



National end of life care  
INTELLIGENCE NETWORK



National End of Life  
Care Programme  
*Improving end of life care*



# Deaths in Older Adults in England

October 2010



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## Foreword

This report, the fourth published by the National End of Life Care Intelligence Network, highlights the importance of understanding the differing needs of older adults at the end of life.

Death occurs most frequently in old age. Currently, two thirds of people die aged 75 or over, with almost three quarters of women (74.4%) dying in this age group compared with 58.4% of men. Also, the age at which people die is increasing as people live longer. Already one in six people die aged 90 or over.

The causes of death change with increasing age at death – Alzheimer's, senility, pneumonia and stroke becoming more common. The place of death changes too, with a higher proportion of the extreme elderly, who are more likely to be women, dying in nursing or old people's homes. This in part reflects the frailty of many elderly people before death, which often results in the need for 24-hour care. It also reflects the greater likelihood of older women being widowed and living alone.

The findings of this report, which clearly highlight the changing end of life care needs as the population ages, are a wake-up call. They provide commissioners and providers of health and social care with information to guide service development now. The report also alerts commissioners and providers to the demographic change already occurring, which will see the population aged 75 years and over rise from 4 million to 7.2 million by 2033. The number of people aged 90 and over will increase from 0.4 million to 1.2 million in the same period. This increase in the elderly population will be accompanied by an increase in those dying over the age of 85 from 36% to 44%.

The report will be of interest more generally and especially to those of us who are part of the baby boom generation, as this is an issue which will affect us all.



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## Executive summary

This report looks at deaths in people aged 75 and over to examine differences in place and cause of death by age band, from old to extreme old age.

### The number of older adults is increasing

- The absolute number of older adults and their proportion in the population is significantly increasing. From 1983–2008, the proportion of the total population aged 75 years and over in England increased by a third from 6% (2.9 million people) to 8% (4.0 million people). The population aged 75 and over is projected to increase to 7.2 million in 2033, and the number of people aged 90 and over is projected to increase from 0.4 million in 2008 to 1.2 million in 2033.(Office for National Statistics).
- Increases in the 'oldest' population have resulted from falling mortality rates in the second half of the 20th Century and increased birth rates at the beginning of the 20th Century (Dini & Goldring, 2008). In the UK, from 1968–2008 mortality rates declined by 51% in males and 43% in females (Office for National Statistics, 2009).
- In England, life expectancy (period expectation of life at birth) increased by over 6 years in males from 1980–82 to 2006–08, from 71.1 years to 77.7 years, and by over 4 years in females, from 77.0 years to 81.9 years (Office for National Statistics).
- Currently there are more females in the oldest age groups than males, but in the future the ratio of males to females is likely to become more similar. In 2008 there were 214 females aged 85 and over for every 100 males. By 2033 it is projected that there will be 138 females for every 100 males aged 85 and over. (Office for National Statistics).
- In the most recent decades too, mortality rates have fallen even in the very oldest age groups. From 1999 to 2008, age-specific mortality rates decreased in all age groups (75–79 years, 80–84 years, 85 and over). For all years in 1999–2008, age-specific mortality rates in people aged 75 and over were higher in males than females.
- The consequence of these falling mortality rates is that people will die at ever older ages.

### Death largely occurs in old age

- In 2006–08 there were 313,942 deaths on average per year in people aged 75 and over, with fewer deaths in males (130,862 deaths per year on average) than in females (183,081 deaths).
- Two-thirds (66.8%) of deaths in 2008 occurred in people aged 75 and over – 58.4% of deaths in males were in the 75 and over age group compared with 74.4% of deaths in females. Overall, the largest number of deaths was in 80–89 year-olds, with a third,33.3%, of deaths in males compared with 38.8% in females. In 2008, 17.1% of all deaths (81,573 deaths) were in people aged 90 and over.
- Trends in numbers of deaths from 1999–2008 are complex. However, considering the most recent five year period (2004–08), the number of deaths decreased in people aged 75–79 and 80–84, but increased in those aged 85–89 and 90 and over. Changes in life expectancy and population size, relating to different birth cohorts, contribute to these differences.
- It is predicted that the total number of deaths in England and Wales will continue to decrease to 2012 before increasing by 16.5% to 2030 (to around 590,000), with the proportion of deaths in those aged 85 and over rising from 32% in 2003 to 44% in 2030 (Gomes & Higginson, 2008).

## Place of death in people aged 75 and over

- Place of death changes with increasing age, influenced by changes in the pattern of causes of death, the need for increasing care due to frailty and chronic conditions, and also the probability of living alone or in a care home.
- The proportion of older males living alone is lower than for older females. In 2007, in the 75 and over age group 34% of males and 61% of females lived alone (Office for National Statistics, 2009).
- In people aged 75 and over in 2006–08, 58.4% of deaths were in hospital, 12.1% were in nursing homes, 10.0% were in old people's homes, 15.5% were in the person's own residence, 0.9% were elsewhere and 3.1% were in a hospice. Compared with the proportion of deaths in each place for all ages in 2005–07 (South West Public Health Observatory, 2010), the proportion of deaths in hospital was the same. However, the proportion of deaths in nursing homes and old people's homes was higher in the 75 and over age group than for all ages, and the proportion of deaths in own residence, a hospice or elsewhere was lower.
- A greater proportion of males than females aged 75 and over died in hospital (males 61.7%; females 56.1%) or in their own residence (males 18.4%; females 13.4%). However, a lower proportion of males than females aged 75 and over died in nursing homes (males 9.0%; females 14.2%) and old people's homes (6.1% males; 12.8% females).
- The proportion of deaths in hospital was lower in the oldest age group compared with the other three age groups (51.6% in the 90 and over age group compared with 60.8% in 75–79 year-olds, 61.5% in 80–84 year-olds and 60.2% in 85–89 year-olds). In people aged 75 and over, the proportion of deaths in nursing homes and old people's homes increased with increasing age – in the 75–79 age group, 6.8% of deaths were in nursing homes compared with 17.9% for people aged 90 and over, and for the same age groups, the proportions in old people's homes were 3.7% and 18.8%.
- In females, the proportion of deaths in hospital in people aged 75 and over decreased with increasing age; this was not seen in males. In the 90 and over age group, 58.9% of males died in hospital compared with 48.8% of females. In all age groups of people aged 75 and over, the proportion of deaths in a person's own residence was higher for males than females; however the proportion of deaths in nursing and old people's homes was lower for males than females.

## Causes of death in people aged 75 and over

- With increasing age, the profile of chronic disease and cause of death changes, with increased prevalence of physical and mental frailty during the years and months prior to death.
- In 2006–08, in people aged 75 and over there were on average 108,342 (34.5%) deaths from cardiovascular disease; 67,865 deaths (21.6%) from cancer; 51,445 (16.4%) deaths from respiratory disease; and 86,290 (27.5%) deaths from 'other' causes.
- In both males and females, the most common cause of death in the 75 and over age group in 2006–08 was cardiovascular disease (males 34.0%; females 34.9%). However, the second most common cause of death differed: in males, this was cancer (26.2%), but in females this was 'other' causes (30.7%).

- In all people aged over 75 and over, the proportion of deaths from cardiovascular disease, 'other' causes and respiratory disease increased with increasing age, in contrast to cancer which decreased. In 75–79 year-olds, 31.3% of deaths were from cardiovascular disease, 21.4% from 'other' causes, 13.9% from respiratory disease and 33.4% from cancer. In comparison, in the 90 and over age group 35.0% of deaths were from cardiovascular disease, 34.9% were from 'other' causes, 19.3% were from respiratory disease and 10.8% were from cancer.
- In all the age bands a greater proportion of males died from cancer compared with females, whereas a higher proportion of females died from 'other' causes compared with males. Fewer than half of deaths from cancer (47.7%) were in hospital compared with more than half of deaths from cardiovascular disease (60.2%), 'other' causes (59.4%) and respiratory disease (67.2%).
- The proportion of deaths at home (own residence) was highest for cancer (21.6%), followed by cardiovascular disease (18.2%) compared to a lower proportion for deaths from respiratory disease (10.9%) or 'other' causes (10.1%).
- For all causes except cancer, less than 1% of deaths were in a hospice. This compared with 13.3% of deaths from cancer.
- Considering underlying causes of death in people aged 75 and over by ICD-10 group, the three most common causes of death were chronic ischaemic heart disease (10.0% of deaths), pneumonia (organism unspecified) (7.4% of deaths), and acute myocardial infarction (6.2% of deaths).
- Chronic ischaemic heart disease, acute myocardial infarction, other chronic obstructive pulmonary disease, and malignant neoplasm of bronchus and lung were more common as causes of death in males than females aged 75 and over. In comparison, deaths from pneumonia (organism unspecified), stroke and dementia were more common in females. Deaths from senility and dementia were both more common with increasing age in people aged 75 and over.
- When causes of death in people aged 75 and over were analysed for each place of death, cardiovascular disease accounted for the largest proportion of deaths elsewhere (39.7%), at home (own residence) (40.5%) or in hospital (35.6%). The largest proportion of deaths in nursing homes (35.3%) and old people's homes (38.5%) were from 'other' causes. Cancer accounted for the largest proportion of deaths in hospices (91.9%).

## Socioeconomic deprivation

- In people aged 75 and over, there were more deaths in the most deprived quintile than in the least deprived quintile. In 2006–08, each year there were on average 74,531 deaths (22.9%) in the most deprived quintile compared with 48,249 deaths (16.8%) in the least deprived. The proportion of deaths in the most deprived quintile was greatest in the youngest group of older adults (75–79 year-olds), and in females compared with males.
- In people aged 75 and over, for all underlying causes of death, the proportion of deaths in the most deprived quintile was greater than the least deprived. The underlying cause of death with the greatest proportion of deaths in the most deprived quintile was respiratory disease (26.4%). The proportion in the most deprived quintile was similar for deaths from cancer (22.9%), cardiovascular disease (23.1%) and 'other' causes (23.6%).

# 1.0 Introduction

## 1.1 Background

We are in a period of significant demographic change, in which the average length of life has been increasing and in the near future will continue to do so. The consequence of this is that the population over the age of 75 is significantly increasing and the age at which people die is correspondingly increasing. The challenge posed to health and social care providers and commissioners is to respond to the increasing numbers of the elderly and extreme elderly in the population and to meet their changing needs for end of life care.

This report describes deaths in older adults aged 75 and older in England. A previous report, *Variations in Place of Death in England* (South West Public Health Observatory, 2010) showed that there were important differences in place and cause of death for older age groups compared with younger age groups of adults. For example, there was a lower proportion of deaths at home in older age groups compared with younger age groups and a higher proportion of deaths from cardiovascular disease and respiratory disease. This report describes deaths in older adults in more detail, to explore whether there are differences in place and cause of death within specific age groups, and to look at the effects of factors such as age, sex and socioeconomic deprivation on place and cause of death.

In this report we have focused on deaths people aged 75 and over. Two-thirds of deaths in England occur in this group, so it is very important to understand their needs for end of life care and how this varies with socio-demographic factors. The number of people aged 75 and over is projected to grow further, highlighting the importance of understanding need and planning now to meet it.

People aged 75 and over contribute a large number of deaths across a range of ages that may have differing characteristics. We have therefore grouped our analysis of these deaths into four age bands: 75–79 years, 80–84 years, 85–89 years and 90 years and over. Statistics presented are largely for deaths registered in 2006–08, since 2008 was the most recent year of complete data available. For some analyses we present data for 1999–2008, to place the most recent data in the context of recent trends.

Data are presented in several ways. Absolute numbers of deaths are presented to illustrate the absolute need for care. These numbers can also be considered along with projected population changes to consider how these needs may change in the future. Proportions are presented to allow comparisons to be made between different groups, for example, between males and females, different age groups, different socioeconomic groups and over time periods. Population demographics can have a large effect on the number of deaths within specific age groups. To take account of this, age-specific and age-standardised mortality rates have been calculated. These rates are presented in an Appendix rather than in the main body of the report since they provide useful supporting information but are harder to interpret directly in terms of need for care. By presenting data in these ways, we hope to provide an understanding of the needs of the population, while placing this in the context of underlying trends in deaths and demographic changes.

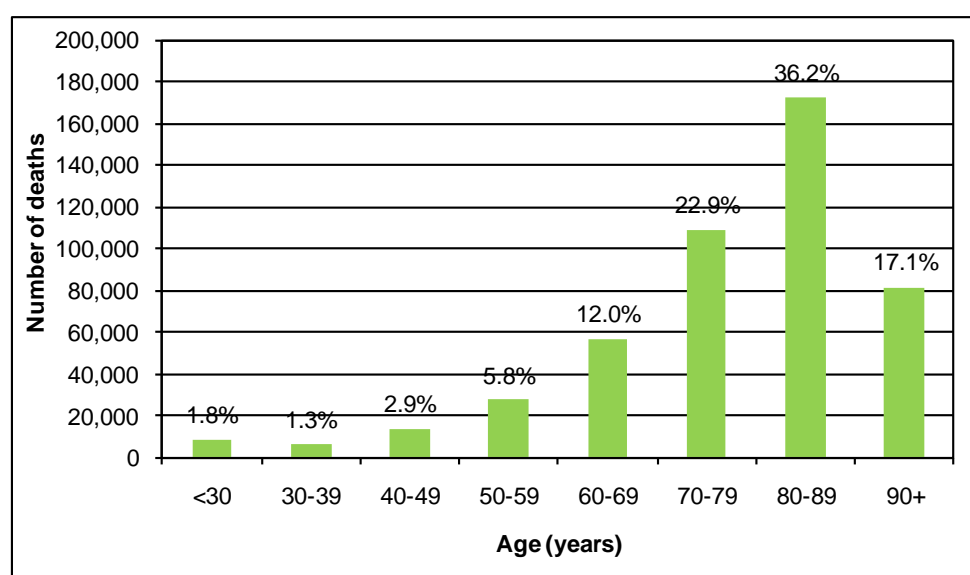
## 1.2 Demographic data for England

This section describes some demographic features of the population in England, including recent changes in the numbers of older people and how the population is likely to change in the future. These data underline the importance of considering deaths in people aged 75 and over when assessing end of life care needs, since not only is the population aging, but given improvements in mortality rates and life expectancy, numbers of people aged 75 and over are expected to increase in the future. In addition, some differences in living arrangements are described, which are likely to influence where people die and the type of care required at the end of life.

