney mid SES	38,495	4,574	695	7,946	6,456	11,568	69,734
Greater Sydney high SES	11,617	4,715	246	7,092	3,232	5,355	32,257
Country NSW	2,018	236	28,055	264	2,933	7,507	41,013
All Areas	69,940	10,563	29,195	16,635	14,949	28,815	170,097

Table 5. Frequencies of Deaths by Place of Death, New South Wales 1989-2003 (cont.)

Place:	Metropolitan Public Hospitals	Metropolitan Private Hospitals	Country Hospitals	Dedicated Palliative Care Institutions	Nursing Homes	Private Residence (Home)	Total
Characteristic:							
Survival from diagnosis (months)							
<3	18,438	2,424	7,393	2,888	3,428	5,364	39,935
3-5	9,287	1,372	3,945	2,458	1,894	4,100	23,056
6-8	6,363	942	2,744	1,718	1,250	2,977	15,994
9-11	4,907	668	2,036	1,284	828	2,271	11,994
12+	30,945	5,157	13,077	8,287	7,549	14,103	79,118
All Survival Times	69,940	10,563	29,195	16,635	14,949	28,815	170,097
Year of death							
1989-1993	22,550	2,730	8,965	6,147	4,486	8,434	53,312
1994-1998	22,852	3,439	9,664	5,918	4,927	9,751	56,551
1999-2003	24,538	4,394	10,566	4,570	5,536	10,630	60,234
All Years	69,940	10,563	29,195	16,635	14,949	28,815	170,097
Cancer Site							
Others and unknown	9,036	1,193	3,689	2,069	1,922	3,508	21,417
Lung	14,149	1,602	5,762	2,901	2,097	5,566	32,077
Colon	5,264	1,126	2,548	1,489	1,400	2,861	14,688
Prostate	4,111	927	2,520	1,166	2,083	1,707	12,514
Breast	5,063	966	1,973	1,296	1,495	2,046	12,839
Rectum	2,965	524	1,436	938	726	1,561	8,150
Pancreas	2,966	528	1,361	837	490	1,487	7,669
Non-Hodgkin's Lymphoma	3,629	480	1,146	621	487	924	7,287
Leukaemia	3,574	381	925	299	393	734	6,306
Stomach	2,639	375	1,084	699	431	1,458	6,686
Melanoma	1,902	304	950	645	421	1,001	5,223
Brain	1,711	257	712	667	566	800	4,713
Kidney	1,643	290	767	459	329	778	4,266
Cancer Site							
Bladder	1,585	297	682	384	503	549	4,000
Oesophagus	1,486	200	706	320	250	598	3,560
MultipleMyeloma	1,448	222	514	216	285	355	3,040
Ovary	1,403	254	553	365	208	595	3,378
Liver	1,204	133	307	214	100	420	2,378
Gallbladder	949	118	338	201	125	438	2,169

Table 5. Frequencies of Deaths by Place of Death, New South Wales 1989-2003 (cont.)

Place:	Metropolitan Public Hospitals	Metropolitan Private Hospitals	Country Hospitals	Dedicated Palliative Care Institutions	Nursing Homes	Private Residence (Home)	Total
Characteristic:							
Cancer Site							
Mesothelioma	773	154	221	222	51	473	1,894
Uterus	559	78	196	160	186	203	1,382
Cervix	637	50	273	142	137	242	1,481
Larynx	529	39	208	107	92	193	1,168
Tongue	347	36	170	106	89	153	901
Mouth	368	29	154	112	83	165	911
All Sites	69,940	10,563	29,195	16,635	14,949	28,815	170,097

Table 6. Odds Ratios Adjusted for Other Variables in the Model Using Multinomial Logistic Regression, 1989-2003 Model

Place:	Metro-politan Public Hospitals	Metropolitan Private Hospitals			Country Hospitals			Dedicated Palliative Care Institutions			Nursing Homes			Private Residence (Home)		
		OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U
Characteristic:																
Age at death																
Under 60	1.00	1.00			1.00			1.00			1.00			1.00		
60-69	1.00	1.32	1.23	1.42	1.27	1.18	1.36	1.30	1.23	1.38	2.86	2.56	3.20	0.94	0.90	0.98
70-79	1.00	1.67	1.57	1.79	1.51	1.41	1.61	1.66	1.57	1.75	7.32	6.62	8.10	0.86	0.82	0.89
80+	1.00	2.07	1.93	2.22	2.01	1.86	2.16	1.96	1.85	2.08	27.9	25.2	30.8	0.89	0.85	0.93
Sex																
Male	1.00	1.00			1.00			1.00			1.00			1.00		
Female	1.00	1.06	1.01	1.11	1.02	0.97	1.07	1.16	1.11	1.21	1.55	1.48	1.62	1.07	1.03	1.11
Aboriginality																
Non-Aboriginal	1.00	1.00			1.00			1.00			1.00			1.00		
Aboriginal/Torres Strait Islander	1.00	0.63	0.36	1.09	1.38	1.02	1.88	1.13	0.75	1.71	1.13	0.76	1.69	0.81	0.61	1.08
Country of birth																
Australia	1.00	1.00			1.00			1.00			1.00			1.00		
UK/ Ireland	1.00	0.70	0.65	0.75	0.85	0.78	0.92	0.92	0.87	0.98	0.96	0.90	1.02	1.09	1.04	1.15
Southern Europe	1.00	0.43	0.38	0.48	0.53	0.45	0.61	0.94	0.87	1.01	0.58	0.53	0.65	0.82	0.78	0.88
Other	1.00	0.70	0.66	0.75	0.61	0.56	0.66	0.98	0.93	1.03	0.93	0.87	0.98	0.97	0.92	1.01

Table 6. Odds Ratios Adjusted for Other Variables in the Model Using Multinomial Logistic Regression, 1989-2003 Model (cont.)

Place:	Metro-politan Public Hospitals	Metropolitan Private Hospitals			Country Hospitals			Dedicated Palliative Care Institutions			Nursing Homes			Private Residence (Home)		
		OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U
Characteristic:																
Residence at Diagnosis																
Greater Sydney low SES	1.00	1.00			1.00			1.00			1.00			1.00		
Greater Sydney mid SES	1.00	1.96	1.82	2.10	1.58	1.35	1.85	2.79	2.62	2.96	1.21	1.15	1.28	1.22	1.17	1.26
Greater Sydney high SES	1.00	6.47	6.02	6.95	1.83	1.51	2.21	8.14	7.63	8.67	1.80	1.69	1.92	1.86	1.78	1.95
Country NSW	1.00	1.86	1.60	2.16	1190	1027	1379	1.86	1.61	2.14	11.4	10.6	12.3	15.5	14.6	16.4
Survival from diagnosis (months)																
<3	1.00	1.00			1.00			1.00			1.00			1.00		
3-5	1.00	1.22	1.14	1.32	1.26	1.17	1.36	1.78	1.67	1.89	1.51	1.41	1.61	1.54	1.47	1.62
6-8	1.00	1.25	1.15	1.36	1.33	1.23	1.45	1.89	1.76	2.02	1.59	1.47	1.72	1.65	1.56	1.75
9-11	1.00	1.12	1.02	1.23	1.27	1.15	1.39	1.82	1.68	1.96	1.43	1.31	1.56	1.61	1.51	1.71
12+	1.00	1.23	1.16	1.31	1.37	1.29	1.46	1.85	1.75	1.94	1.72	1.63	1.81	1.71	1.64	1.78
Year of death																
1989-1993	1.00	1.00			1.00			1.00			1.00			1.00		
1994-1998	1.00	1.21	1.15	1.28	0.99	0.94	1.05	0.92	0.89	0.96	0.98	0.93	1.02	1.13	1.09	1.18
1999-2003	1.00	1.43	1.36	1.51	0.93	0.88	0.99	0.65	0.62	0.68	0.92	0.88	0.96	1.14	1.10	1.18
Cancer Site																
Others and unkn.	1.00	1.00			1.00			1.00			1.00			1.00		
Lung	1.00	0.91	0.84	0.99	1.03	0.95	1.12	0.90	0.84	0.96	0.86	0.80	0.93	0.99	0.94	1.05
Colon	1.00	1.40	1.28	1.54	1.19	1.08	1.31	0.99	0.91	1.07	1.01	0.93	1.09	1.26	1.19	1.35
Prostate	1.00	1.35	1.22	1.50	1.15	1.04	1.29	0.92	0.84	1.01	1.61	1.48	1.76	0.92	0.85	1.00
Breast	1.00	1.32	1.19	1.46	1.06	0.95	1.18	0.84	0.77	0.91	1.27	1.16	1.39	0.82	0.76	0.88
Rectum	1.00	1.25	1.12	1.40	1.16	1.03	1.31	1.17	1.07	1.28	1.07	0.97	1.19	1.18	1.10	1.28
Pancreas	1.00	1.30	1.16	1.45	1.20	1.06	1.35	1.17	1.06	1.28	0.73	0.66	0.82	1.34	1.24	1.45
N-H's Lymphoma	1.00	0.85	0.75	0.95	0.66	0.58	0.75	0.59	0.53	0.65	0.52	0.46	0.58	0.55	0.51	0.60
Leukaemia	1.00	0.71	0.63	0.80	0.48	0.42	0.55	0.31	0.27	0.35	0.45	0.40	0.51	0.45	0.41	0.49
Stomach	1.00	1.12	0.99	1.27	1.19	1.05	1.36	1.07	0.97	1.18	0.73	0.65	0.82	1.43	1.32	1.55
Melanoma	1.00	1.03	0.89	1.19	1.14	0.99	1.31	1.20	1.08	1.34	1.06	0.93	1.20	1.09	0.99	1.19
Brain	1.00	1.25	1.08	1.45	1.12	0.97	1.30	1.76	1.58	1.96	3.20	2.85	3.60	1.08	0.98	1.19
Kidney	1.00	1.25	1.08	1.44	1.12	0.96	1.30	1.07	0.95	1.21	0.89	0.77	1.02	1.11	1.00	1.22
Bladder	1.00	1.22	1.06	1.41	1.00	0.85	1.17	0.82	0.73	0.94	0.99	0.88	1.12	0.82	0.74	0.92
Oesophagus	1.00	0.92	0.78	1.08	0.94	0.80	1.11	0.82	0.72	0.94	0.66	0.57	0.77	0.92	0.82	1.03

Table 6. Odds Ratios Adjusted for Other Variables in the Model Using Multinomial Logistic Regression, 1989-2003 Model (cont.)