### 1.1.1 Death is usually in old age

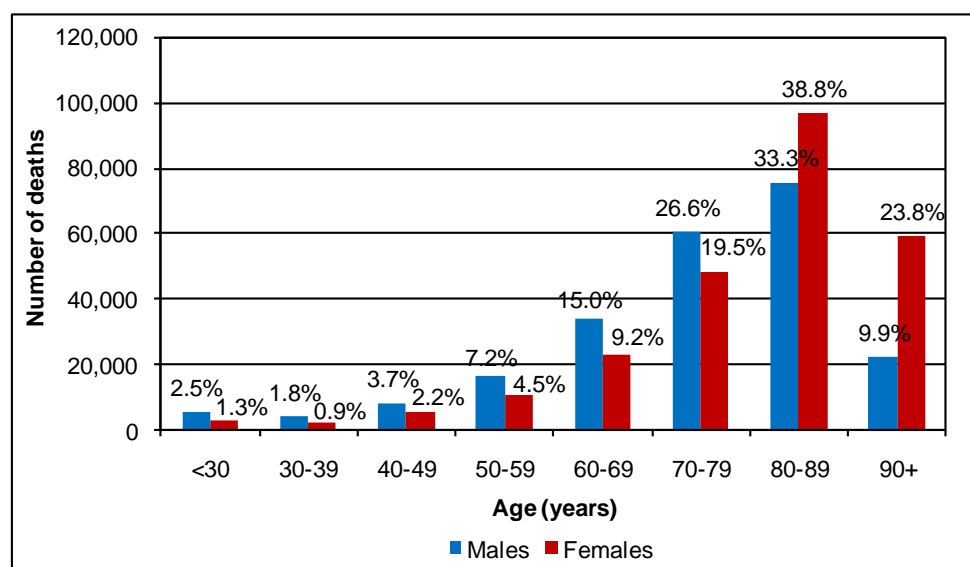
- Death is, in general, an event which occurs in old age (Figure 1.1). Approximately two-thirds (66.8%) of deaths in 2008 occurred in people aged 75 and over, though there were differences for males and females (Figure 1.2); 58.4% of deaths in males were in the 75 and over age group compared with 74.4% of deaths in females. Overall, the largest number of deaths was in the 80–89 years age group.
- The differences between males and females are even more striking when the ten year age bands are considered, with a third (33.3%) of all deaths in males occurring between 80–89 years compared with 38.8% of females, but just under one-tenth (9.9%) of deaths in males occurring over the age of 90 compared with almost a quarter (23.8%) of females.
- In 2008, over half of all deaths were in people aged 81 years and over.

**Figure 1.1: Number of deaths by age in England, 2008 (labels give percentage of deaths)**



Source: South West Public Health Observatory from Office for National Statistics data

**Figure 1.2: Number of deaths in males and females by age in England, 2008 (labels give percentage of deaths in males and females)**

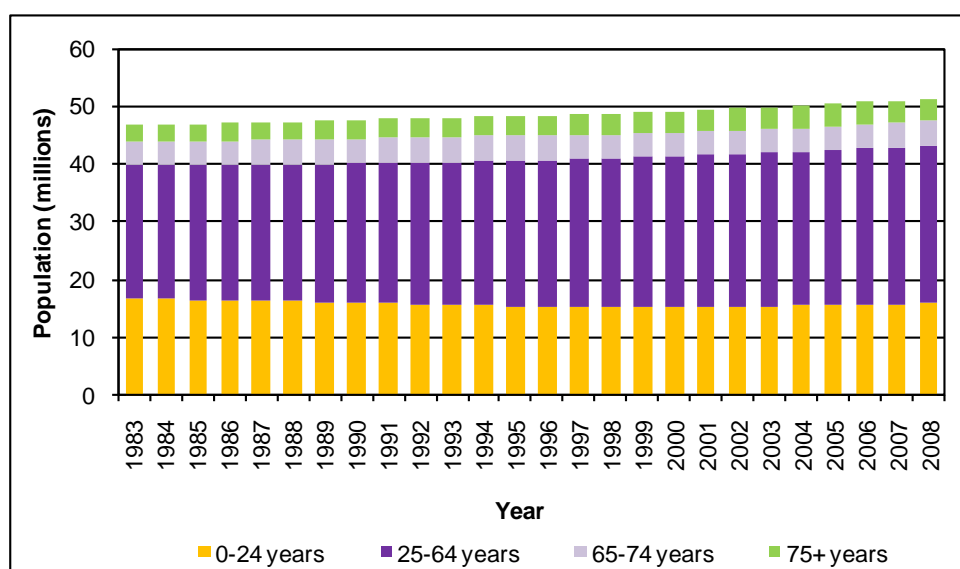


Source: South West Public Health Observatory from Office for National Statistics data

### 1.1.2 The population of England is aging

- The population of England is undergoing a significant phase of demographic change, with the absolute number of older adults and their proportion in the population significantly increasing. This has especially important implications for the provision of end of life care.
- From 1983 to 2008, the proportion of the total population aged 75 years or over in England increased by a third from 6% to 8% (Figure 1.3); this was an increase of over a million people from 2.9 million people in 1983 to 4.0 million people in 2008. From 1983 to 2008 the proportion aged under 25 years fell from 36% (16.7 million) to 31% (15.9 million).

**Figure 1.3: England population by age (under 25 years, 25–64 years, 65–74 years and 75 years and over), 1983–2008**



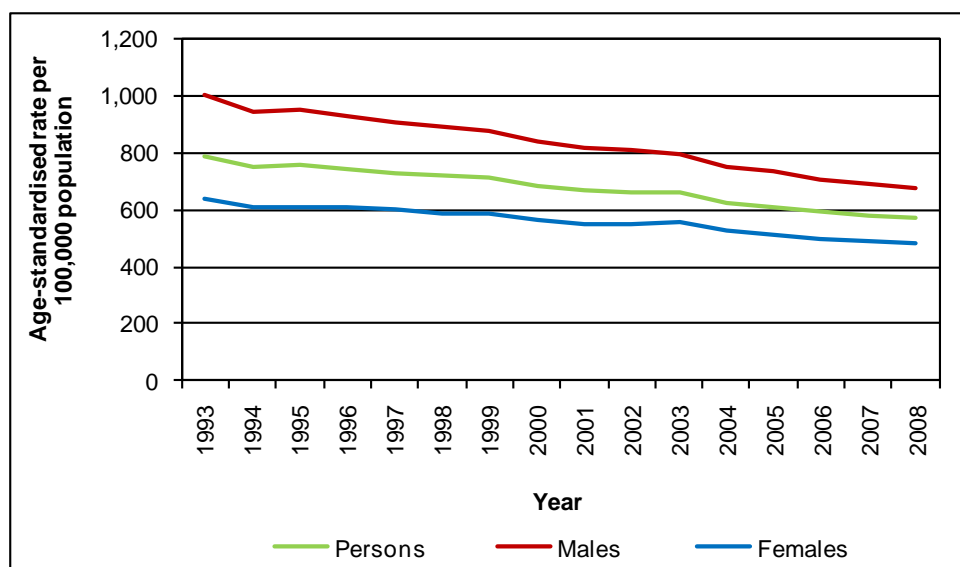
Source: South West Public Health Observatory from Office for National Statistics data

- There has been growth in the number of people aged 85 and over. In England, from 1983–2008 the number of people aged 85 and over increased from 0.5 million (1.2% of the population) to 1.1 million (2.2%) (Source: Office for National Statistics data).
- The increase in the population in the oldest ages can be seen by considering the age exceeded by the oldest 5% of the population (95<sup>th</sup> percentile). In England and Wales, in 1981 it was estimated that 5% of the male population was aged 73 years or over, compared with 78 years in females. By 2006, this had risen to 77 years for males and 81 years for females. (Dini & Goldring, 2008).

### 1.1.3 Mortality rates have decreased

- Increases in the 'oldest' population are thought to be mainly the result of falling mortality rates for the oldest age groups in the second half of the 20th Century, though these increases have also been contributed to by decreased mortality rates from childhood to age 80 and increased birth rates at the beginning of the 20th Century (Dini & Goldring, 2008).
- In the UK, from 1968–2008 mortality rates declined by 51% in males and 43% in females, with decreases in all age groups (Office for National Statistics, 2009). In England, age-standardised mortality rates from all causes for all age groups decreased from 1993–2008 (Figure 1.4).

**Figure 1.4: Mortality from all causes, directly age-standardised rates per 100,000 population, England, 1993–2008**



Source: *Compendium of Clinical and Health Indicators / Clinical and Health Outcomes Knowledge Base* from Office for National Statistics data

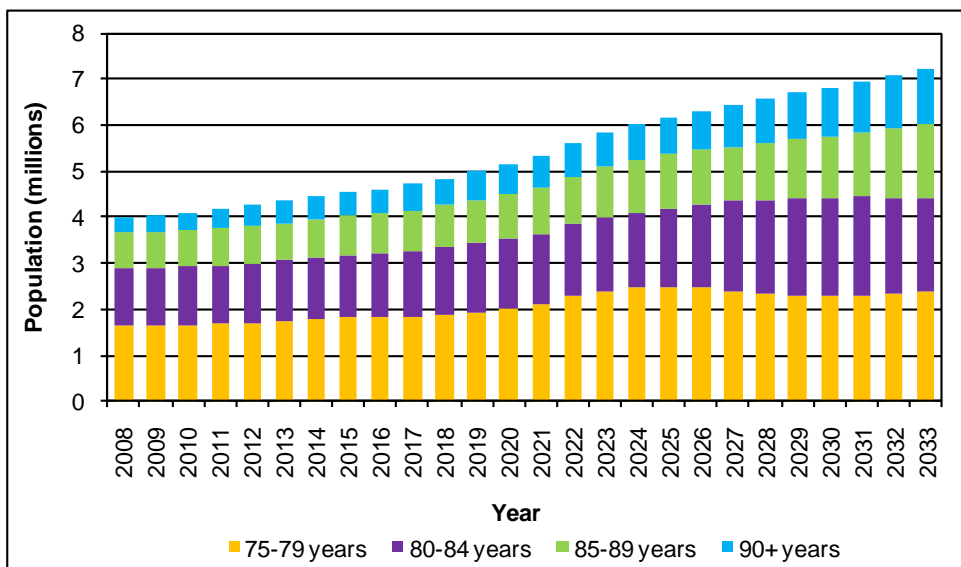
#### 1.1.4 Life expectancy has increased

- In the UK, life expectancy has risen since the early 1980s and is predicted to continue to increase (Dunnell, 2008). In England, life expectancy (period expectation of life at birth) increased by over 6 years in males from 1980–82 to 2006–08, from 71.1 years to 77.7 years, and by over 4 years in females, from 77.0 years to 81.9 years (Office for National Statistics).

#### 1.1.5 Numbers of older people and deaths are projected to increase

- In England, the number of people aged 75 and over is projected to increase over the next 25 years, from 4.0 million in 2008 to 7.2 million in 2033 (Office for National Statistics, 2009). Broken down by age group, this increase is projected to be (Figure 1.5):
  - from 1.7 million to 2.4 million in people aged 75–79 years
  - from 1.2 million to 2.0 million in people aged 80–84 years
  - from 0.8 million to 1.6 million in people aged 85–89 years
  - from 0.4 million to 1.2 million in people aged 90 and over.

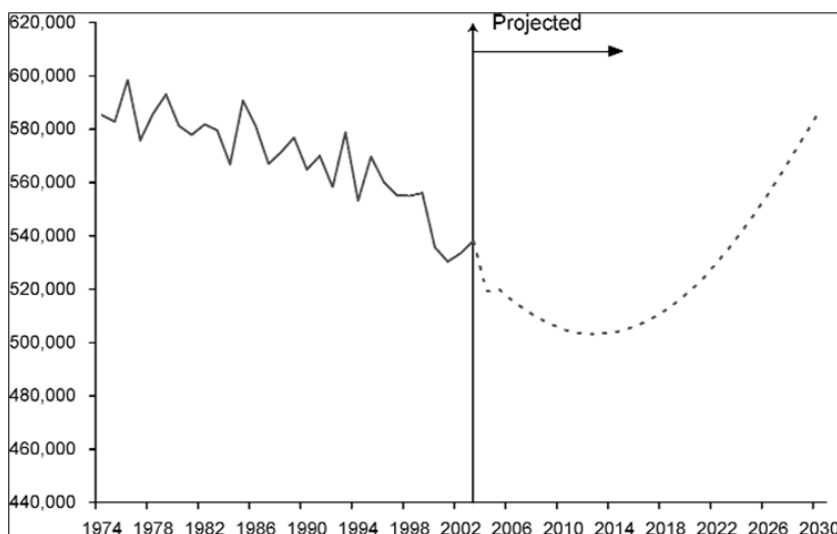
**Figure 1.5: Projected population of people aged 75 and over by age group, England, 2008–33 (based on estimated population in 2008)**



Source: South West Public Health Observatory from Office for National Statistics data (2008-based National Population Projections)

- Since females have a greater life expectancy than males, there are more females in the oldest age groups than males in the UK, but in the future this ratio is expected to become more similar due to improvements in male mortality (Dunnell, 2008). In England, in 1983 there were 336 females aged 85 and over for every 100 males the same age, compared with 214 females for every 100 males in 2008 (Office for National Statistics). By 2033 it is projected that there will be 138 females for every 100 males aged 85 and over (Office for National Statistics, 2009).
- It is predicted that the total number of deaths in England and Wales will continue to decrease to 2012 before increasing by 16.5% to 2030 (to around 590,000) (Figure 1.6), with the proportion of deaths in those aged 85 and over growing from 32% in 2003 to 44% in 2030 (Gomes & Higginson, 2008). Our figures show that by 2008 the proportion of deaths in the 85s and over had reached 35.8% (Source: Office for National Statistics data).