Place:	Metro-politan Public Hospitals	Metropolitan Private Hospitals			Country Hospitals			Dedicated Palliative Care Institutions			Nursing Homes			Private Residence (Home)		
		OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U	OR	CI95L	CI95U
Characteristic:																
Cancer Site																
MultipleMyeloma	1.00	0.95	0.81	1.12	0.74	0.62	0.88	0.50	0.43	0.58	0.71	0.61	0.82	0.53	0.47	0.61
Ovary	1.00	1.18	1.01	1.38	0.94	0.79	1.12	0.86	0.75	0.98	0.57	0.49	0.68	0.90	0.80	1.00
Liver	1.00	0.97	0.80	1.18	0.99	0.80	1.23	0.93	0.79	1.09	0.61	0.49	0.76	1.03	0.91	1.16
Gallbladder	1.00	0.90	0.73	1.11	1.00	0.81	1.23	0.83	0.71	0.98	0.53	0.44	0.65	1.20	1.06	1.37
Mesothelioma	1.00	1.44	1.20	1.74	0.95	0.75	1.20	1.15	0.98	1.36	0.41	0.30	0.55	1.55	1.36	1.76
Uterus	1.00	0.93	0.72	1.19	0.72	0.56	0.93	0.94	0.78	1.14	1.04	0.86	1.26	0.77	0.64	0.91
Cervix	1.00	0.67	0.50	0.90	1.18	0.92	1.51	0.86	0.71	1.05	1.13	0.91	1.39	0.82	0.69	0.96
Larynx	1.00	0.58	0.41	0.81	0.79	0.61	1.03	0.83	0.67	1.04	1.02	0.80	1.30	0.80	0.66	0.95
Tongue	1.00	0.81	0.57	1.16	1.18	0.87	1.60	1.28	1.02	1.61	1.60	1.24	2.08	0.97	0.79	1.19
Mouth	1.00	0.60	0.41	0.89	0.92	0.68	1.25	1.21	0.97	1.52	1.10	0.84	1.42	0.98	0.80	1.20

Table 7: Area Health Service of Residence at Diagnosis versus Area Health Service of Death 1999-2003 (Excluding Home Deaths)

AHS of Residence at Diagnosis	Area Health Service of the Institution of Patient Death																		
	CSAHS	SESAHS	SWSAHS	WSAHS	WAHS	NSAHS	CCAHS	HAHS	IAHS	FWAHS	GMAHS	MAHS	MNCAHS	MWAHS	NEAHS	NRAHS	SAHS	CHW	Total
CSAHS	2601	535	148	127	20	137	27	14	13	0	6	5	9	6	3	8	6	8	3673
SESAHS	210	5488	81	46	20	96	31	27	35	3	18	7	22	9	2	21	14	1	6131
SWSAHS	196	197	3693	561	63	57	30	21	34	0	4	3	21	11	3	10	13	13	4930
WSAHS	162	44	114	3392	146	356	30	14	17	0	5	4	14	5	3	9	3	25	4343
WAHS	13	21	22	199	1421	20	13	8	7	0	2	0	11	8	2	3	3	9	1762
NSAHS	254	198	23	178	34	5163	60	28	11	0	6	3	27	9	7	14	6	9	6030
CCAHS	38	47	28	38	15	126	2482	48	12	0	1	3	16	6	4	9	1	6	2880
HAHS	11	30	7	20	7	42	84	4461	8	0	11	8	17	6	21	14	1	0	4748
IAHS	45	102	29	31	13	17	11	9	2634	1	6	1	6	2	3	6	11	0	2927
FWAHS	3	4	0	2	0	3	0	4	0	287	2	13	2	4	3	1	0	0	328
GMAHS	7	32	9	9	1	13	2	7	4	2	1699	7	2	42	3	2	6	0	1847
MAHS	33	24	5	7	9	10	1	9	4	1	5	727	6	17	4	1	1	0	864
MNCAHS	22	36	17	23	9	77	20	109	12	0	1	6	2327	3	14	25	4	2	2707
MWAHS	18	58	6	23	16	12	10	10	5	0	24	18	3	1254	1	3	7	1	1469
NEAHS	11	28	2	5	4	22	8	23	2	1	1	4	22	5	1329	15	0	1	1483
NRAHS	11	18	11	4	6	14	8	8	4	0	4	1	35	3	9	1964	2	1	2103
SAHS	17	22	14	11	1	15	3	9	17	0	18	0	3	10	1	2	1234	2	1379
Total	3652	6884	4209	4676	1785	6180	2820	4809	2819	295	1813	810	2543	1400	1412	2107	1312	78	49604
Excluding = 10630 (Home deaths)																		Total deaths in institution in the same area health service of residence:	42156

Table 8: Area Health Service of Residence at Diagnosis versus Area Health Service of Death 1999-2003 (Row Percentages)

AHS of Residence at Diagnosis	Area Health Service of the Institution of Patient Death								% of all deaths diagnosed in each AHS					
	CSAHS	SESAHS	SWSAHS	WSAHS	WAHS	NSAHS	CCAHS	HAHS	IAHS	FWAHS	GMAHS	MAHS	MNCAHS	MWAHS
CSAHS	70.81	14.57	4.03	3.46	0.54	3.73	0.74	0.38	0.35	0.00	0.16	0.14	0.25	0.16
SESAHS	3.43	89.51	1.32	0.75	0.33	1.57	0.51	0.44	0.57	0.05	0.29	0.11	0.36	0.15
SWSAHS	3.98	4.00	74.91	11.38	1.28	1.16	0.61	0.43	0.69	0.00	0.08	0.06	0.43	0.22
WSAHS	3.73	1.01	2.62	78.10	3.36	8.20	0.69	0.32	0.39	0.00	0.12	0.09	0.32	0.12
WAHS	0.74	1.19	1.25	11.29	80.65	1.14	0.74	0.45	0.40	0.00	0.11	0.00	0.62	0.45
NSAHS	4.21	3.28	0.38	2.95	0.56	85.62	1.00	0.46	0.18	0.00	0.10	0.05	0.45	0.15
CCAHS	1.32	1.63	0.97	1.32	0.52	4.38	86.18	1.67	0.42	0.00	0.03	0.10	0.56	0.21
HAHS	0.23	0.63	0.15	0.42	0.15	0.88	1.77	93.96	0.17	0.00	0.23	0.17	0.36	0.13
IAHS	1.54	3.48	0.99	1.06	0.44	0.58	0.38	0.31	89.99	0.03	0.20	0.03	0.20	0.07
FWAHS	0.91	1.22	0.00	0.61	0.00	0.91	0.00	1.22	0.00	87.50	0.61	3.96	0.61	1.22
GMAHS	0.38	1.73	0.49	0.49	0.05	0.70	0.11	0.38	0.22	0.11	91.99	0.38	0.11	2.27
MAHS	3.82	2.78	0.58	0.81	1.04	1.16	0.12	1.04	0.46	0.12	0.58	84.14	0.69	1.97
MNCAHS	0.81	1.33	0.63	0.85	0.33	2.84	0.74	4.03	0.44	0.00	0.04	0.22	85.96	0.11
MWAHS	1.23	3.95	0.41	1.57	1.09	0.82	0.68	0.68	0.34	0.00	1.63	1.23	0.20	85.36
NEAHS	0.74	1.89	0.13	0.34	0.27	1.48	0.54	1.55	0.13	0.07	0.07	0.27	1.48	0.34
NRAHS	0.52	0.86	0.52	0.19	0.29	0.67	0.38	0.38	0.19	0.00	0.19	0.05	1.66	0.14
SAHS	1.23	1.60	1.02	0.80	0.07	1.09	0.22	0.65	1.23	0.00	1.31	0.00	0.22	0.73
Total	7.36%	13.88%	8.49%	9.43%	3.60%	12.46%	5.69%	9.69%	5.68%	0.59%	3.65%	1.63%	5.13%	2.82%
Frequency Missing = 10630 (Home deaths)									mean of all institutionalised patients: 84.99%					

Table 9: Number of Predicted Cancer Deaths Using the Fitted Multinomial Logistic Model (1999-2003)

Place	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Total	10630	10626	4570	22596	6276	5536	60234
Characteristic							
Aged at death							
less than 60	2418.6	2664.9	787.1	3992.4	882.1	115.0	10860
60 to 69	2433.8	2352.3	893.2	5009.8	1185.2	404.7	12279
70 to 79	3478.6	3390.3	1553.1	7908.7	2241.2	1593.0	20165
more than 80	2299.0	2218.5	1336.6	5685.1	1967.5	3423.3	16930
Sex							
Male	5946	6106	2498	13145	3596	2645	33936
Female	4684	4520	2072	9451	2680	2891	26298
Aboriginality							
Non-Aboriginal	10561	10564	4548	22327	6253	5511	59764
Aboriginal or Torres Strait Islander	69	62	22	269	23	25	470
Country of Birth							
Australia	7286	6567	2971	16723	4869	3917	42333
UK & Republic of Ireland	1086	1023	485	1952	545	577	5668
Western Europe excl. British Isles	797	1038	376	1382	274	268	4135
Other Europe	344	594	283	892	146	231	2490
Middle East and Africa	204	353	105	336	66	54	1118
South and SE Asia	179	333	89	440	44	50	1135
East Asia	98	259	100	312	56	93	918
North and South America	80	109	53	152	42	30	466
Others incl. New Zealand	190	185	95	258	83	65	876
Unknown	366	165	13	149	151	251	1095

Table 9: Number of Predicted Cancer Deaths Using the Fitted Multinomial Logistic Model (1999-2003) (cont.)

Place	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Characteristic							
Index of Relative Socioeconomic Disadvantage							
Lowest 20% (most disadvantaged)	2026	2161	192	6424	578	1024	12405
Mid-lower 20%	2547	2124	270	6155	1490	1076	13662
Middle 20%	2107	1935	736	4428	1191	1145	11542
Mid-upper 20%	2058	2530	1306	3447	1040	1138	11519
Upper 20% (least disadvantaged)	1892	1876	2066	2142	1977	1153	11106
Remoteness of residence:							
Major City	6275	9017	4290	11261	3629	3765	38237
Inner Regional	2711	1334	239	5809	2046	1036	13175
Outer Regional	1497	240	35	4853	588	691	7904
Remote to Very Remote	147	35	6	673	13	44	918
Survival from Diagnosis							
less than 3 months	2067	3247	742	5469	1462	1390	14377
3 to 5 months	1389	1273	635	2917	790	657	7661
6 to 11 months	1879	1586	836	3804	927	729	9761
12 to 23 months	1963	1555	871	3723	1000	767	9879
24 to 59 months	1915	1654	855	3761	1130	874	10189
more than 60 months	1417	1311	631	2922	967	1119	8367
Area Health Service of Residence							
South Eastern Sydney AHS	656	1443	322	1201	146	561	4329
Central Sydney AHS	1058	1491	2961	512	496	671	7189
South Western Sydney AHS	857	1188	78	2847	183	634	5787
Western Sydney AHS	761	1423	94	2082	288	456	5104
Wentworth AHS	396	810	17	560	235	140	2158

Table 9: Number of Predicted Cancer Deaths Using the Fitted Multinomial Logistic Model (1999-2003) (cont.)

Place	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Characteristic							
Area Health Service of Residence							
Northern Sydney AHS	1087	1023	928	1657	1599	823	7117
Central Coast AHS	786	1830	51	115	513	371	3666
Hunter AHS	1208	516	17	3126	613	476	5956
Illawarra AHS	871	498	31	1860	314	224	3798
Far West AHS	99	7	2	303	3	13	427
Greater Murray AHS	554	32	7	1506	133	169	2401
Maquarie AHS	164	58	8	542	65	191	1028
Mid North Coast AHS	829	114	12	1344	985	252	3536
Mid Western AHS	232	82	19	1130	106	132	1701
New England AHS	217	51	7	1143	129	153	1700
Northern Rivers AHS	434	26	3	1440	454	180	2537
Southern AHS	421	34	13	1228	14	90	1800
Disease Stage at Diagnosis							
Localised	2263	2080	997	4700	1223	1298	12561
Regional	2323	2052	1028	4578	1390	858	12229
Distant	2842	2975	1542	6699	1740	1134	16932
Unknown	3202	3519	1003	6619	1923	2246	18512
Cancer Site							
Others and unknown	1329	1446	548	2856	699	739	7617
Lung	1968	1998	770	4615	995	797	11143
Colon	995	678	384	1899	602	508	5066
Prostate	657	494	302	1666	568	783	4470
Breast	710	751	327	1450	515	515	4268
Rectum	553	395	263	1040	313	281	2845
Pancreas	577	394	253	1097	319	162	2802
Non-Hodgkin's Lymphoma	318	723	173	904	281	205	2604
Leukaemia	272	902	93	703	228	141	2339

Table 9: Number of Predicted Cancer Deaths Using the Fitted Multinomial Logistic Model (1999-2003) (cont.)

Place	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Characteristic							
Cancer Site							
Stomach	507	334	186	824	228	142	2221
Melanoma	376	271	197	722	211	167	1944
Brain	343	204	183	627	139	201	1697
Kidney	317	230	133	599	154	122	1555
Bladder	210	235	106	505	185	176	1417
Oesophagus	233	213	91	565	120	105	1327
MultipleMyeloma	152	327	73	390	147	103	1192
Ovary	231	179	105	442	151	78	1186
Liver	202	246	90	388	110	52	1088
Gallbladder	161	148	54	280	75	45	763
Mesothelioma	190	110	76	254	106	21	757
Uterus	77	86	40	192	51	60	506
Cervix	59	73	35	163	27	39	396
Larynx	69	81	28	163	20	33	394
Tongue	59	56	31	132	17	32	327
Mouth	65	52	29	120	15	29	310

Table 10a Model Predictions of Place of Death by Sex for Lung Cancer

Sex	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Male	1289.5	1367.2	483.2	3165.0	679.1	463.0	7447.0
Female	678.5	630.8	286.8	1450.0	315.9	334.0	3696.0
Total	1968.0	1998.0	770.0	4615.0	995.0	797.0	11143.0

Table 10b Actual Frequencies of Place of Death by Sex for Lung Cancer

Sex	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Male	1276	1381	479	3184	660	467	7447
Female	692	617	291	1431	335	330	3696
Total	1968	1998	770	4615	995	797	11143

Table 11a Model Predictions of Place of Death by Socioeconomic Status for Prostate Cancer

Index of Relative Socioeconomic Disadvantage	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Lowest 20%	110.4	86.9	11.0	420.3	47.7	134.6	811.0
Mid-lower 20%	166.0	103.0	19.0	470.3	141.8	163.0	1063.0
Middle 20%	131.6	92.9	51.8	336.4	108.9	166.2	888.0
Mid-upper 20%	137.8	126.5	86.6	286.4	99.0	164.7	901.0
Upper 20%	111.2	84.7	133.6	152.6	170.5	154.4	807.0
Total	657.0	494.0	302.0	1666.0	567.9	782.9	4470.0

Table 11b Actual frequencies of Place of Death by Socioeconomic Status for Prostate Cancer

Index of Relative Socioeconomic Disadvantage	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
Lowest 20%	103	82	14	424	52	136	811
Mid-lower 20%	176	112	18	466	140	151	1063
Middle 20%	135	79	51	360	100	163	888
Mid-upper 20%	129	129	83	265	117	178	901
Upper 20%	114	92	136	151	159	155	807
Total	657	494	302	1666	568	783	4470

Table 12a Model Predictions of Place of Death by Age Status for Mouth Cancer

Aged at Death	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
less than 60	16.7	13.4	4.9	25.5	2.7	0.7	64.0
60 to 69	16.4	13.3	8.7	30.8	3.0	2.8	75.0
70 to 79	18.3	12.5	7.0	37.2	4.2	7.7	87.0
more than 80	13.6	12.7	8.4	26.4	5.1	17.7	84.0
Total	65.0	51.9	29.0	119.9	15.0	28.9	310.0

Table 12b Actual frequencies of Place of Death by Age Status for Mouth Cancer

Aged at Death	Private Residence	Principal Referral Hospitals	Dedicated Palliative Care Institutions	Other Public Hospitals	Private Hospitals	Nursing Homes	Total
less than 60	17	10	7	27	1	2	64
60 to 69	15	14	8	29	3	6	75
70 to 79	20	12	9	36	5	5	87
more than 80	13	16	5	28	6	16	84
Total	65	52	29	120	15	29	310

Figure 5: Effect of Age on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

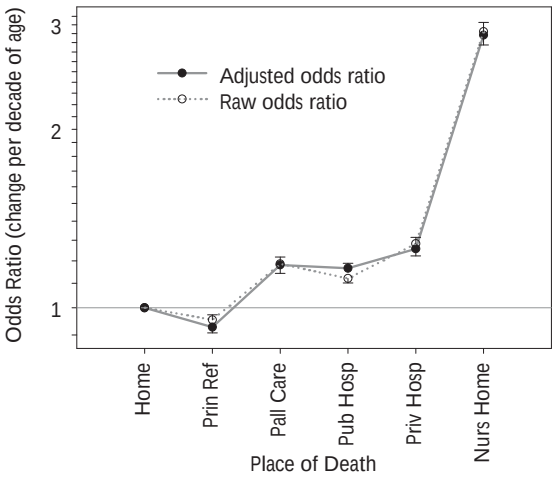

Figure 6: Effect of Gender on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

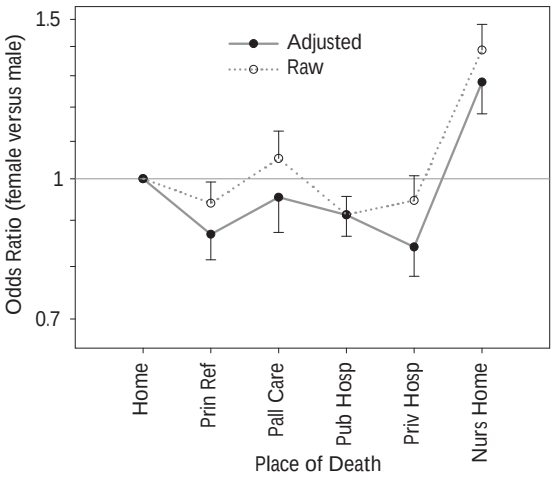

Figure 7: Effect of Aboriginality on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

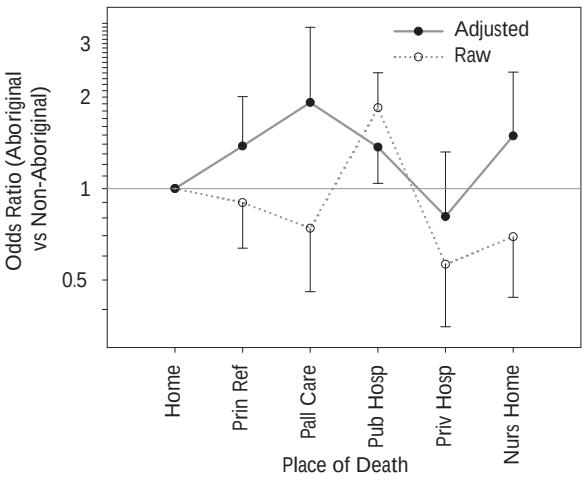

Figure 8: Effect of Country of Birth on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