**Figure 1.6: Actual and projected deaths in England and Wales, 1974–2030 (Gomes & Higginson, 2008)**



Source data: Office for National Statistics for actual deaths 1974-2030 and the Government Actuary's Department for future projections (2004 based population projections, 2004-2030)  
 Reproduced with permission from Gomes, B., & Higginson, I. (2008). Where people die (1974–2030): past trends, future projections and implications for care. *Palliative Medicine*, 22, 33–41 doi: 10.1177/0269216307084606

### 1.1.6 Living arrangements differ in males and females

- There are differences in where older males and females live and whether alone. The proportion of older males living alone is lower than for older females, with more males living as a married couple and fewer who are widowed compared with females. Similarly, the proportion of older males living in a communal establishment is lower than for females. (Office for National Statistics, 2009):
  - In 2007, in the 75 and over age group 34% of males and 61% of females lived alone (in Great Britain)
  - In 2007, 61% of males aged 75 and over lived in a married couple household compared with only 28% of females (in Great Britain)
  - In 2007, 27% of males aged 75 and over were widowed compared with 61% of females (in Great Britain)
  - In 2001, 12% of males and 23% of females aged 85 and over lived in a communal establishment (in the UK).
- Factors that are thought to contribute to differences in living arrangements include a greater life expectancy for females than males and a tendency for females to marry males who are older than themselves (Office for National Statistics, 2009).

### 1.1.7 Place and cause of death is related to age

- A previous report, *Variations in Place of Death in England* (South West Public Health Observatory, 2010) showed that the place of death and cause of death in older adults was very different from younger adults, but in that report only very broad age-groups were used (65–84 year-olds and 85 years and older). This did not permit examination of important differences which may occur in deaths across the range of ages of older adults, from old to extreme old age, and related to living conditions, changing patterns of prevalence of disease and causes of death. This report seeks to examine whether such differences occur and what the implications may be for care.

## 2.0 Methodological notes

### 2.1 Source of data

Data on deaths presented in this report are from the Office for National Statistics (ONS) annual mortality extracts for 2006–08. The mortality files contain extracts from death certificates. Key data items used for this analysis include place of death (see 2.3), postcode of 'normal' place of residence, date of birth, gender and cause of death (see 2.5).

The denominator populations used for the calculation of mortality rates were the United Kingdom Association of Cancer Registries (UKACR) population dataset (v5.6) and ONS Mid-Year Population Estimates for England.

### 2.2 Cohort definition

The report includes all deaths registered in England in 2006–08. Therefore, in this report, 'year' refers to the year that the death was registered. Although year of registration may differ from the year of occurrence, this is consistent with the methodology used in ONS *Series DR Mortality Statistics* reports from 2006 onwards.

### 2.3 Place of death

The categorisation of place of death relies on the accuracy of ONS information regarding the nature of establishments caring for the sick. Some care needs to be taken interpreting the hospital and hospice categories in particular. Hospital refers not only to large acute hospitals but also community and psychiatric hospitals (see below). These data will under-report the role of hospices: the death certificate records the physical place of death – not who was caring for a person at the end of their life. This means, for example, if a hospice is actively caring for a person at the end of their life within a hospital setting, the place of death will be recorded as hospital.

The ONS describes the place of death as either one of 84 communal establishment types or 'own residence' or 'elsewhere'. This scheme is further categorised broadly following the scheme used by ONS in their *DH1 General Mortality Statistics* publication:

**Hospital:** NHS or non-NHS, acute, community or psychiatric hospitals/units, includes establishments described by ONS as:

- General Hospital (including convalescent)
- Sanatoria
- Geriatric Hospital or Unit
- Chronic Sick
- Maternity Hospital
- Military Hospital
- Psychiatric Hospital
- Psychiatric Unit
- Mental Hostel
- Mentally Handicapped (Adults)
- Mentally Handicapped (Children)

- Mental Nursing Home
- Psychiatric Hospital (Security)
- Mental Holiday Home
- Mental Aftercare
- Mental Hostel (Autism)
- Mentally Handicapped Home (Adults)
- Mentally Handicapped Home (Children)
- Mentally Infirm (Aged)
- Mental Nursing Home
- Mental Rehabilitation
- Multi-function site.

**Own residence:** the death occurred in the place of usual residence where this is *not* a communal establishment.

**Old people's home:** Local Authority or private residential home.

**Nursing home:** NHS or private nursing home.

**Hospice:** many hospices are 'free standing' but some are found within NHS hospitals. Also, hospices increasingly work in the community. At present ONS classifies the place of death as Hospice only when the event occurred in a freestanding hospice premises.

**Elsewhere:** Other communal establishment or a private address other than normal place of residence or outdoor location or nil recorded.

## 2.4 Analysis by deprivation quintile

Lower Super Output Areas (LSOAs) are small areas of the country specifically devised to improve the reporting and comparison of local statistics. In England there are 32,482 LSOAs (which have a minimum population of 1,000).

The Income Deprivation Affecting Older People Index (IDAOPI) is a supplementary index produced as part of the Index of Multiple Deprivation 2007. This index is a measure of income deprivation affecting older people and is defined as the proportion of adults aged 60 and over living in pension credit (guarantee) households (i.e. receiving means tested benefit). LSOAs were grouped into quintiles of deprivation according to the rank of their deprivation score such that each quintile had an equal resident population aged 60 and over (since IDAOPI is based on adults aged 60 and over).

The residential postcode recorded on the death certificate was used to place each deceased person in an LSOA and assign to that death the deprivation quintile of the LSOA.

It is important to note that if a person lives and then dies in a nursing home, for example, the place of death will be recorded as the nursing home and the residential postcode on the death certificate will be that of the nursing home.

## 2.5 Cause of death

The single 'underlying' cause of death is determined from the death certificate by ONS and coded using the ICD-10 system (International Classification of Disease, Tenth Issue). This code is used to categorise cause of death as follows:

- Cancer: C00 to C97 or D00 to D48 – includes all malignant, benign and in situ neoplasms.
- Respiratory disease: J00 to J99 – includes influenza, pneumonia, bronchitis, emphysema, asthma and other chronic obstructive pulmonary disease.
- Cardiovascular disease: I00 to I52 and I60 to I69 – includes rheumatic fever, rheumatic heart disease, hypertension, ischaemic heart disease, stroke.
- Other: an ‘underlying’ cause of death not included in the first three categories.

An ‘underlying’ cause of death is defined by the World Health Organisation as:

- the disease or injury that initiated the train of events directly linked to death; or
- the circumstances of the accident or violence that produced the fatal injury.

Diseases or conditions, regardless of whether or not they are the ‘underlying’ cause of death, are recorded if they are either part of the causal sequence of events leading to death, or they contribute to the death but are not part of the causal sequence (‘mentions’). However, only the ‘underlying’ cause of death is considered in this report.

According to the ‘rules’ concerning the recording of deaths, people with a particular disease who die from a completely unrelated cause will not have that disease recorded as either an ‘underlying’ or ‘mentioned’ cause of death. For example, a person with cancer who dies of a road accident will not have cancer recorded as either an ‘underlying’ or ‘mentioned’ cause of death. Consequently, the numbers of deaths referred to in this report are not a true measure of the numbers of people ‘who die and who have’ a particular disease, nor are the numbers shown a measure of either: i) incidence (numbers of people newly diagnosed with a disease); or prevalence (numbers of people living with a disease).

In this report, analyses of cause of death are presented for ‘underlying’ cause of death. As described above, the ‘underlying’ causes of death have been grouped into four main categories: cancer, cardiovascular, respiratory and ‘other’ using ICD-10 Chapters. The ‘other’ underlying causes of death category is a mixed group of conditions including dementia, neurodegenerative diseases, external causes (accidents, suicides and homicides), gastrointestinal conditions, diseases of the genitourinary tract and others. Dementia, which is a condition common in the very elderly, and in particular amongst residents of nursing and old people’s homes, also presents specific challenges for end of life care. Dementia appears in both chapters F and G of ICD-10.

## 2.6 Significance testing

### 2.6.1 Differences between proportions

The proportion of deaths in two different groups (for example, to compare the proportion of deaths in hospital in males and females) were compared using z tests under the null hypothesis of no difference between the proportions. The two groups compared are assumed to be independent random samples and the z test depends on the value of:

$$z = (p_A - p_B) / \sqrt{p(1-p)(1/n_A + 1/n_B)}$$

(Where z is distributed under a standard normal distribution,  $z \sim N(0,1)$ ).

Where  $p_A = d_A/n_A$ ,  $p_B = d_B/n_B$  and  $p = (d_A + d_B) / (n_A + n_B)$

$p_A$  is the proportion of deaths in group A (e.g. the proportion of deaths in hospital in males);

$p_B$  is the proportion of deaths in group B (e.g. the proportion of deaths in hospital in females);

$n_A$  is the total number of deaths in group A (e.g. number of deaths in males);

$n_B$  is the total number of deaths in group B (e.g. number deaths in females);

$d_A$  is the number of deaths of interest in group A (e.g. number of deaths in hospital for males);  
 $d_B$  is the number of deaths of interest in group B (e.g. number of deaths in hospital for females).

In this report, two-tailed tests were carried out at the 5% significant level. If the calculated value of  $z$  was smaller than -1.96 or larger than 1.96, the null hypothesis was rejected and the difference between the proportions was considered to be significant.

### 2.6.2 Differences between rates

Rates in two different groups (for example, to compare the age-specific mortality rate in males and females) were compared using a  $z$  test under the null hypothesis of no difference between the rates. The  $z$  statistic was computed as:

$$z = \log(\text{rate}_1 / \text{rate}_2) / \text{standard error of the } \log_e(\text{rate}_1 / \text{rate}_2)$$

(Where  $z$  is distributed under a standard normal distribution,  $z \sim N(0,1)$ ).

Where  $\text{rate}_1$  is the rate in the first group (e.g. the rate in males);  $\text{rate}_2$  is the rate in the second group (e.g. the rate in females); and the standard error of the  $\log_e(\text{rate}_1 / \text{rate}_2)$  is given by:

$$\text{Standard error of the } \log(\text{rate}_1 / \text{rate}_2) = \sqrt{(1/n_1 + 1/n_2)}$$

Where  $n_1$  is the number of deaths in the first group and  $n_2$  is the number of deaths in the second group.

In this report, two-tailed tests were carried out at the 5% significant level. If the calculated value of  $z$  was smaller than -1.96 or larger than 1.96, the null hypothesis was rejected and the difference between the proportions was considered to be significant.

## 3.0 Deaths in people aged 75 and over in England

In this section, we illustrate the current need for end of life care services for older adults by presenting numbers of deaths for the most recent three years of available data (2006–08). To put the numbers of deaths in the context of recent trends, we also present numbers of deaths in the time period 1999–2008 broken down by sex and age.

The demographics of the background population will influence the number of deaths in males and females and in different age groups. To take account of this, mortality rates have been calculated. However, since rates are harder to interpret directly in terms of need for care, these are presented as supporting information in Appendix A rather than in the main body of the report.

### 3.1 Overview of deaths in 2006–08

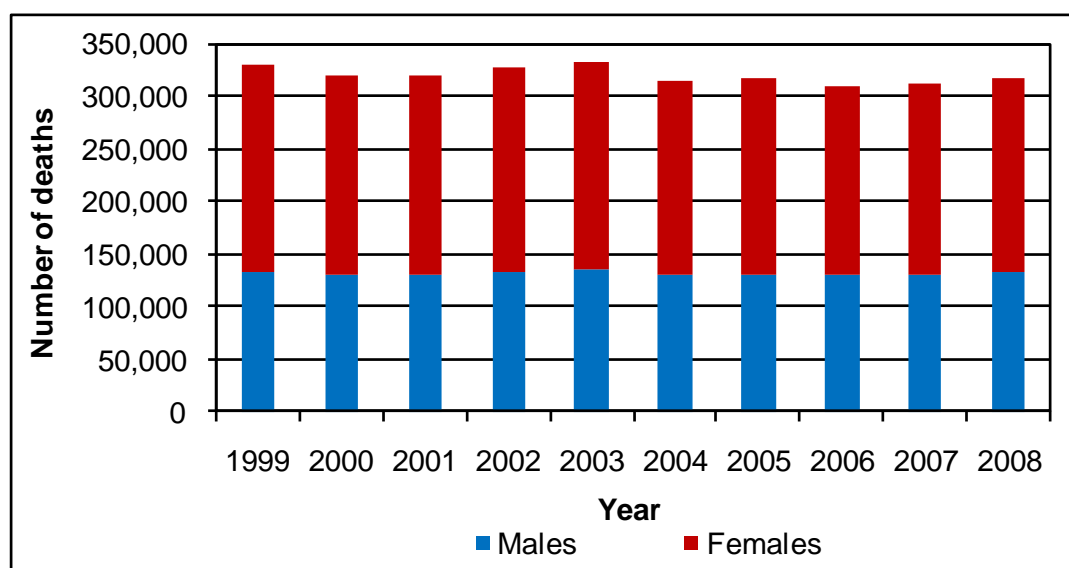
Considering deaths in 2006–08 in people aged 75 and over:

- Each year there were 313,942 deaths on average, accounting for 66.5% of all deaths.
- There were fewer deaths in males (130,862 deaths per year on average) than in females (183,081 deaths).
- In 2006–08, fewer deaths occurred in the youngest age group (75–79 years) than in the older age groups: 65,236 deaths per year on average were in 75–79 year-olds, 84,577 deaths in 80–84 year-olds, 83,488 deaths in 85–89 year-olds and 80,641 deaths in people aged 90 and over.
- Death occurred at younger ages in males than females; in males, 57.7% of deaths (75,433 per year on average) were in the 75–84 age group compared with 40.6% of deaths (74,370 per year on average) in females.