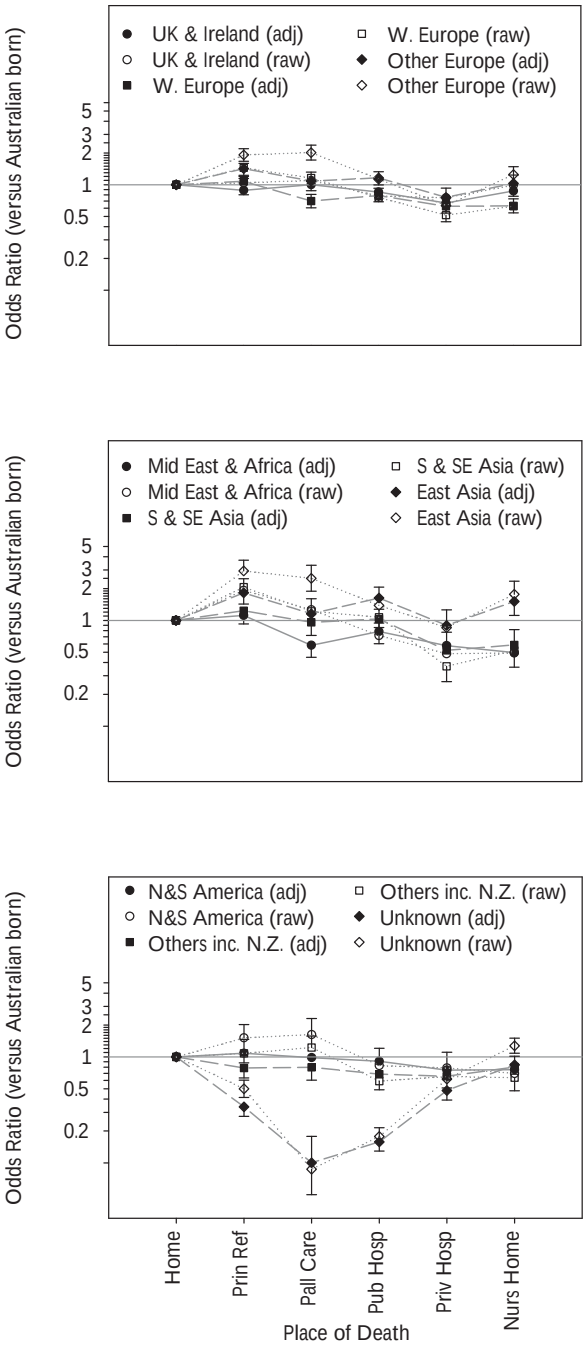

Figure 9: Effect of Socioeconomic Status (IRSD) on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

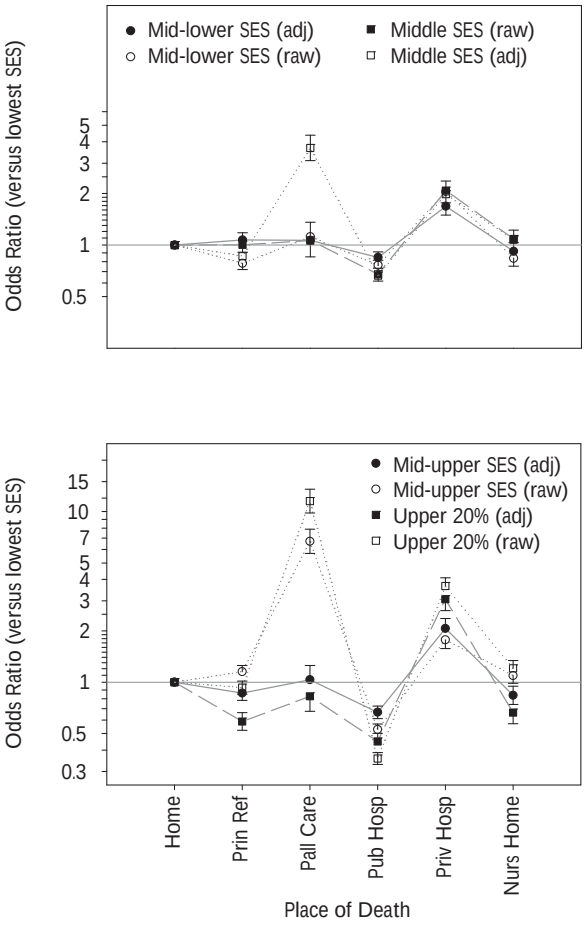

Figure 10: Effect of Remoteness (ARIA) on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

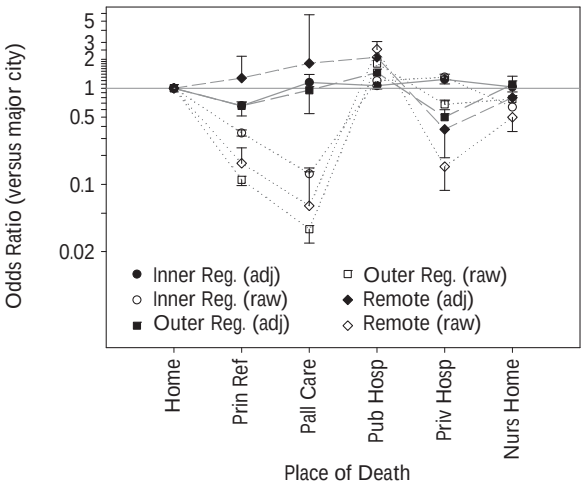

Figure 11: Effect of Survival from Diagnosis on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

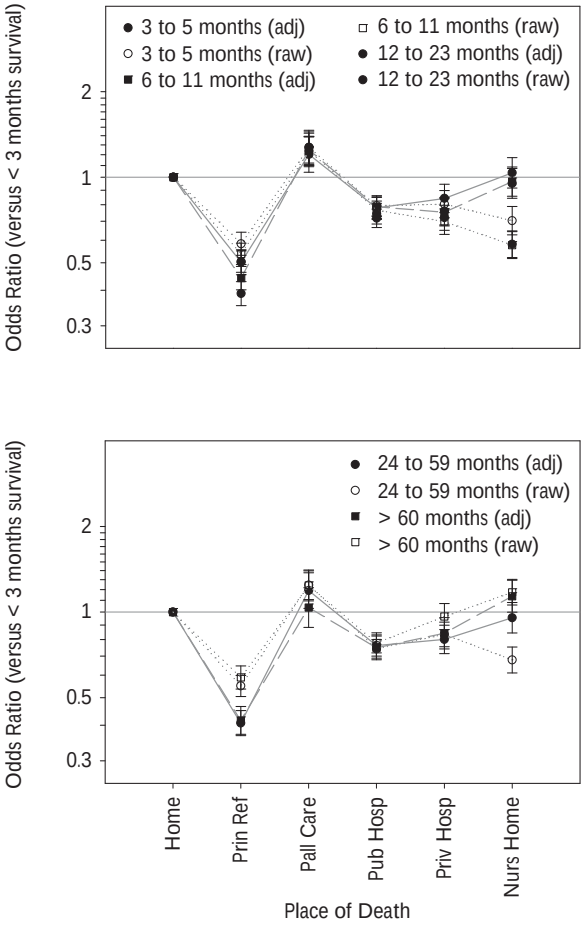

Figure 12: Effect of Stage of Disease on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

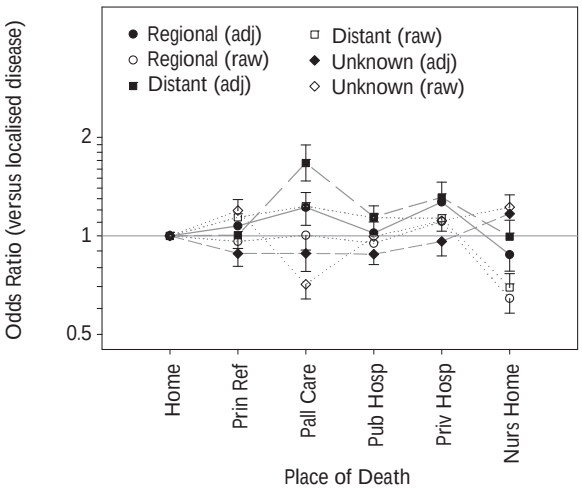

Figure 13a: Effect of Area Health Service on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

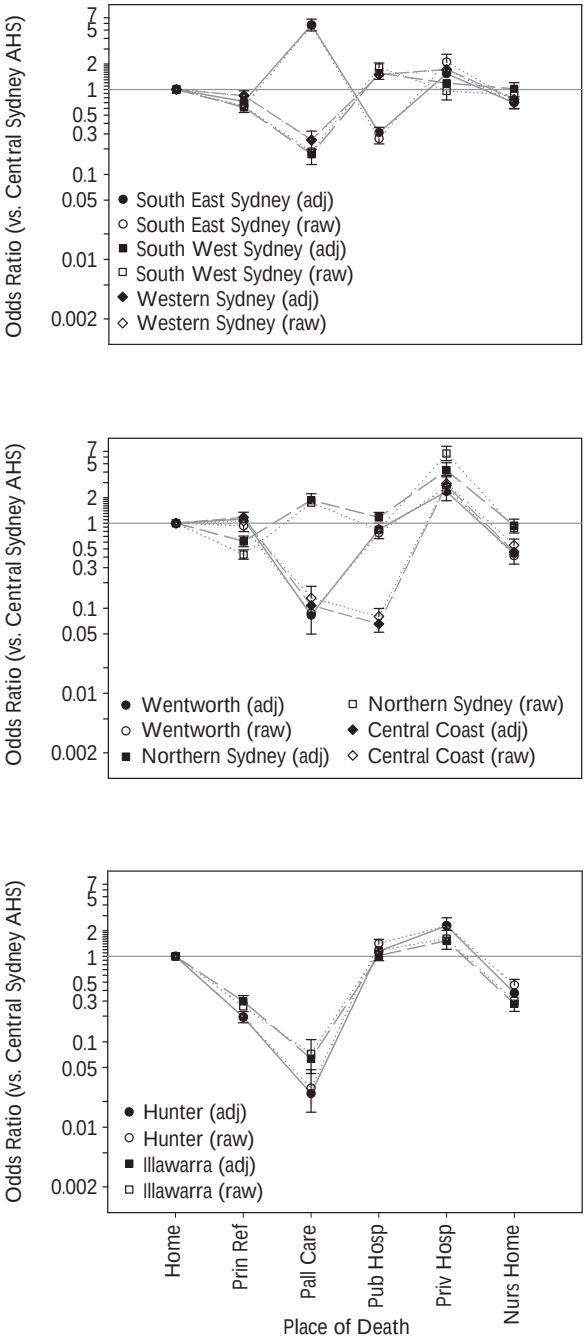

Figure 13b: Effect of Area Health Service on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

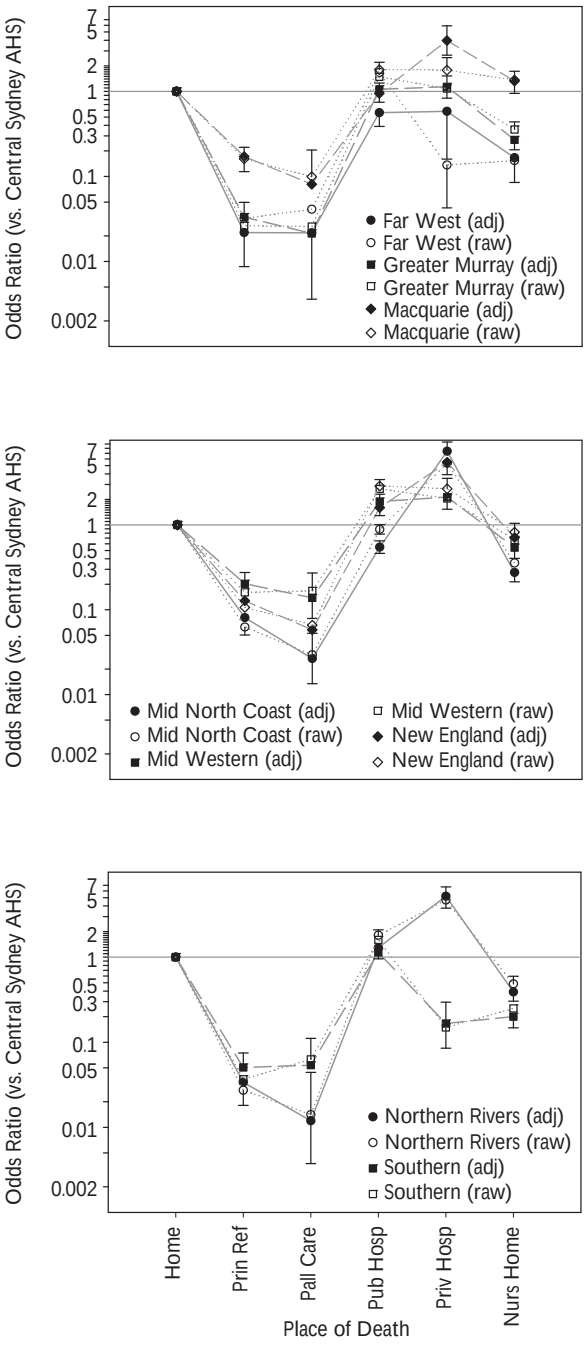

Figure 14a: Effect of Cancer on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

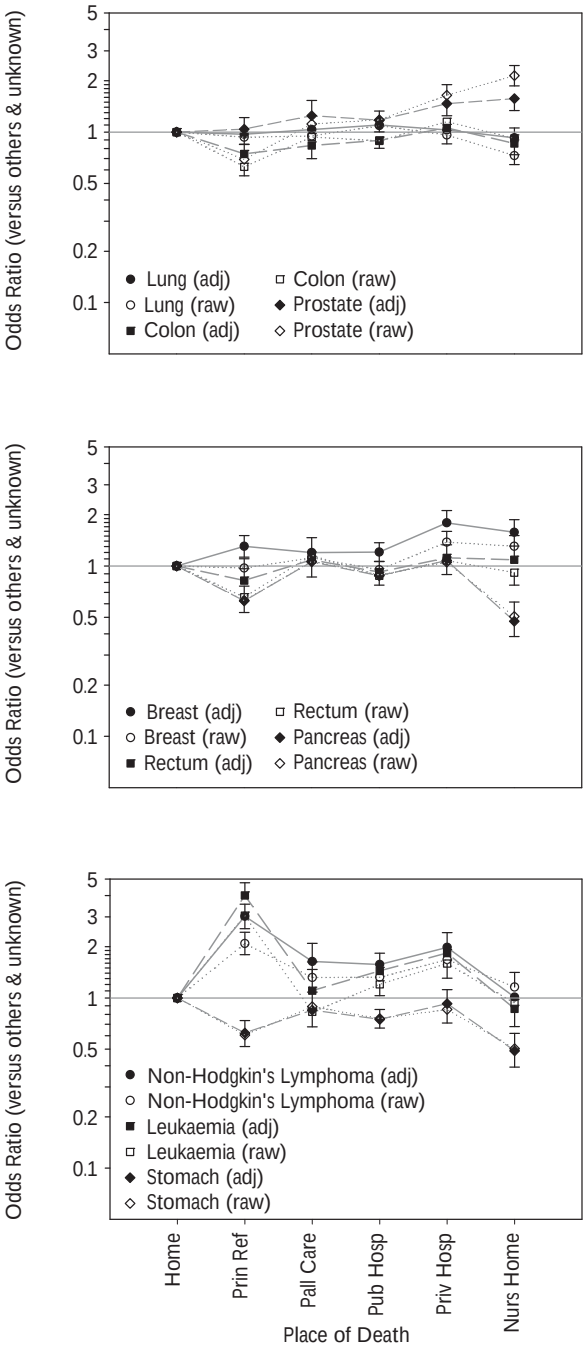

Figure 14b: Effect of Cancer on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

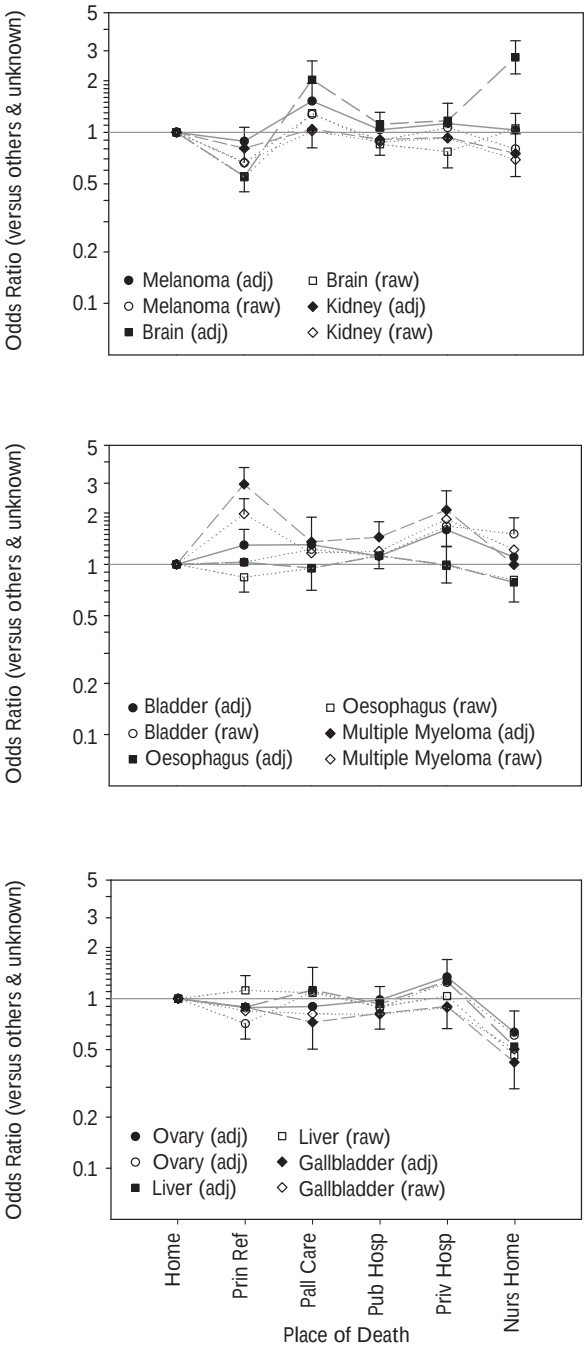

Figure 14c: Effect of Cancer on Place of Death:
Raw and Adjusted Odds Ratios and 95% Confidence Intervals

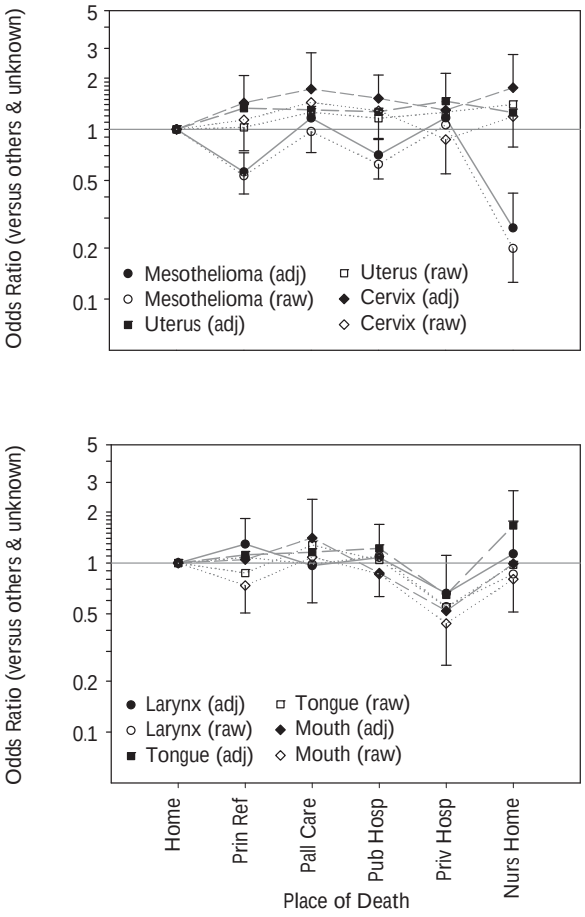

Figure 15: Predicted Effect of Age on Place of Death:

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal, Australian-born, Middle SES, Major City, 6-11 Months Survival, Localised Disease at Diagnosis, Others & Unknown Cancer Site)