### 3.2 Trends in deaths, 1999–2008

From 1999–2008 there were changes in the number of deaths in people aged 75 and over:

- As a result of improvements in public health and NHS interventions, the number of deaths was lower in 2008 (317,868 deaths) compared with 1999 (329,522 deaths) (Figure 3.1). However the number of deaths in the oldest age groups is expected to increase in future years.
- The proportion of deaths in males increased from 40.3% in 1999 (132,951 deaths) to 41.7% in 2008 (132,565 deaths) and, correspondingly the proportion in females decreased from 59.7% (196,571 deaths) to 58.3% (185,303 deaths).

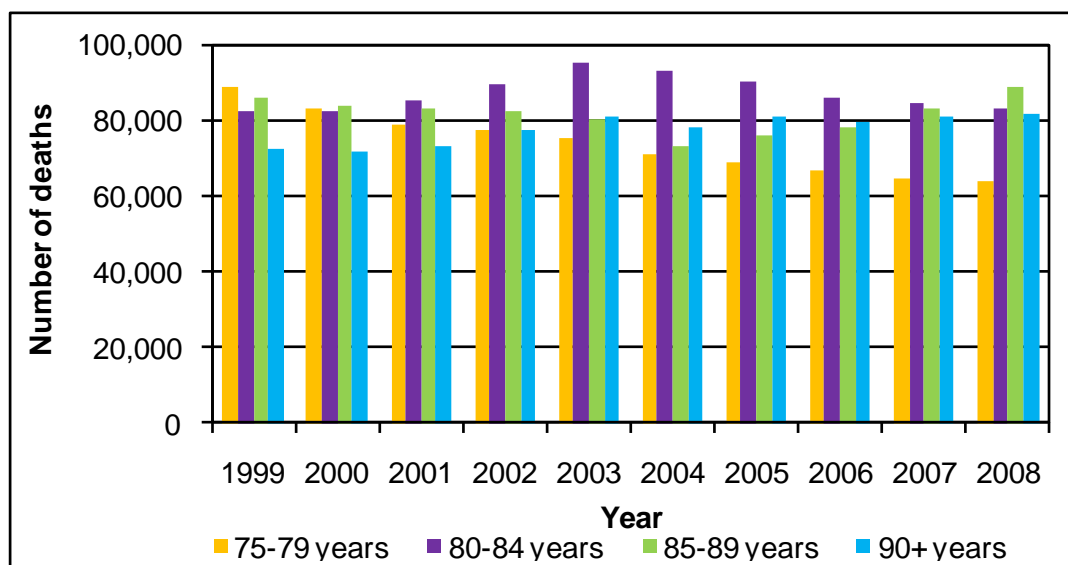
**Figure 3.1: Number of deaths per year in people aged 75 and over by sex, England, 1999–2008**

Source: South West Public Health Observatory from Office for National Statistics data

### 3.3 Trends in deaths by age, 1999–2008

The trends in deaths by age group in people aged 75 and over are complex, and there are differences between age groups. (Numbers of deaths are presented in Figure 3.2 and proportions are presented in Appendix B, Figure B1). Changes in the number of deaths in each age group seem to be partly explained by increased life expectancy and partly by differences in the populations in each age group due to differences in the numbers of births more than 75 years previously. For example, in Appendix C, which shows the number of deaths in people aged 75 and over by year of birth, there are a lower number of deaths in people born in 1916–19 which reflects a lower number of births in 1916–19 (Figures C1 and C2).

- In recent years, there have been more deaths in older age groups, and fewer in younger age groups. In 1999, the largest proportion of deaths was in 75–79 year-olds (26.9%, 88,681 deaths), but in 2008 the largest proportion of deaths was in 85–89 year-olds (28.0%, 88,980 deaths) (Figure 3.2).
- Between 1999 and 2008 the number of deaths in people aged 75–79 years decreased.
- Deaths in people aged 80–84 years increased from 1999–2003, before decreasing from 2003–08.
- Deaths in people aged 85–89 years decreased from 1999–2004, but increased from 2004–08.
- In people aged 90 and over the general trend was an increase in the number of deaths, though there were variations in the number of deaths each year.
- Similar changes were seen in the proportion of deaths in each age group (Figure B1).

**Figure 3.2: Number of deaths in people aged 75 and over by age group, England, 1999–2008**

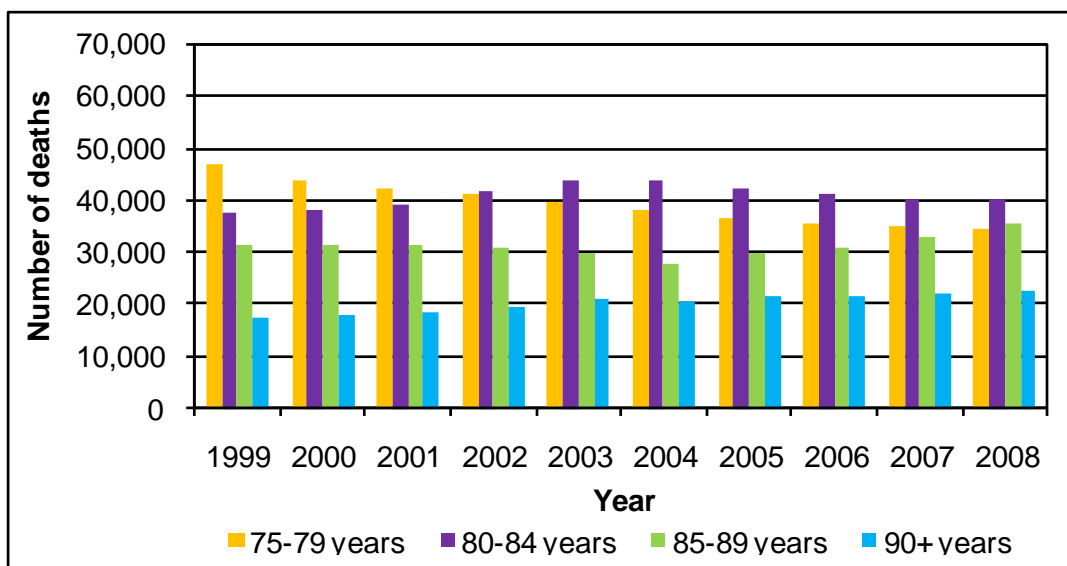
Source: South West Public Health Observatory from Office for National Statistics data

### 3.4 Trends in deaths by age and sex, 1999–2008

When deaths by age group in males and females aged 75 and over are compared, there are striking differences. (Numbers of deaths are presented in Figures 3.3 and 3.4, and proportions of deaths are presented in Appendix B, Figures B2 and B3):

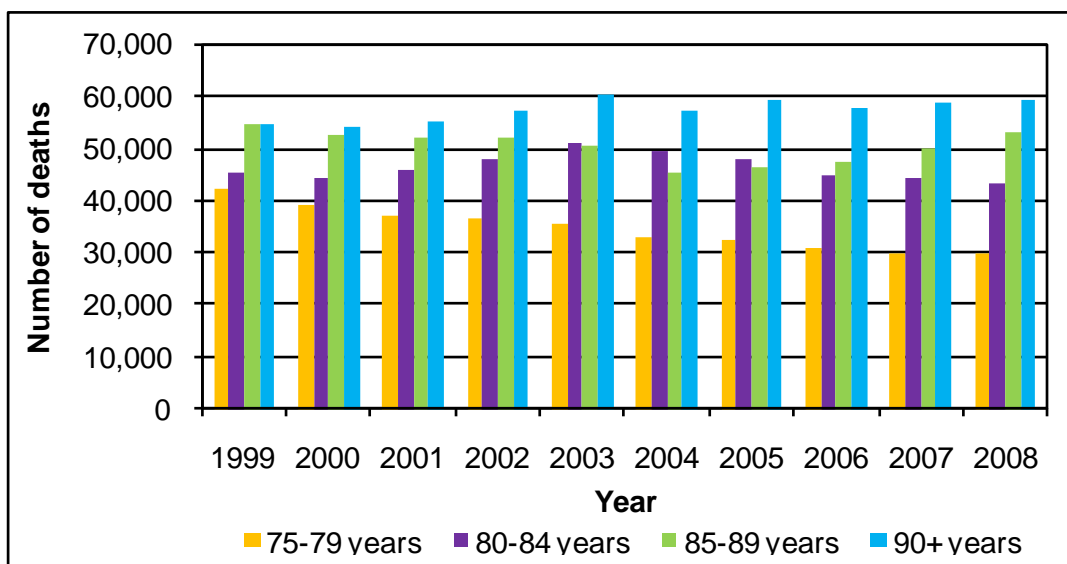
- Throughout 1999–2008, deaths in males were at younger ages compared with females.
- In males, in recent years the highest number of deaths was in 80–84 year-olds (though before 2002, the highest number of deaths was in 75–79 year-olds) and in all years, the lowest number of deaths was in the 90 and over age group.
- This differs to females where, in all years, the highest number of deaths was in the 90 years and over age group and the lowest number of deaths was in 75–79 year-olds.
- Although the numbers and proportions of deaths in each age group differed in males and females, the trends within each age group from 1999–2008 were similar for males and females. For example, in both males and females the number of deaths in the 75–79 age group decreased from 1999–2008, in contrast to deaths in the 90 and over age group which increased (though with some variations from year to year).

Figure 3.3: Number of deaths in males aged 75 and over by age group, England, 1999–2008



Source: South West Public Health Observatory from Office for National Statistics data

Figure 3.4: Number of deaths in females aged 75 and over by age group, England, 1999–2008



Source: South West Public Health Observatory from Office for National Statistics data

## 4.0 Place of death in people aged 75 and over in England

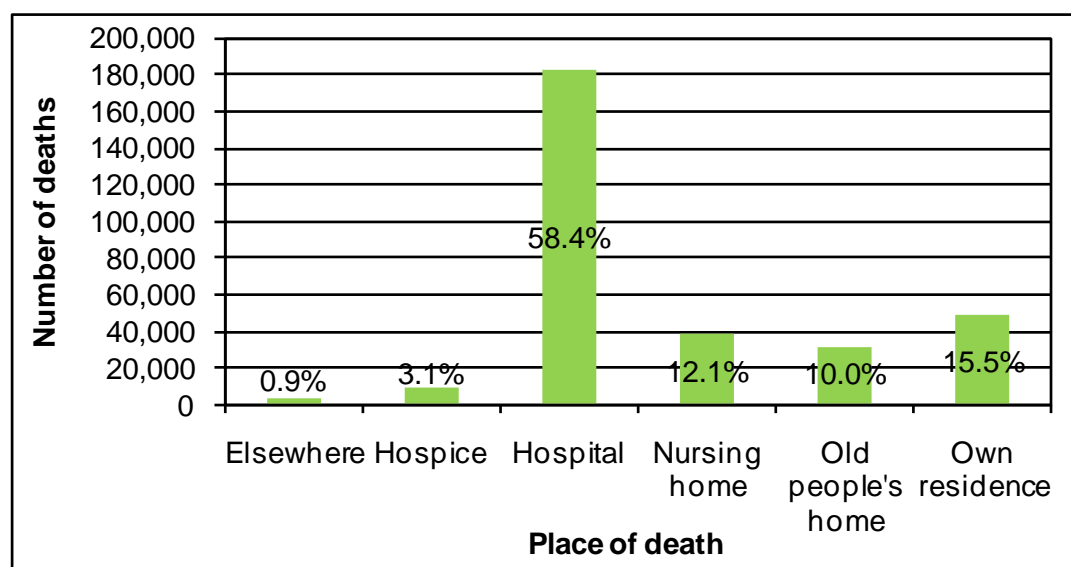
The place of death may be affected by factors such as age, sex, the underlying condition leading to death and the place in which the person is normally resident. The previous report, *Variations in Place of Death in England* (South West Public Health Observatory, 2010), identified differences between place of death in older and younger adults. In this chapter, differences in place of death in older adults according to age and sex are examined in more detail – differences by cause of death are discussed in ‘6.0: Underlying cause and place of death in people aged 75 and over in England’. Details of how the place of death was assigned are given in section ‘2.0: Methodological notes’.

### 4.1 Overview of place of death

As seen previously (*Variations in Place of Death in England* (South West Public Health Observatory, 2010)), most deaths were in hospital (Figure 4.1). However, there were some differences when place of death in the 75 and over age group (2006–08 data) was compared with place of death for all ages from the previous report (2005–07 data). (Average numbers of deaths per year in 2006–08 are given in Appendix D, Table D1). Note that the observed differences in proportions are important and, although overlapping time periods are being compared, the underlying numbers are not materially different:

- 58.4% of people aged 75 and over died in hospital. This was the same as the proportion of deaths in hospital (58.4%) for all age groups in 2005–07.
- In people aged 75 and over, 12.1% of deaths were in nursing homes and 10.0% of deaths were in old people’s homes. This was higher than for all ages in 2005–07, where the proportions were 8.8% and 6.8% respectively.
- 15.5% of people aged 75 and over died in their own residence. This was lower than the proportion for all age groups in 2005–07 (19.1%).
- In the 75 and over age group, 0.9% of deaths were elsewhere and 3.1% of deaths were in a hospice, which were lower than the proportions in all age groups where 2.0% of deaths were elsewhere and 5.0% of deaths were in a hospice.