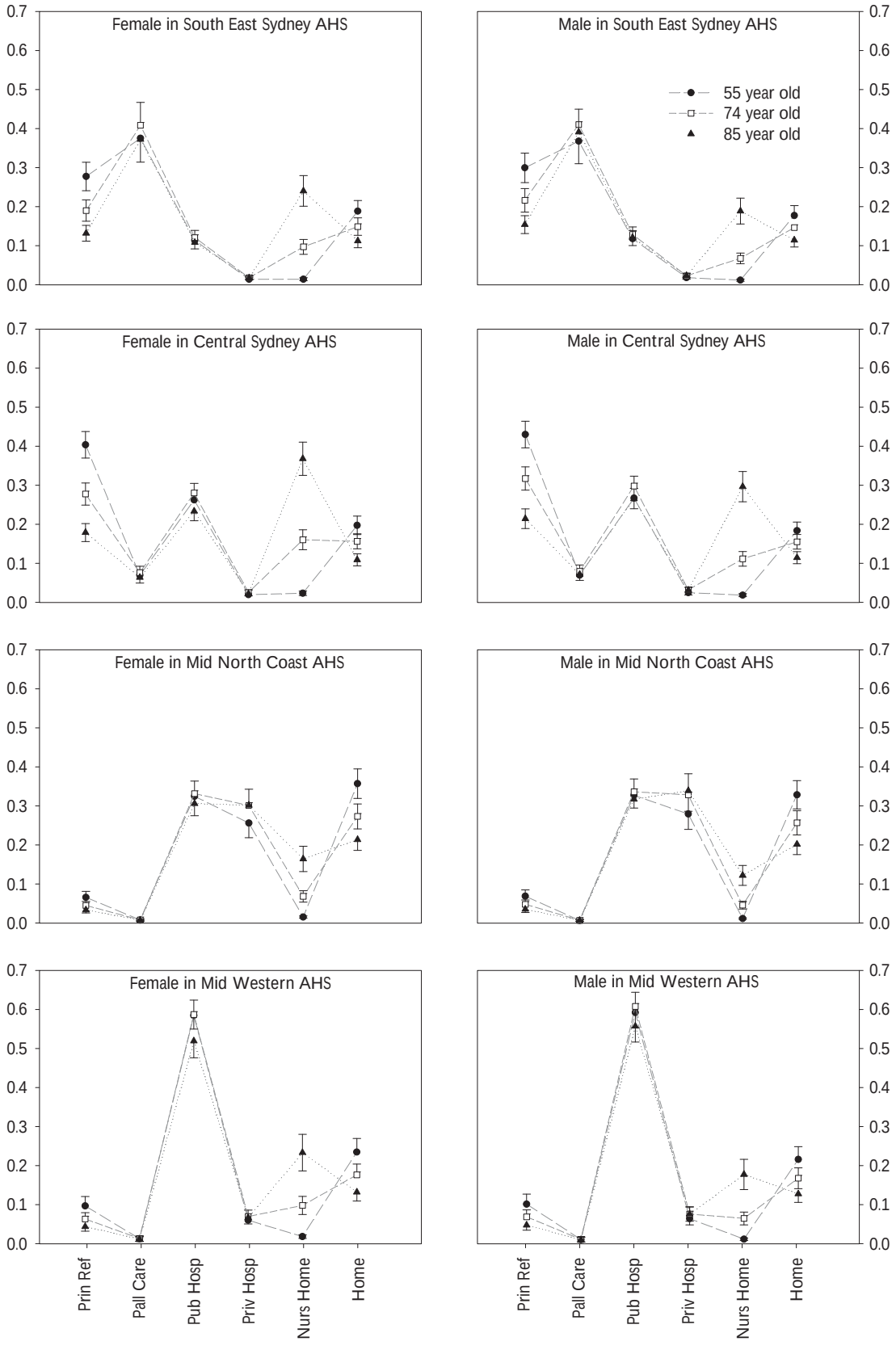

Figure 16: Predicted Effect of Aboriginality and Place of Death

Predicted Probability and 95% Confidence Intervals

(Aboriginal or Torres Strait Islander; 62 (Female) or 65 (Male) at Death; Major City (Sydney), Outer Regional (New England) or Remote (Far West); 6-11 Months Survival; Localised Disease at Diagnosis; Others & Unknown Cancer)

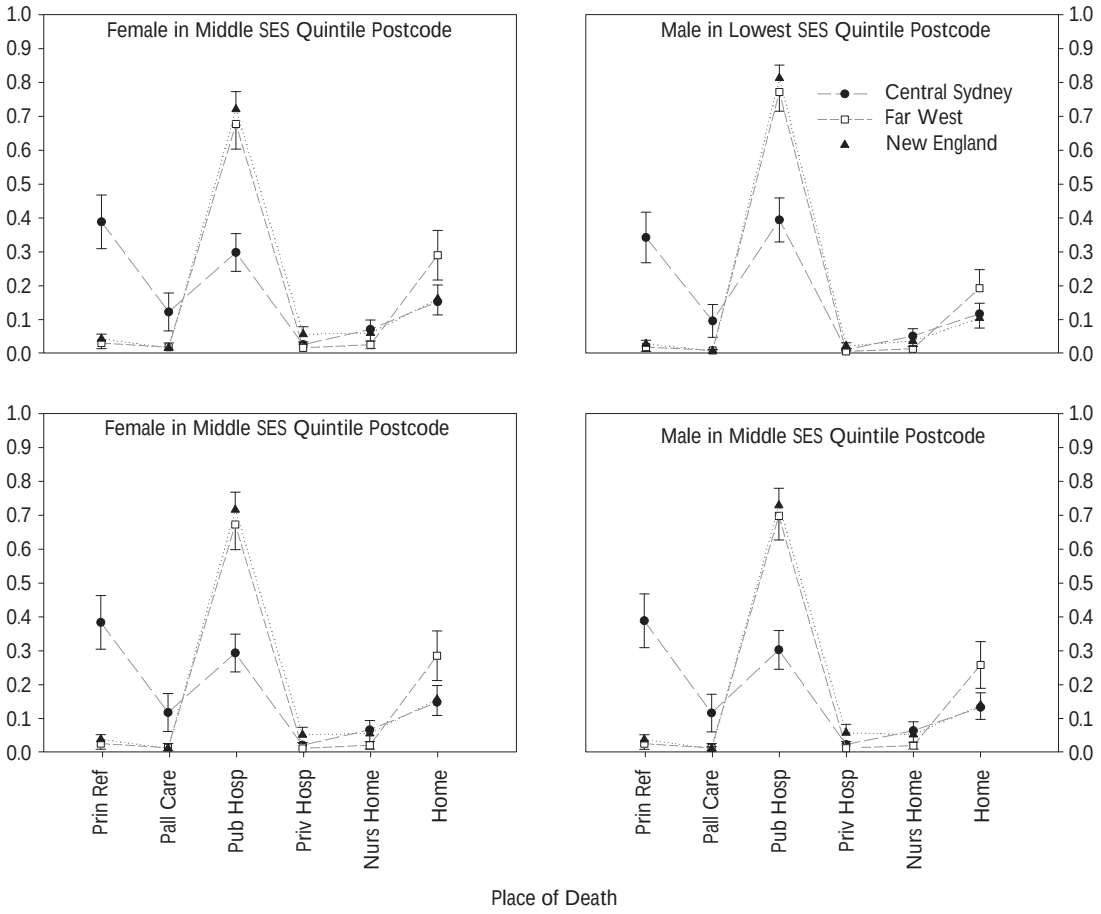

Figure 17: Predicted Effect of Country of Birth on Place of Death

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal in Central Sydney AHS; Middle SES; 6-11 Months Survival; Localised Disease at Diagnosis; Others & Unknown Cancer Site)

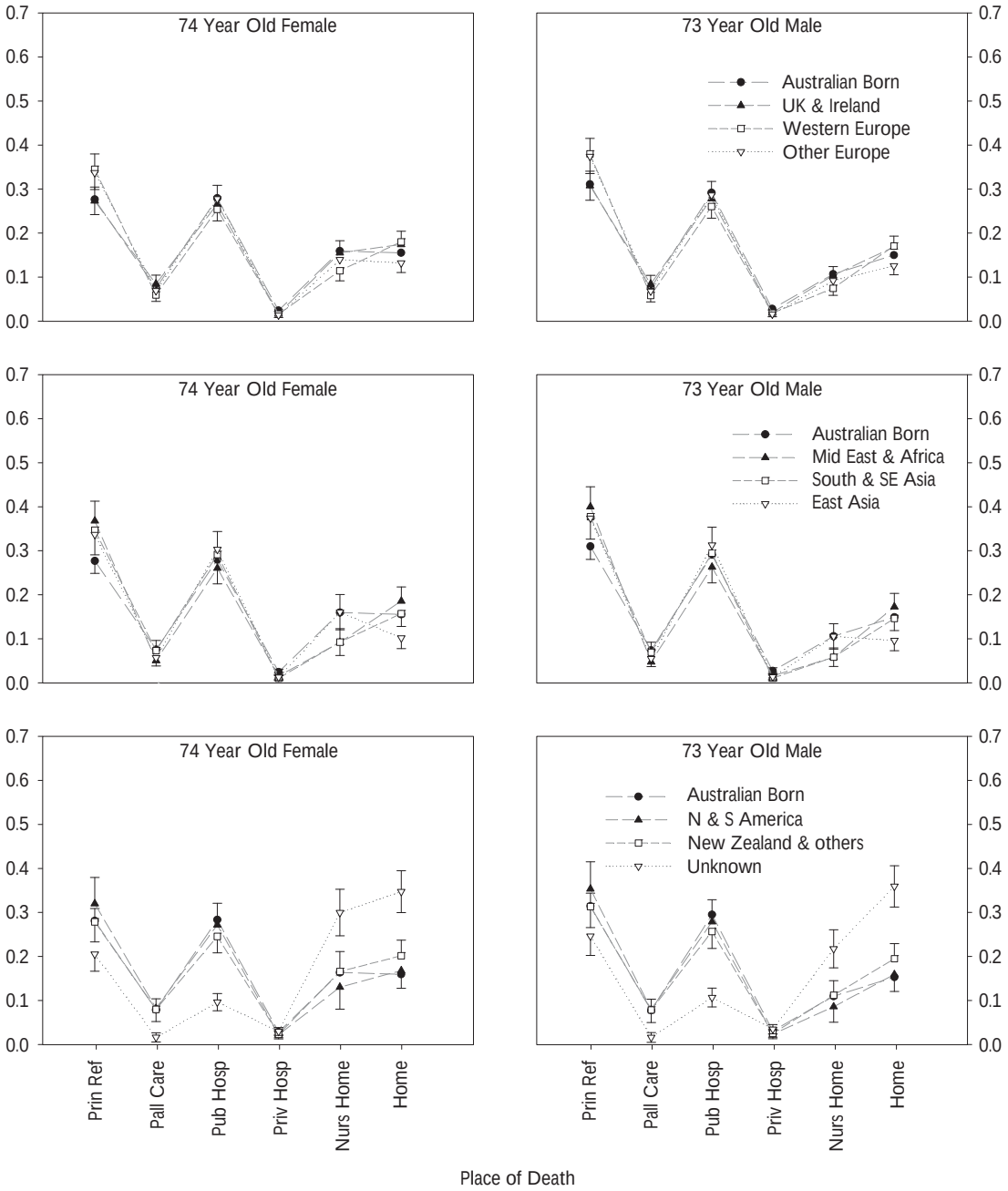

Figure 18: Predicted Effect of Socioeconomic Status of Postal Area on Place of Death