**Figure 4.1: Place of death for people aged 75 and over, England, 2006–08**



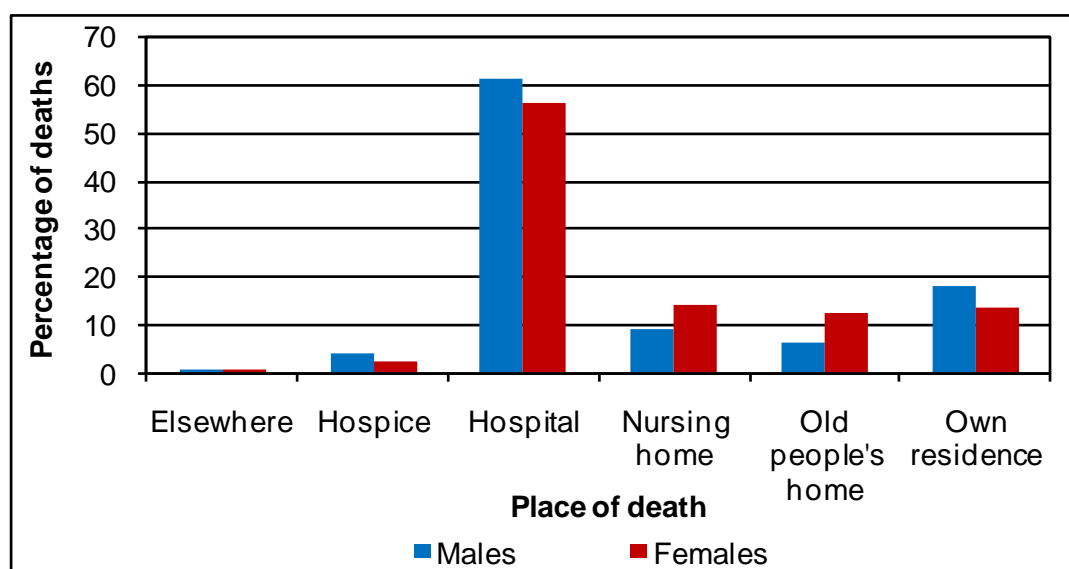
Source: South West Public Health Observatory from Office for National Statistics data

## 4.2 Place of death by sex

There were differences between where males and females died (Average numbers of deaths per year in 2006–08 are given in Appendix D, Table D1). Of deaths in people aged 75 and over in 2006–08.

- A higher proportion of males (61.7%) died in hospital compared with females (56.1%) ( $p < 0.05$ ) (Figure 4.2).
- The proportion of males who died in their own residence (18.4%) was higher than the proportion of females (13.4%) ( $p < 0.05$ ).
- A higher proportion of males (3.9%) aged 75 and over died in hospices compared with females (2.6%) ( $p < 0.05$ ).
- The place of death was 'elsewhere' for a higher proportion of males (1.0%) than females (0.8%) ( $p < 0.05$ ).
- A lower proportion of males (9.0%) died in nursing homes compared with females (14.2%) ( $p < 0.05$ ).
- The proportion of males who died in old people's homes (6.1%) was lower than females (12.8%) ( $p < 0.05$ ).

**Figure 4.2: Proportion of deaths by place in males and females aged 75 and over, England, 2006–08 (proportion of deaths in males and females)**



Source: South West Public Health Observatory from Office for National Statistics data

## 4.3 Place of death by age

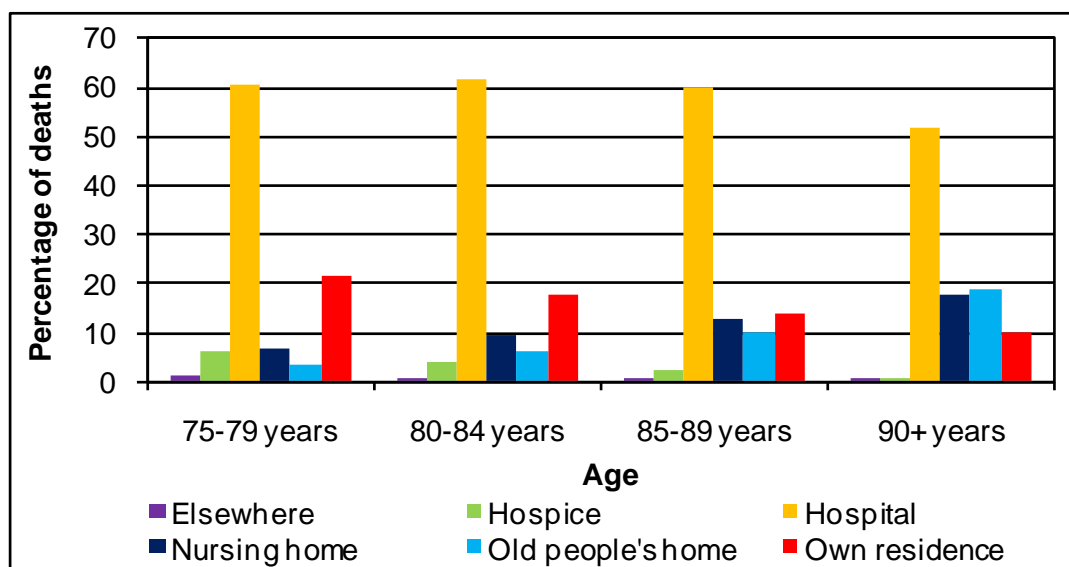
In people aged 75 and over, there were differences in where people died depending on how old they were (Figure 4.3) (Average numbers of deaths per year in 2006–08 are given in Appendix D, Table D1):

- The proportion of deaths in hospital was lower in the oldest age group (51.6% in the 90 and over age group) compared with the other three age groups (60.8% in 75–79 year-olds; 61.5% in 80–84 year-olds and 60.2% in 85–89 year-olds) ( $p < 0.05$  for all).
- The proportion of deaths in nursing homes and old people's homes increased with increasing age ( $p < 0.05$  for all). The proportion of deaths in nursing homes was 6.8% in 75–79 year-olds

compared with 17.9% of the 90 and over group, and the proportions in old people's homes were 3.7% and 18.8% for the same age groups. In people aged 90 and over, 36.7% of deaths were in nursing homes or old people's homes.

- In contrast, proportions of deaths in hospices and at home (own residence) decreased with increasing age ( $p < 0.05$  for all).
- Although the proportion of deaths elsewhere was small, this decreased with increasing age from 1.2% of deaths in 75–79 year-olds to 0.6% of deaths in people aged 90 and over ( $p < 0.05$ ).

**Figure 4.3: Place of death for people aged 75 and over by age group, England, 2006–08 (proportion of deaths in each age group)**



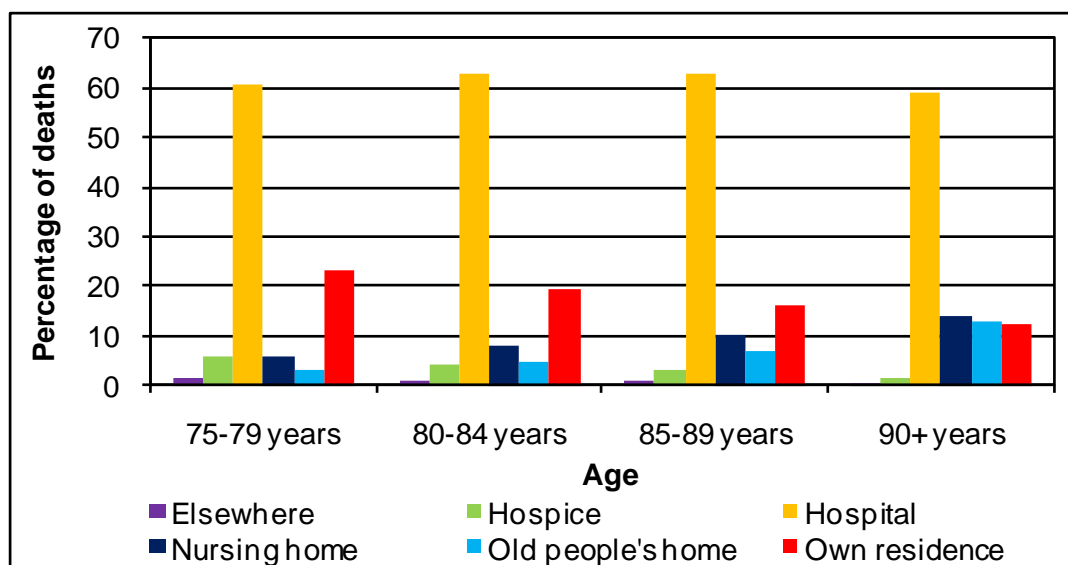
Source: South West Public Health Observatory from Office for National Statistics data

## 4.4 Place of death by age and sex

The general pattern of where people died was largely similar in males and females, though there were some differences (Figures 4.4 and 4.5). Considering deaths in 2006–08 in the 75 and over age group:

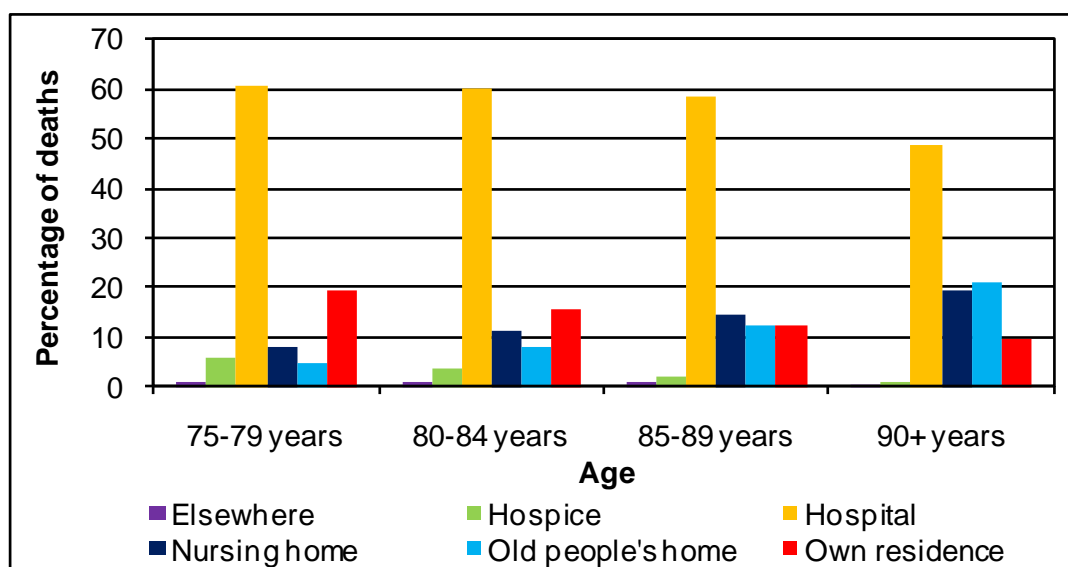
- In females, the proportion of deaths in hospital decreased with increasing age; this was not seen in males. In the oldest age group a higher proportion of males than females died in hospital – in the 90 years and over age group, 58.9% of males died in hospital compared with 48.8% of females ( $p < 0.05$ ).
- In all age groups, the proportion of deaths at home (own residence) was higher for males than females ( $p < 0.05$  for all).
- In all age groups, the proportion of deaths in nursing and old people's homes was higher in females than males ( $p < 0.05$  for all).