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal in Central Sydney AHS; Australian Born; 6-11 Months Survival; Localised Disease at Diagnosis; Others & Unknown Cancer Site)

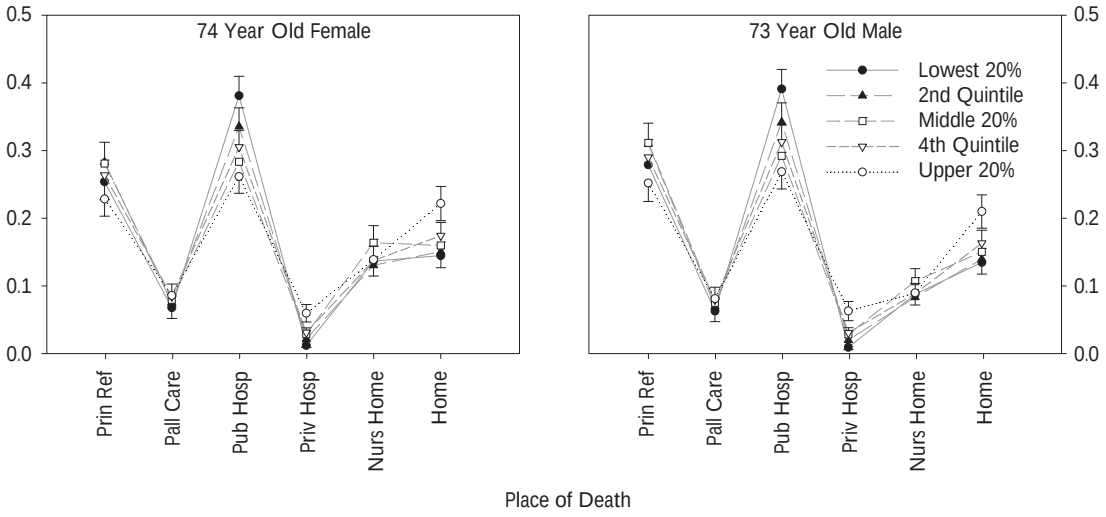

Figure 19: Predicted Effect of Remoteness of Residence on Place of Death

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal in Mid Western AHS; Australian Born; Middle SES; 6-11 Months Survival; Localised Disease at Diagnosis; Others & Unknown Cancer Site)

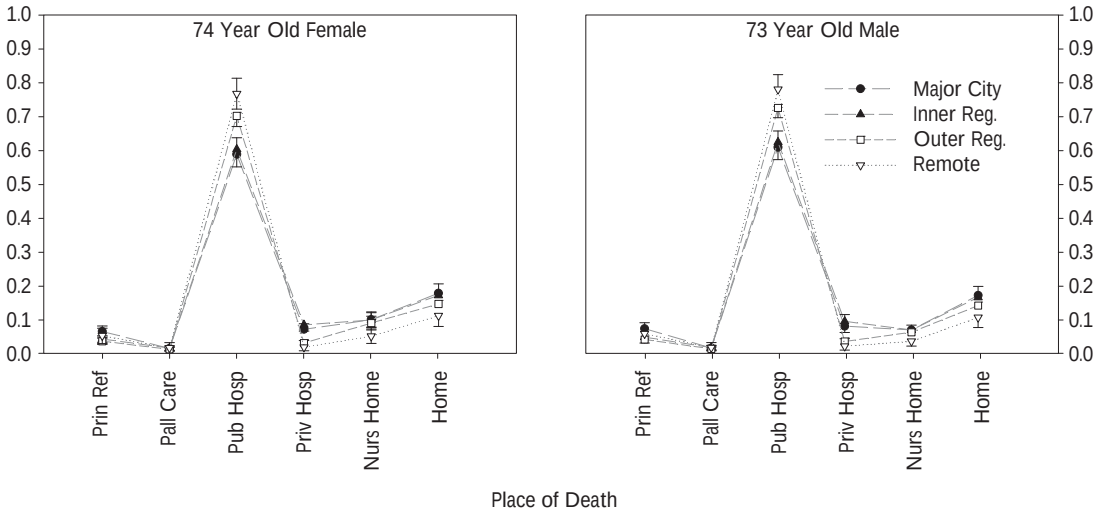

Figure 20: Predicted Effect of Survival from Diagnosis on Place of Death

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal in Central Sydney AHS; Australian Born; Middle 20% SES; Localised Disease at Diagnosis; Others & Unknown Cancer Site)

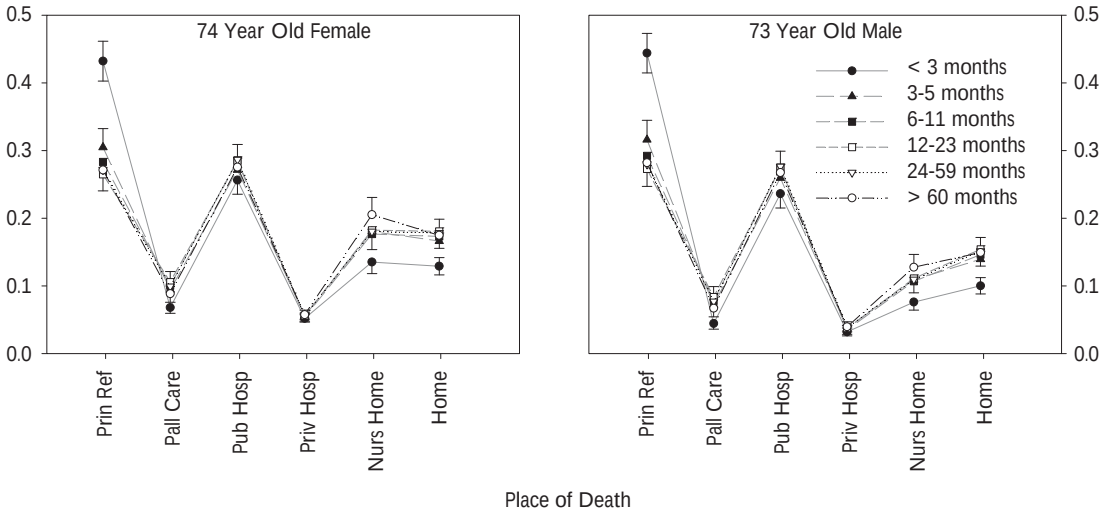

Figure 21: Predicted Effect of Stage of Cancer at Diagnosis on Place of Death

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal in Central Sydney AHS; Australian Born; Middle SES; 6-11 Months Survival; Others & Unknown Cancer Site)

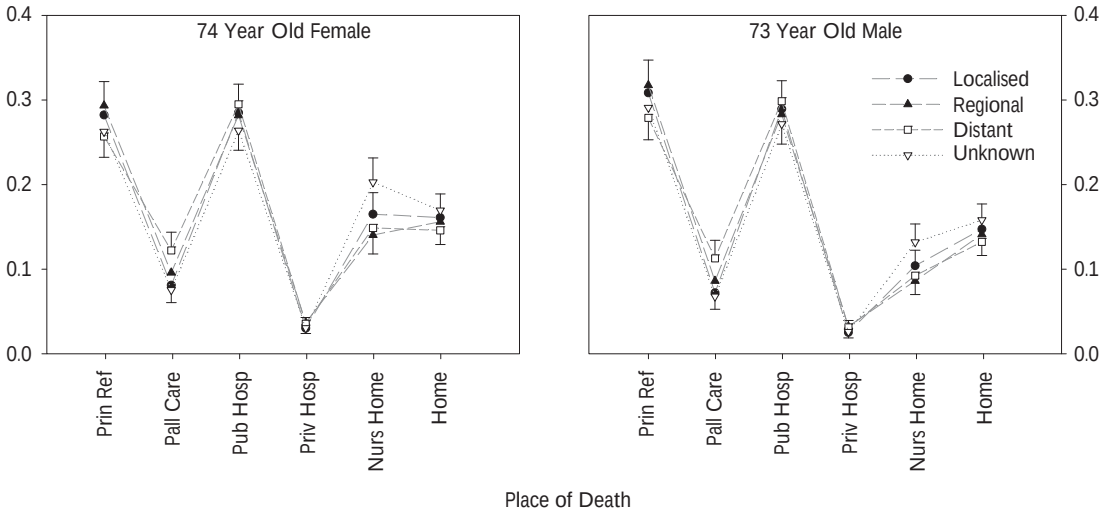

Figure 22a: Predicted Effect of Area Health Service on Place of Death

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal; Australian Born; Middle SES; 6-11 Months Survival; Localised Disease at Diagnosis; Others & Unknown Cancer Site)

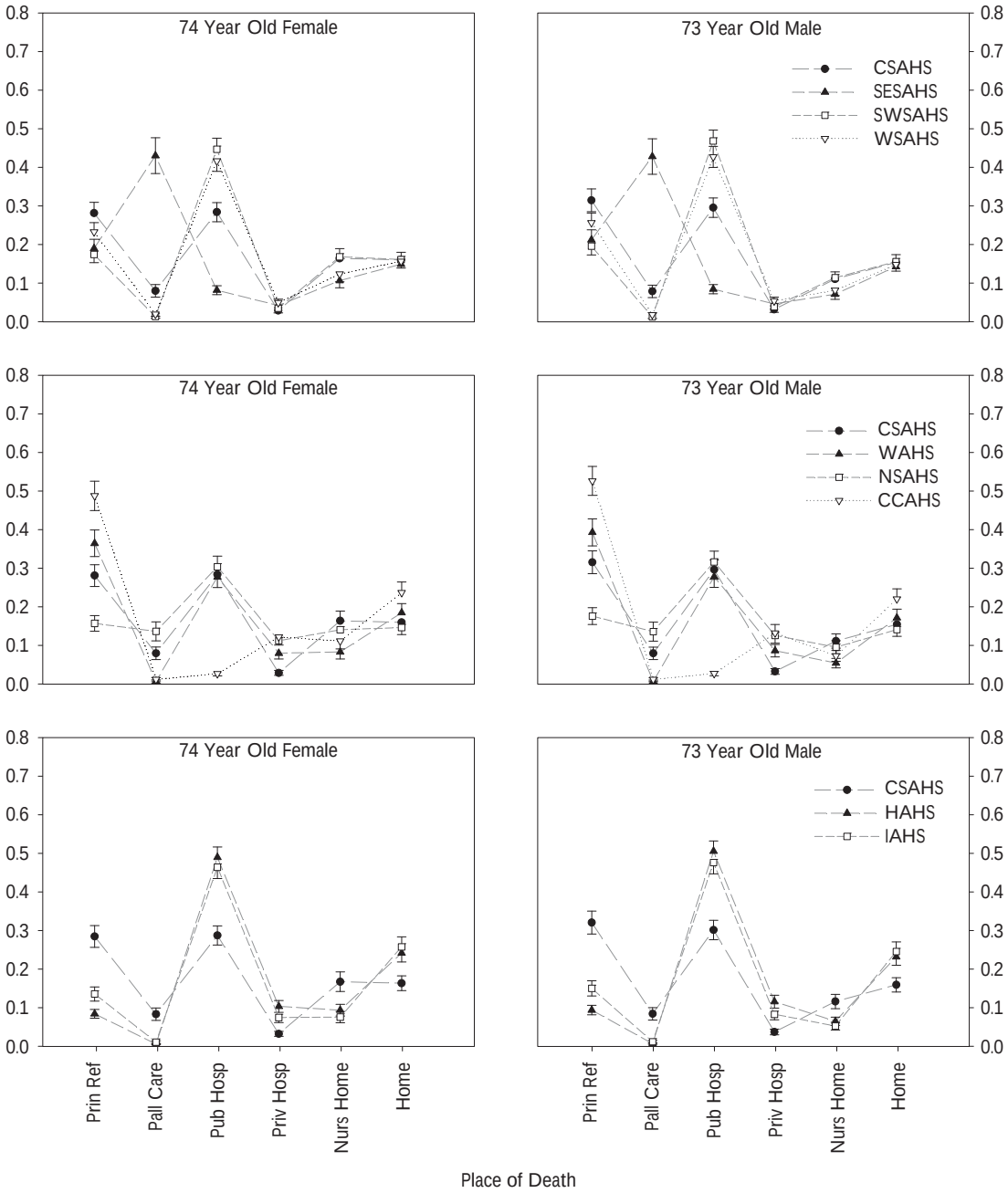

Figure 22b: Predicted Effect of Area Health Service on Place of Death

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal; Australian Born; Middle SES; 6-11 Months Survival; Localised Disease at Diagnosis; Others & Unknown Cancer Site)

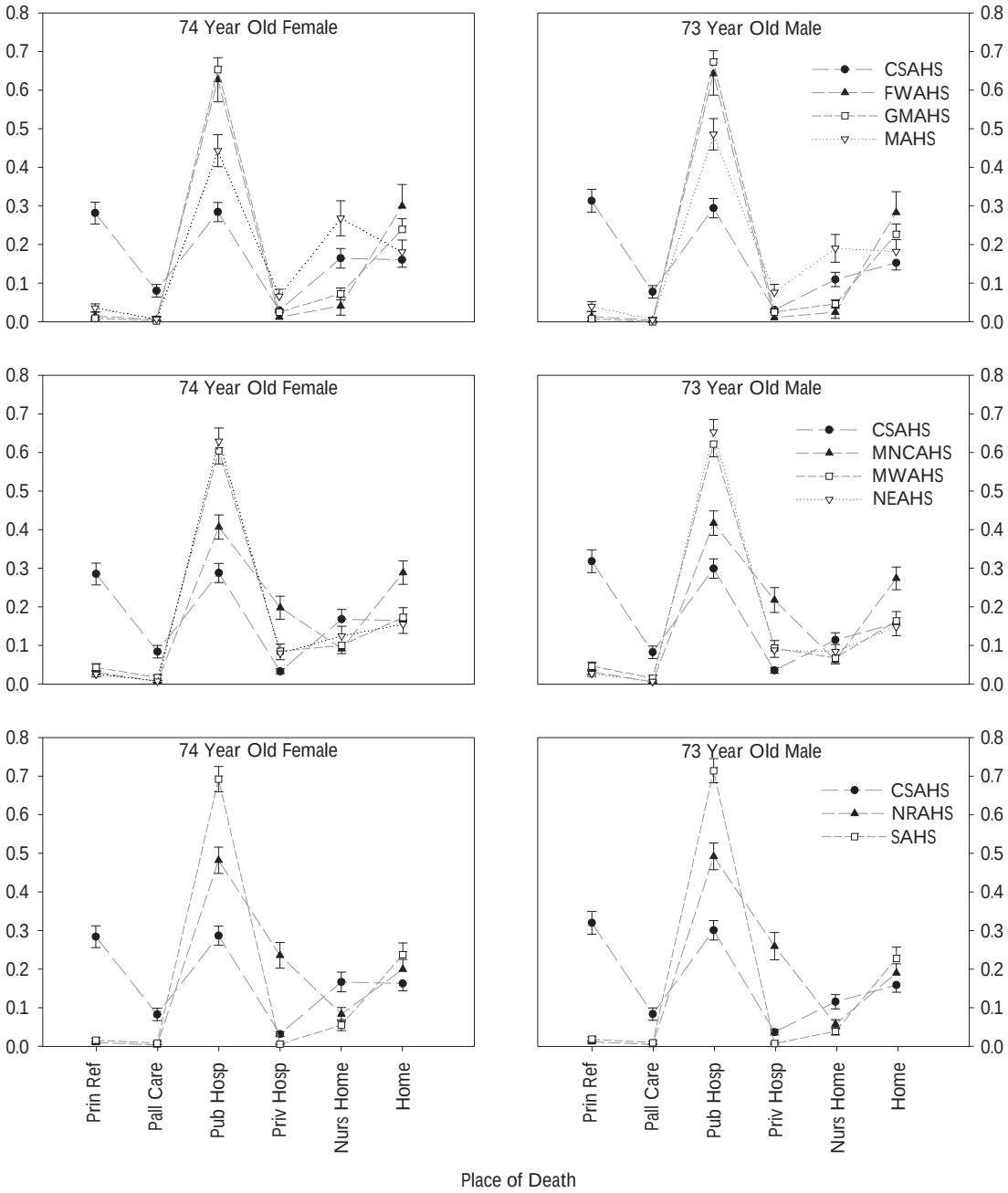

Figure 23a: Predicted Effect of Type of Cancer on Place of Death

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal in Central Sydney AHS; Australian Born; Middle SES; 6-11 Months Survival; Localised Disease at Diagnosis)

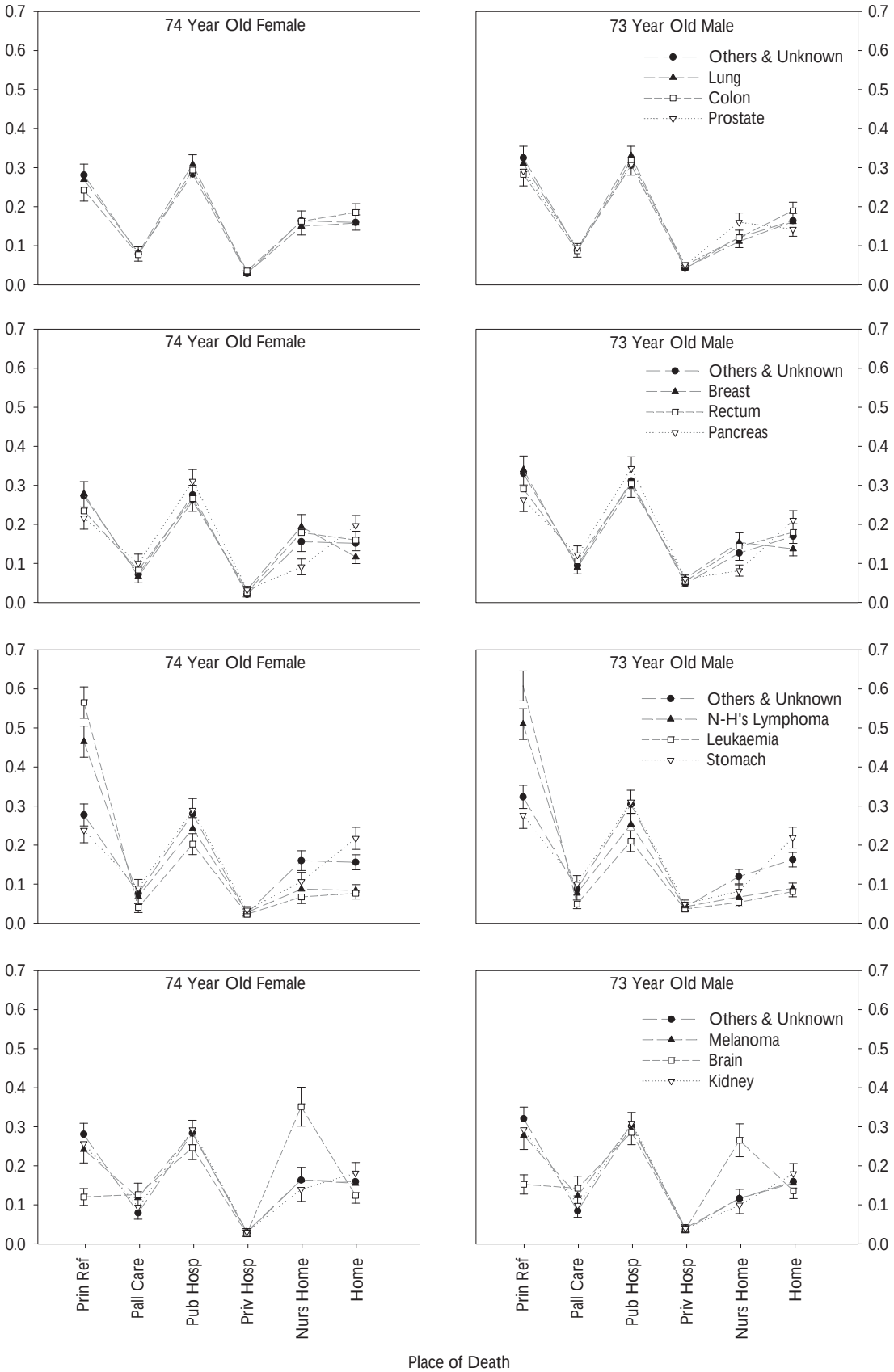

Figure 23b: Predicted Effect of Type of Cancer on Place of Death

Predicted Probability and 95% Confidence Intervals

(Non-Aboriginal in Central Sydney AHS; Australian Born; Middle SES; 6-11 Months Survival; Localised Disease at Diagnosis)