Figure 4.4: Place of death for males aged 75 and over by age group, England, 2006–08



Source: South West Public Health Observatory from Office for National Statistics data

Figure 4.5: Place of death for females aged 75 and over by age group, England, 2006–08

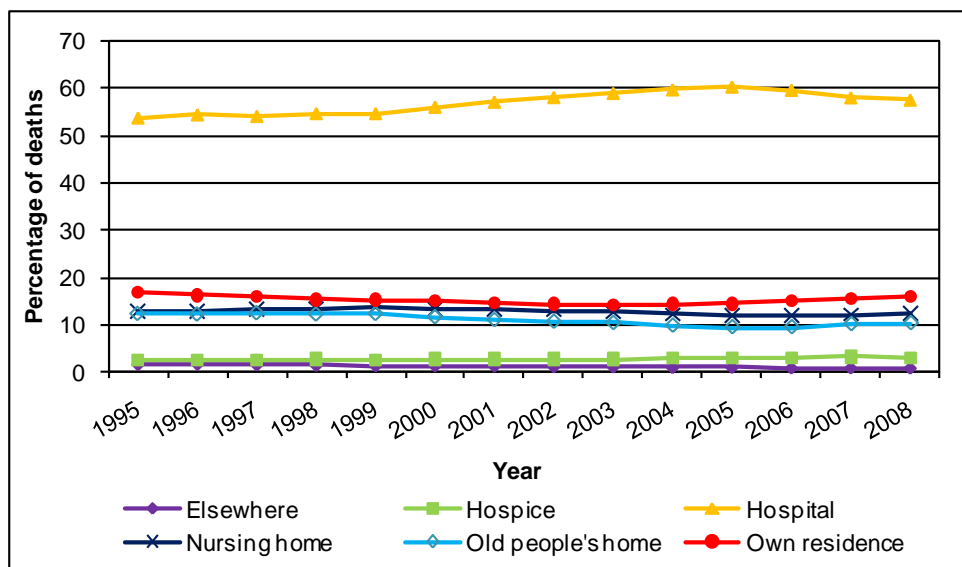


Source: South West Public Health Observatory from Office for National Statistics data

## 4.5 Trends in place of death by age

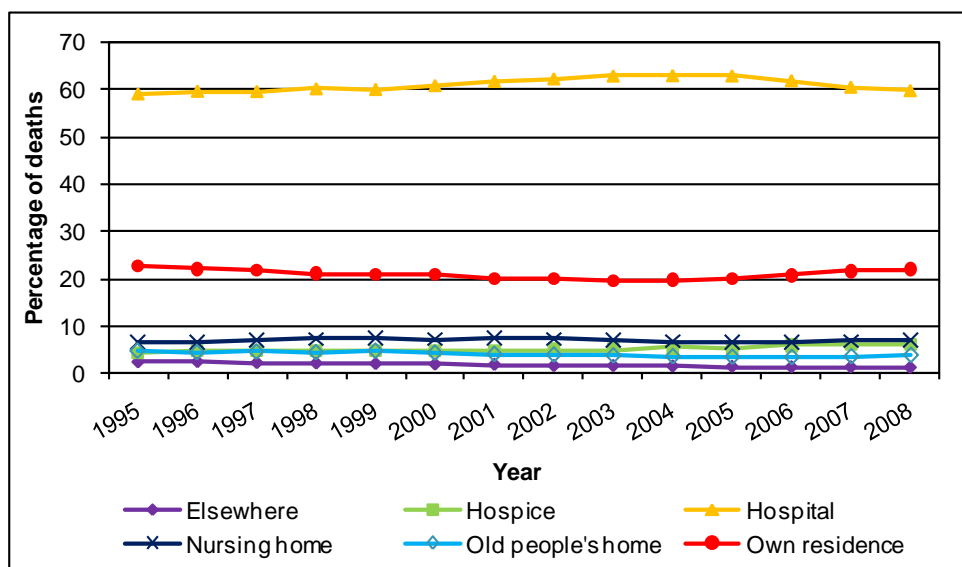
The proportions dying in various locations are markedly different for each age group of people aged 75 and over. Also, there appears to have been a trend in all age groups for deaths in hospital to increase over the first 10 years of the period 1995–2008 and then to plateau. Over the same time period, the proportion of deaths in old people's homes has reduced in the 80 and above age groups. The proportion of deaths in a person's own residence appears to fall slightly and then to increase again, inversely reflecting the trends in deaths in hospital and/or old people's homes.

Figure 4.6: Place of death (proportion of deaths) in people aged 75 and over, England, 1995–2008



Source: South West Public Health Observatory from Office for National Statistics data

Figure 4.7: Place of death (proportion of deaths) in people aged 75–79 years, England, 1995–2008



Source: South West Public Health Observatory from Office for National Statistics data

Figure 4.8: Place of death (proportion of deaths) in persons aged 80–84 years, England, 1995–2008

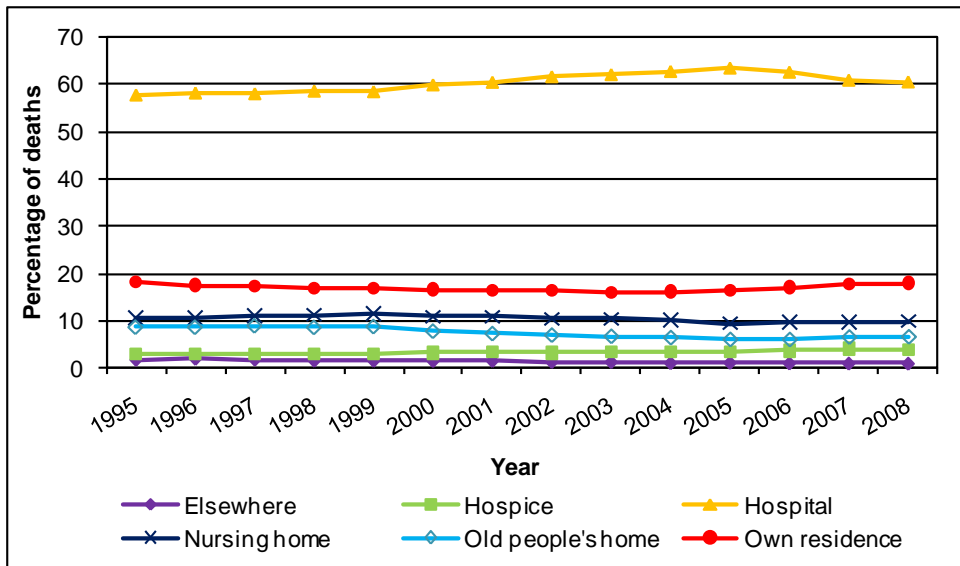


Figure 4.9: Place of death (proportion of deaths) in persons aged 85–89 years, England, 1995–2008

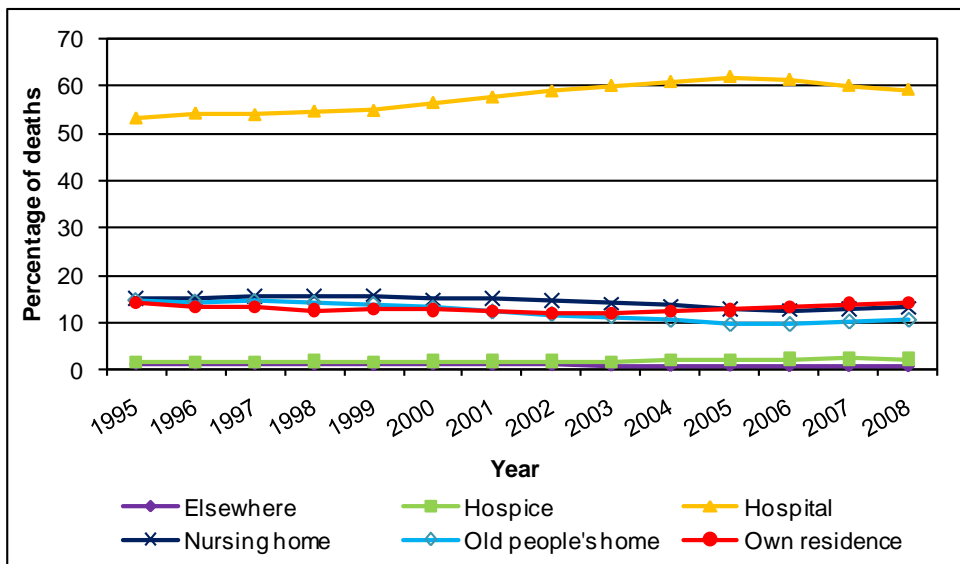
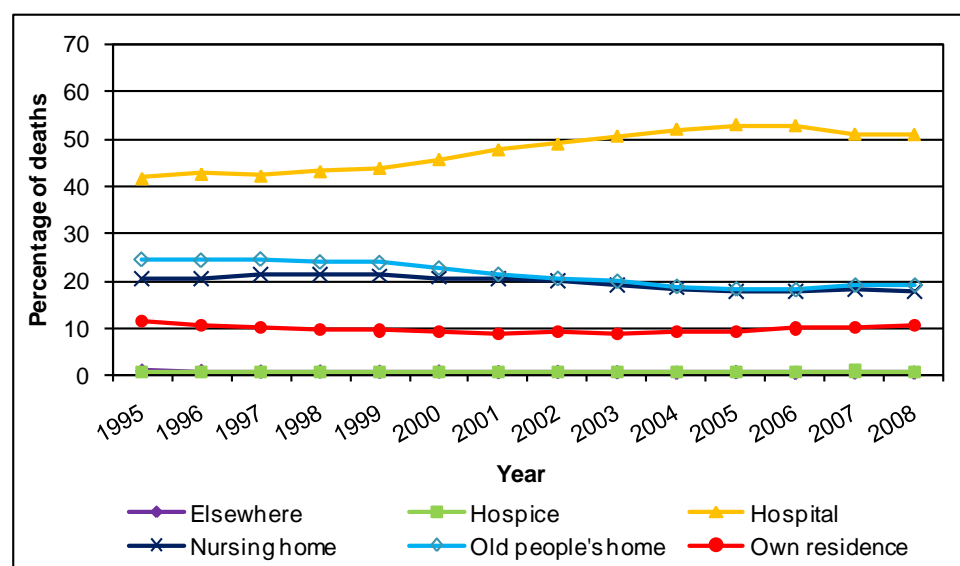


Figure 4.10: Place of death (proportion of deaths) in persons aged 90 years and over, England, 1995–2008



Source: All charts this page: South West Public Health Observatory from Office for National Statistics data

## 5.0 Underlying cause of death in people aged 75 and over in England

Cause of death is an important factor in the type of care needed at the end of life and also the place of death. Analyses of underlying causes of death in people aged 75 and over, grouped into four categories, as well as more detailed analyses of specific causes of death are presented. Categories used are:

- Cancer – includes all malignant, benign and in situ neoplasms.
- Respiratory disease – includes influenza, pneumonia, bronchitis, emphysema, asthma and other chronic obstructive pulmonary disease.
- Cardiovascular disease – includes rheumatic fever, rheumatic heart disease, hypertension, ischaemic heart disease, stroke.
- Other – an ‘underlying’ cause of death not included in the first three categories.

Since the ‘other’ category includes a wide range of conditions, further analyses are also presented evaluating the relative contributions of more specific causes to ‘other’ deaths.

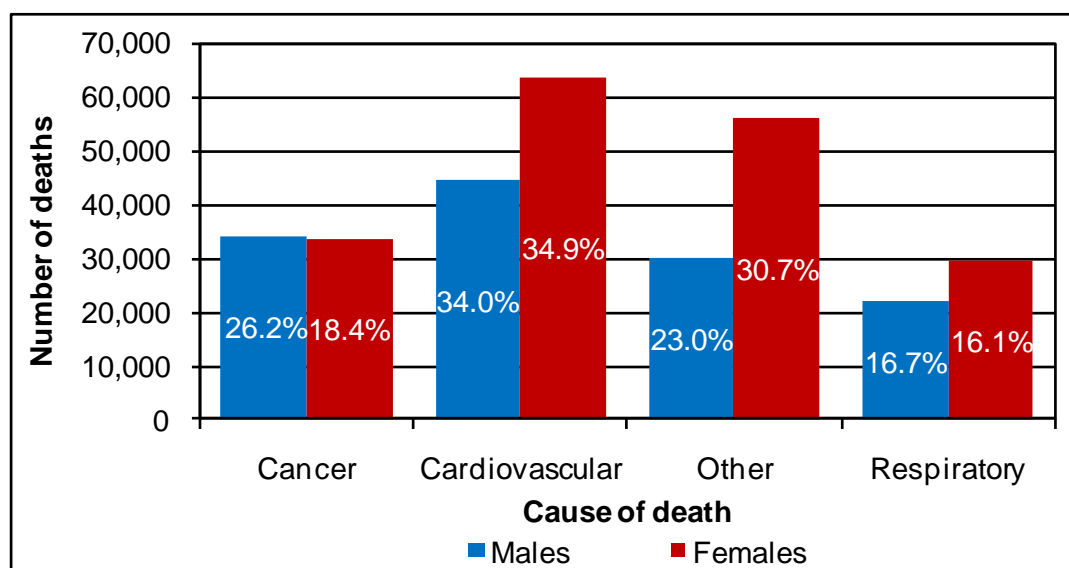
### 5.1 Overview of underlying causes of death

- Considering deaths in people aged 75 and over (2006–08), each year there were, on average, 108,342 (34.5%) deaths from cardiovascular disease; 86,290 (27.5%) deaths from ‘other’ causes; 67,865 deaths (21.6%) from cancer; and 51,445 (16.4%) deaths from respiratory disease.

### 5.2 Underlying cause of death by sex

- There are differences between males and females in underlying cause of death in people aged 75 and over (Figure 5.1). Although the largest proportion of deaths were from cardiovascular disease in both males (34%) and females (34.9%), in males the second largest proportion of deaths was from cancer (26.2%), but in females this was ‘other’ causes (30.7%).

**Figure 5.1: Average number of deaths per year by underlying cause and sex in people aged 75 and over, England, 2006–08 (labels give proportions of deaths from each cause in males and females)**



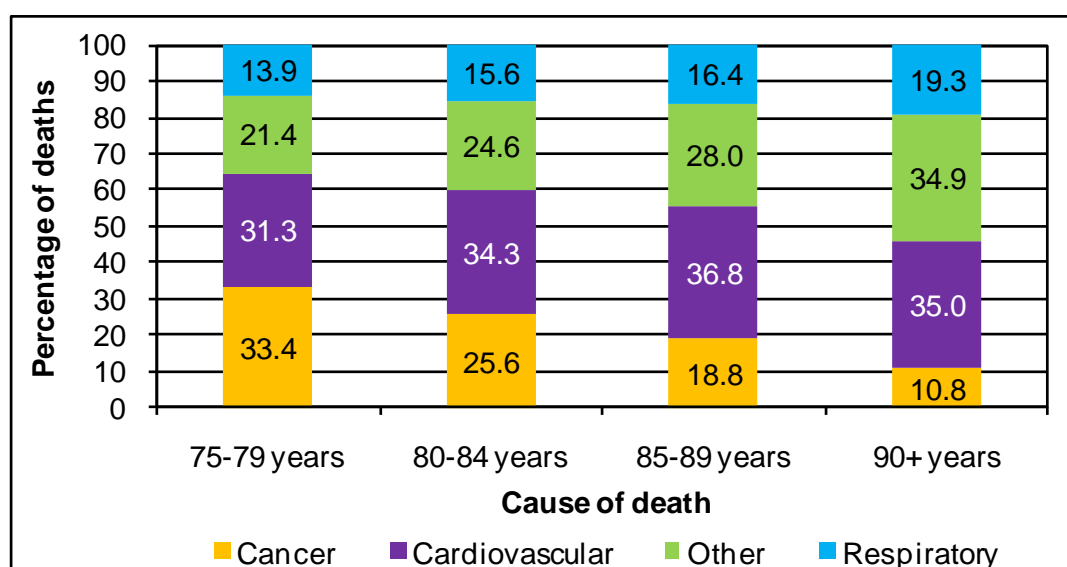
Source: South West Public Health Observatory from Office for National Statistics data

### 5.3 Underlying cause of death by age

There are differences in the underlying cause of death in people aged 75 and over depending on age (Figure 5.2). Considering deaths in 2006–08 in people aged 75 and over:

- Deaths in older age groups were less likely to be from cancer, but more likely to be from cardiovascular disease, 'other' causes and respiratory disease in comparison to younger age groups. The proportion of deaths from cancer decreased with increasing age, in contrast to deaths from cardiovascular disease, 'other' causes and respiratory disease which increased (75–79 age group compared with 90 and over,  $p < 0.05$ ).
- The main underlying cause of death differed according to age. In 75–79 year-olds, the most common cause of death was cancer (33.4%, 21,798 per year), while cardiovascular disease was the most common cause in 80–84 year-olds (34.3%, 28,965 deaths), 85–89 year-olds (36.8%, 30,732 deaths) and people aged 90 and over (35.0%, 28,249 deaths).

**Figure 5.2: Underlying cause of death by age, proportion of deaths in people aged 75 and over in England, 2006–08 (labels give percentage of deaths in age group)**



Source: South West Public Health Observatory from Office for National Statistics data

### 5.4 Underlying cause of death by age and sex

Although general patterns in underlying cause of death are similar, there are differences in causes of death for males and females (numbers of deaths are presented in Table 5.1 and proportions of deaths in Figures 5.3 and 5.4). For deaths in people aged 75 and over:

- In all age groups except 90 and over, the main underlying cause was the same in males, females and persons. However, in the 90 and over age group, in females the most common cause of death was 'other' causes (37.1%), though in males it was cardiovascular disease (33.9%).
- A higher proportion of males than females die from cancer. In all age groups, the proportion of deaths from cancer was higher in males than females ( $p < 0.05$ ).
- A higher proportion of females than males die from other causes. In all age groups, the proportion of deaths from 'other' causes was higher in females than males ( $p < 0.05$  for all).

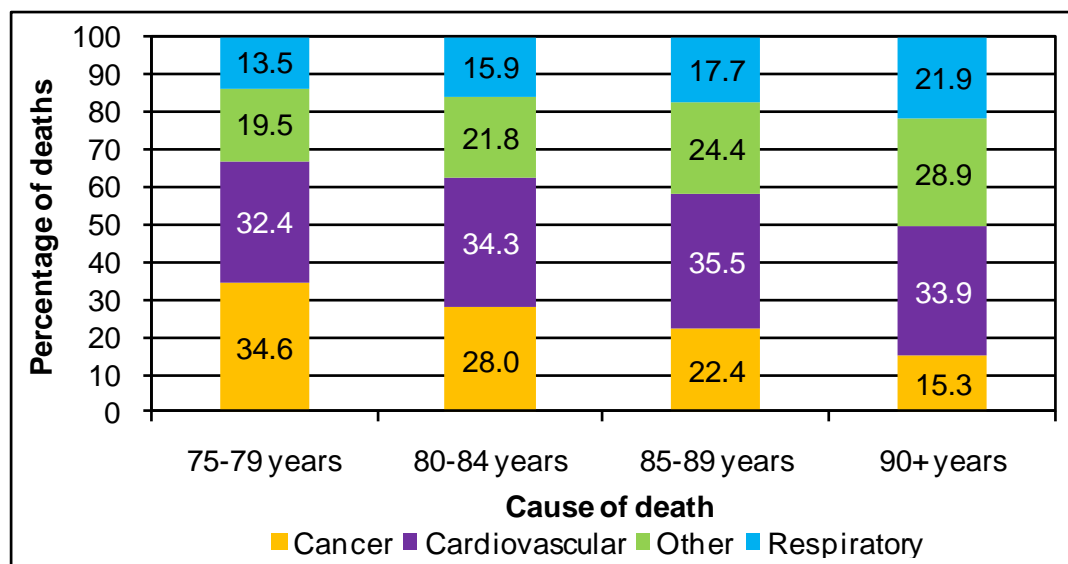
- In the two oldest age groups (85–89 years and 90 years and over), in males a greater proportion of deaths were from respiratory disease and a lower proportion were from cardiovascular disease compared with females ( $p < 0.05$  for all).

**Table 5.1: Average number of deaths per year in people aged 75 and over, by underlying cause, age group and sex, England, 2006–08**

Age group	Sex	Underlying cause of death				
		Cancer	Cardio-vascular	Other	Respiratory	All causes
75-79 years	Males	12,103	11,339	6,843	4,740	35,024
	Females	9,695	9,056	7,126	4,335	30,212
	Persons	21,798	20,395	13,969	9,075	65,236
80-84 years	Males	11,321	13,866	8,805	6,427	40,419
	Females	10,328	15,099	12,007	6,723	44,158
	Persons	21,649	28,965	20,812	13,150	84,577
85-89 years	Males	7,459	11,829	8,124	5,894	33,305
	Females	8,231	18,904	15,274	7,774	50,183
	Persons	15,690	30,733	23,398	13,668	83,488
90+ years	Males	3,388	7,499	6,384	4,841	22,113
	Females	5,340	20,750	21,727	10,711	58,528
	Persons	8,728	28,249	28,111	15,552	80,641
<b>All 75+ years</b>	<b>Persons</b>	<b>67,865</b>	<b>108,342</b>	<b>86,290</b>	<b>51,445</b>	<b>313,942</b>

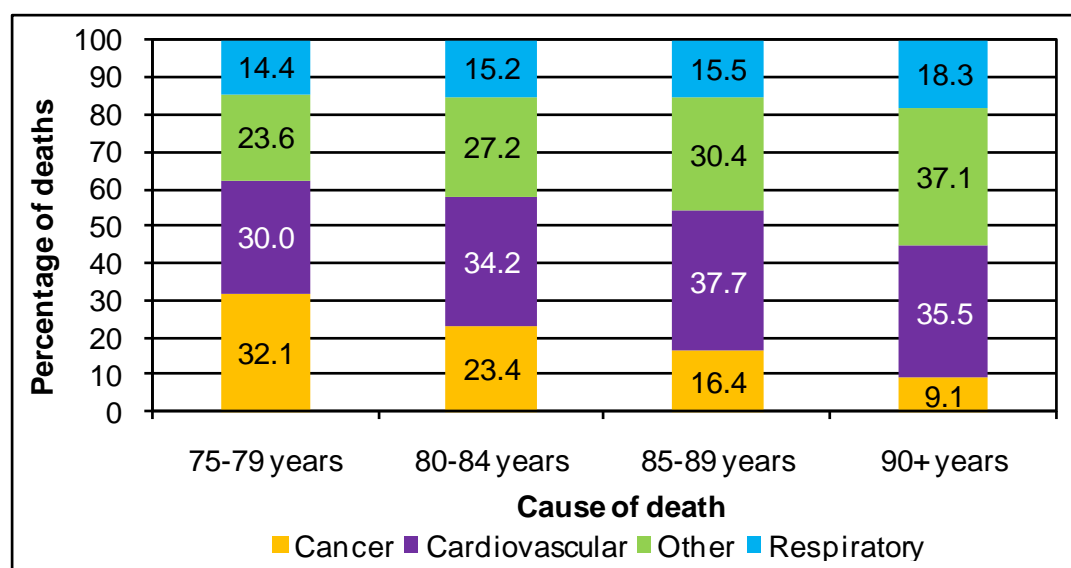
Source: South West Public Health Observatory from Office for National Statistics data

**Figure 5.3: Underlying cause of death by age in males, proportion of deaths in males aged 75 and over in England, 2006–08 (labels give percentage of deaths in age group)**



Source: South West Public Health Observatory from Office for National Statistics data

**Figure 5.4: Underlying cause of death by age in females, proportion of deaths in females aged 75 and over in England, 2006–08 (labels give percentage of deaths in age group)**



Source: South West Public Health Observatory from Office for National Statistics data

## 5.5 Ten most common underlying causes of death in people aged 75 and over

The following more detailed analyses give the most common ICD-10 codes for deaths in males and females aged 75 and over, to investigate what proportion of deaths are due to specific conditions such as dementia.

### 5.5.1 Ten most common underlying causes of death

The ten most frequent underlying causes of death in people aged 75 and over are summarised in Table 5.2:

**Table 5.2: Ten most common underlying causes of death in people aged 75 and over, persons, England, 2006–08**

Description	Underlying cause category	n (average per year)	% deaths
I25: Chronic ischaemic heart disease	Cardiovascular	31,296	10.0%
J18: Pneumonia, organism unspecified	Respiratory	23,085	7.4%
I21: Acute myocardial infarction	Cardiovascular	19,344	6.2%
I64: Stroke, not specified as haemorrhage or infarction	Cardiovascular	18,878	6.0%
J44: Other chronic obstructive pulmonary disease	Respiratory	14,711	4.7%
C34: Malignant neoplasm of bronchus and lung	Cancer	13,278	4.2%
F03: Unspecified dementia	Other	12,955	4.1%
I67: Other cerebrovascular diseases	Cardiovascular	9,154	2.9%
R54: Senility	Other	8,855	2.8%
I50: Heart failure	Cardiovascular	7,049	2.2%
<b>Total (ten most common causes)</b>		<b>158,605</b>	<b>50.5%</b>
<b>All causes</b>		<b>313,942</b>	

Source: South West Public Health Observatory from Office for National Statistics data

### 5.5.2 Ten most common underlying causes of death by sex

There were differences in the most common underlying causes of death for males and females aged 75 and over (Tables 5.3 and 5.4):

- Deaths from chronic ischaemic heart disease, acute myocardial infarction, other chronic obstructive pulmonary disease and malignant neoplasm of bronchus and lung accounted for a higher proportion of deaths in males than females ( $p < 0.05$  for all).
- Deaths from pneumonia, stroke and dementia accounted for a higher proportion of deaths in females than males ( $p < 0.05$  for all).
- Two sex-specific cancers were in the ten most common causes of death in people aged 75 and over: prostate cancer (4.7% of male deaths) and breast cancer (2.5% of female deaths).
- Aortic aneurysm and dissection appeared in the ten most common causes for males (2.2%) but not for females (1.3% of deaths), and senility appeared in the ten most common causes for females (3.9%) but not for males (1.3% of deaths).
- It is important to note that the absolute number of deaths may be greater for one gender compared with the other, even if the proportion of deaths is smaller. For example, there are fewer deaths from chronic ischaemic heart disease in males than females though the proportion of deaths is greater in males than females.

**Table 5.3: Ten most common underlying causes of death in males aged 75 and over, England, 2006–08**

Description	Underlying cause category	n (average per year)	% deaths
I25: Chronic ischaemic heart disease	Cardiovascular	15,015	11.5%
I21: Acute myocardial infarction	Cardiovascular	9,338	7.1%
J18: Pneumonia, organism unspecified	Respiratory	8,525	6.5%
J44: Other chronic obstructive pulmonary disease	Respiratory	7,425	5.7%
C34: Malignant neoplasm of bronchus and lung	Cancer	7,396	5.7%
I64: Stroke, not specified as haemorrhage or infarction	Cardiovascular	6,322	4.8%
C61: Malignant neoplasm of prostate	Cancer	6,214	4.7%
F03: Unspecified dementia	Other	3,503	2.7%
I67: Other cerebrovascular diseases	Cardiovascular	3,336	2.5%
I71: Aortic aneurysm and dissection	Other	2,833	2.2%
<b>Total (ten most common causes)</b>		<b>69,907</b>	<b>53.4%</b>
<b>All causes</b>		<b>130,862</b>	

Source: South West Public Health Observatory from Office for National Statistics data

**Table 5.4: Ten most common underlying causes of death in females aged 75 and over, England, 2006–08**

Description	Underlying cause category	n (average per year)	% deaths
I25: Chronic ischaemic heart disease	Cardiovascular	16,281	8.9%
J18: Pneumonia, organism unspecified	Respiratory	14,560	8.0%
I64: Stroke, not specified as haemorrhage or infarction	Cardiovascular	12,556	6.9%
I21: Acute myocardial infarction	Cardiovascular	10,006	5.5%
F03: Unspecified dementia	Other	9,452	5.2%
J44: Other chronic obstructive pulmonary disease	Respiratory	7,285	4.0%
R54: Senility	Other	7,203	3.9%
C34: Malignant neoplasm of bronchus and lung	Cancer	5,883	3.2%
I67: Other cerebrovascular diseases	Cardiovascular	5,818	3.2%
C50: Malignant neoplasm of breast	Cancer	4,539	2.5%
<b>Total (ten most common causes)</b>		<b>93,583</b>	<b>51.3%</b>
<b>All causes</b>		<b>183,081</b>	

Source: South West Public Health Observatory from Office for National Statistics data

### 5.5.3 Ten most common underlying causes of death by sex and age

There were differences in the ten most common underlying causes of death in people aged 75 and over depending on age and sex (Tables 5.5–5.8). Of particular interest were the proportions of deaths from dementia, stroke and senility:

- Dementia was one of the ten most common causes of death in females aged 75–79 years (2.2%), but was not in the ten most common causes of death in males the same age (1.4% of deaths). There was a lower proportion of deaths from dementia in males than females in all age groups ( $p < 0.05$ ). The proportion of deaths from dementia increased with age in both males and females (comparison of consecutive age groups,  $p < 0.05$ ).
- In all age groups, stroke was an important cause of death. The proportion of deaths from stroke was lower in males than females ( $p < 0.05$  for all age groups). The proportion of deaths from stroke increased with increasing age in males and females (comparison of consecutive age groups,  $p < 0.05$ ).
- Senility is one of the ten most common causes of death in females aged 85–89 years and 90 years and over, and in males aged 90 years and over. The proportion of deaths from senility increased with age (comparison of consecutive age groups,  $p < 0.05$ ). In males, 0.1% deaths in the 75–79 years age group were due to senility, compared with 0.4% in 80–84 year-olds, 1.1% in 85–89 year-olds and 5.1% in the 90 and over group. In females, 0.1% deaths in the 75–79 years age group were due to senility, compared with 1.0% in 80–84 year-olds, 2.4% in 85–89 year-olds and 9.4% in the 90 and over group.
- In people aged 85 and over, pneumonia (organism unspecified) accounted for a large proportion of deaths, with a similar proportion in males and females. The proportion of deaths from pneumonia increased with increasing age (comparison of consecutive age groups,  $p < 0.05$ ), from 3.6% of deaths in males aged 75–79 years and 4.3% in females, compared with 12.1% of deaths in males aged 90 and over and 11.7% of deaths in females.
- Although there were differences in the proportion of deaths from different causes in different age groups, chronic ischaemic heart disease was an important cause of death in all age groups for both males and females.

**Table 5.5: Ten most common underlying causes of death in people aged 75–79 years by sex and age, England, 2006–08****(a) Males aged 75–79 years**

Cause of death	% deaths
I25: Chronic ischaemic heart disease	11.9%
C34: Malignant neoplasm of bronchus and lung	8.7%
I21: Acute myocardial infarction	7.9%
J44: Other chronic obstructive pulmonary disease	6.2%
C61: Malignant neoplasm of prostate	4.7%
I64: Stroke, not specified as haemorrhage or infarction	3.9%
J18: Pneumonia, organism unspecified	3.6%
I71: Aortic aneurysm and dissection	2.6%
C18: Malignant neoplasm of colon	2.3%
C80: Malignant neoplasm without specification of site	2.2%
<b>Total (ten most common causes)</b>	<b>53.9%</b>

**(b) Females aged 75–79 years**

Cause of death	% deaths
I25: Chronic ischaemic heart disease	8.4%
C34: Malignant neoplasm of bronchus and lung	7.3%
J44: Other chronic obstructive pulmonary disease	6.6%
I21: Acute myocardial infarction	6.1%
I64: Stroke, not specified as haemorrhage or infarction	5.0%
J18: Pneumonia, organism unspecified	4.3%
C50: Malignant neoplasm of breast	3.9%
C80: Malignant neoplasm without specification of site	2.8%
F03: Unspecified dementia	2.2%
C18: Malignant neoplasm of colon	2.1%
<b>Total (ten most common causes)</b>	<b>48.7%</b>

Note: Percentages may not add to total due to rounding.

Source: South West Public Health Observatory from Office for National Statistics data

**Table 5.6: Ten most common underlying causes of death in people aged 80–84 years by sex and age, England, 2006–08****(a) Males aged 80–84 years**

Cause of death	% deaths
I25: Chronic ischaemic heart disease	11.8%
I21: Acute myocardial infarction	7.6%
J44: Other chronic obstructive pulmonary disease	6.2%
C34: Malignant neoplasm of bronchus and lung	6.2%
J18: Pneumonia, organism unspecified	5.3%
C61: Malignant neoplasm of prostate	4.9%
I64: Stroke, not specified as haemorrhage or infarction	4.8%
I67: Other cerebrovascular diseases	2.4%
I71: Aortic aneurysm and dissection	2.3%
F03: Unspecified dementia	2.3%
<b>Total (ten most common causes)</b>	<b>53.8%</b>

**(b) Females aged 80–84 years**

Cause of death	% deaths
I25: Chronic ischaemic heart disease	9.1%
I64: Stroke, not specified as haemorrhage or infarction	6.4%
I21: Acute myocardial infarction	6.1%
J18: Pneumonia, organism unspecified	5.9%
J44: Other chronic obstructive pulmonary disease	5.5%
C34: Malignant neoplasm of bronchus and lung	4.6%
F03: Unspecified dementia	3.9%
C50: Malignant neoplasm of breast	2.8%
I67: Other cerebrovascular diseases	2.7%
C80: Malignant neoplasm without specification of site	2.3%
<b>Total (ten most common causes)</b>	<b>49.3%</b>

Note: Percentages may not add to total due to rounding.

Source: South West Public Health Observatory from Office for National Statistics data

**Table 5.7: Ten most common underlying causes of death in people aged 85–89 years by sex and age, England, 2006–08****(a) Males aged 85–89 years**

Cause of death	% deaths
I25: Chronic ischaemic heart disease	11.5%
J18: Pneumonia, organism unspecified	7.4%
I21: Acute myocardial infarction	7.0%
J44: Other chronic obstructive pulmonary disease	5.5%
I64: Stroke, not specified as haemorrhage or infarction	5.3%
C61: Malignant neoplasm of prostate	4.9%
C34: Malignant neoplasm of bronchus and lung	4.2%
F03: Unspecified dementia	3.4%
I67: Other cerebrovascular diseases	3.0%
I50: Heart failure	2.4%
<b>Total (ten most common causes)</b>	<b>54.6%</b>

**(b) Females aged 85–89 years**

Cause of death	% deaths
I25: Chronic ischaemic heart disease	9.5%
J18: Pneumonia, organism unspecified	7.7%
I64: Stroke, not specified as haemorrhage or infarction	7.4%
I21: Acute myocardial infarction	6.0%
F03: Unspecified dementia	5.7%
J44: Other chronic obstructive pulmonary disease	3.6%
I67: Other cerebrovascular diseases	3.6%
I50: Heart failure	2.6%
R54: Senility	2.4%
C34: Malignant neoplasm of bronchus and lung	2.3%
<b>Total (ten most common causes)</b>	<b>50.7%</b>

Note: Percentages may not add to total due to rounding.

Source: South West Public Health Observatory from Office for National Statistics data

**Table 5.8: Ten most common underlying causes of death in people aged 90 years and over by sex and age, England, 2006–08****(a) Males aged 90 years and over**

Cause of death	% deaths
J18: Pneumonia, organism unspecified	12.1%
I25: Chronic ischaemic heart disease	10.1%
I64: Stroke, not specified as haemorrhage or infarction	5.6%
I21: Acute myocardial infarction	5.3%
R54: Senility	5.1%
C61: Malignant neoplasm of prostate	4.3%
F03: Unspecified dementia	4.3%
J44: Other chronic obstructive pulmonary disease	4.1%
I67: Other cerebrovascular diseases	3.4%
I50: Heart failure	3.3%
<b>Total (ten most common causes)</b>	<b>57.6%</b>

**(b) Females aged 90 years and over**

Cause of death	% deaths
J18: Pneumonia, organism unspecified	11.7%
R54: Senility	9.4%
I25: Chronic ischaemic heart disease	8.5%
I64: Stroke, not specified as haemorrhage or infarction	7.6%
F03: Unspecified dementia	7.2%
I21: Acute myocardial infarction	4.2%
I67: Other cerebrovascular diseases	3.9%
I50: Heart failure	3.3%
J98: Other respiratory disorders	2.7%
N39: Other disorders of urinary system	2.4%
<b>Total (ten most common causes)</b>	<b>61.0%</b>

Note: Percentages may not add to total due to rounding.

Source: South West Public Health Observatory from Office for National Statistics data

## 5.6 'Other' underlying causes of death

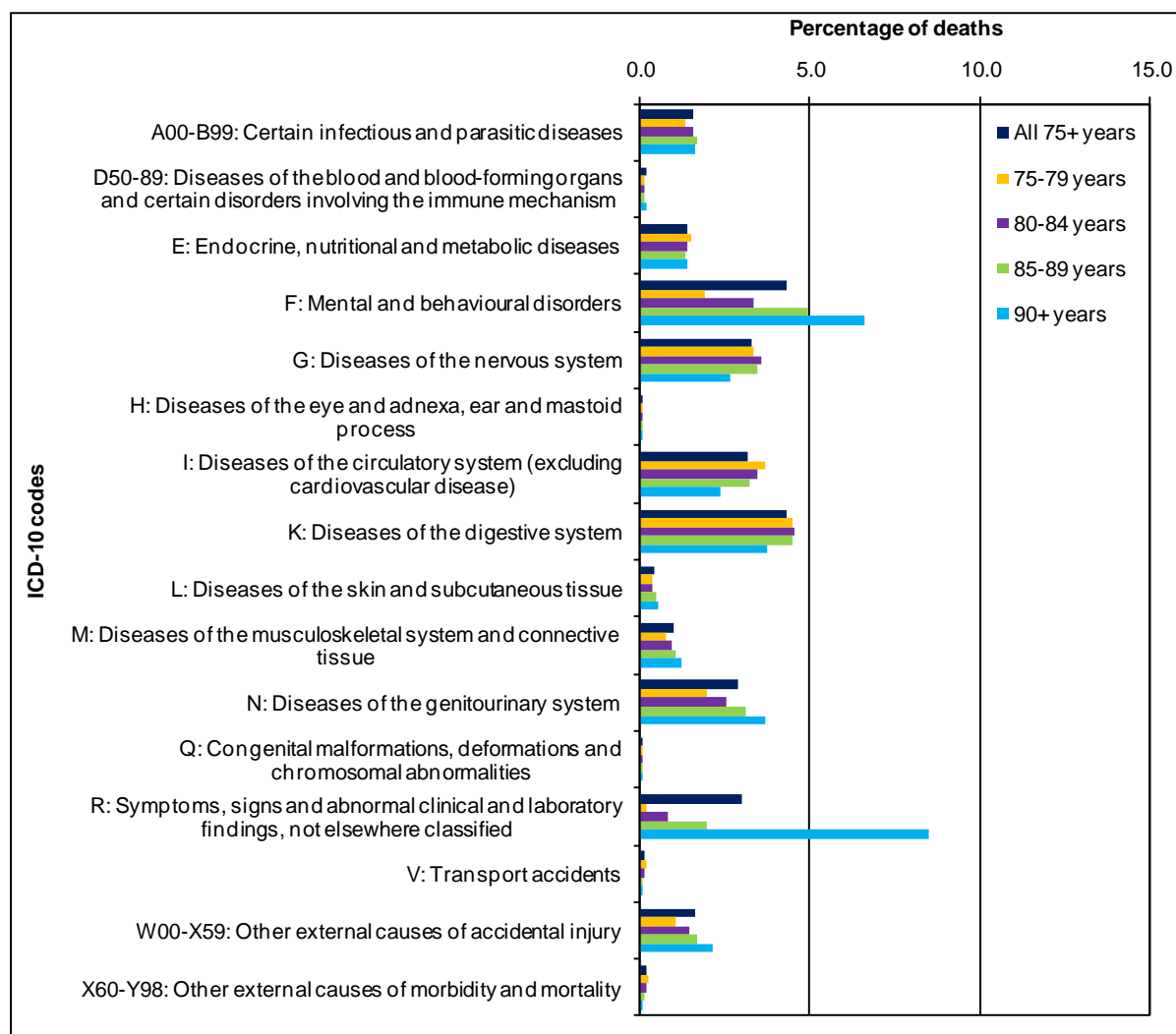
The 'other' underlying causes of death category includes a range of conditions including dementia, neurodegenerative diseases, external causes (i.e. accidents, suicides and homicides), gastrointestinal conditions, diseases of the genitourinary tract and others. To allow an understanding of the relative contributions of more specific causes to 'other' deaths, further analyses of 'other' causes of death in people aged 75 and over are presented below, following the disease grouping of ICD-10.

### 5.6.1 'Other' underlying causes of death by age

Considering deaths in people aged 75 and over in whom the underlying cause was 'other' (Figure 5.5):

- Diseases of the digestive system 'K' are the second largest group among the other causes (4.3% of all deaths in people aged 75 and over).
- The proportion of deaths from 'R: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified' increased with increasing age (comparison of consecutive age groups,  $p < 0.05$  for all). Of deaths in this category, nearly all (94.5%) were coded as 'R54: Senility' (though this ranged from 42.1% (172 deaths) of deaths coded as R in the 75–79 year-old age group to 96.7% (19,912 deaths) in the 90 and over group).
- The proportion of deaths from 'F: Mental and behavioural disorders' increased with increasing age (comparison of consecutive age groups,  $p < 0.05$  for all). 'F: Mental and behavioural disorders' includes dementia, which presents specific challenges for end of life care.
- The proportion of deaths from 'G: Diseases of the nervous system' was lower in the oldest age group compared with the other age groups ( $p < 0.05$  for all). Included in this category is Alzheimer's disease (G30), however the decrease in the proportion was not seen in deaths from Alzheimer's. Alzheimer's disease accounted for 1.0% of all deaths in 75–79 year-olds, 1.5% in 80–84 year-olds, 1.8% of 85–89 year-olds and 1.7% of people aged 90 and over.
- The proportion of deaths from 'I: Diseases of the circulatory system' decreased with increasing age (comparison of consecutive age groups,  $p < 0.05$  for all), and the proportion of deaths from 'K: Diseases of the digestive system' was lower in the 90 and over age group compared with the other age groups ( $p < 0.05$  for all).
- The proportion of deaths from 'N: Diseases of the genitourinary system', and 'W00–X59: Other external causes of morbidity and mortality' increased with increasing age (comparison of consecutive age groups,  $p < 0.05$  for all).

**Figure 5.5: Main underlying causes of death in the 'other' category: proportion of all deaths in people aged 75 and over by age, England, 2006–08**



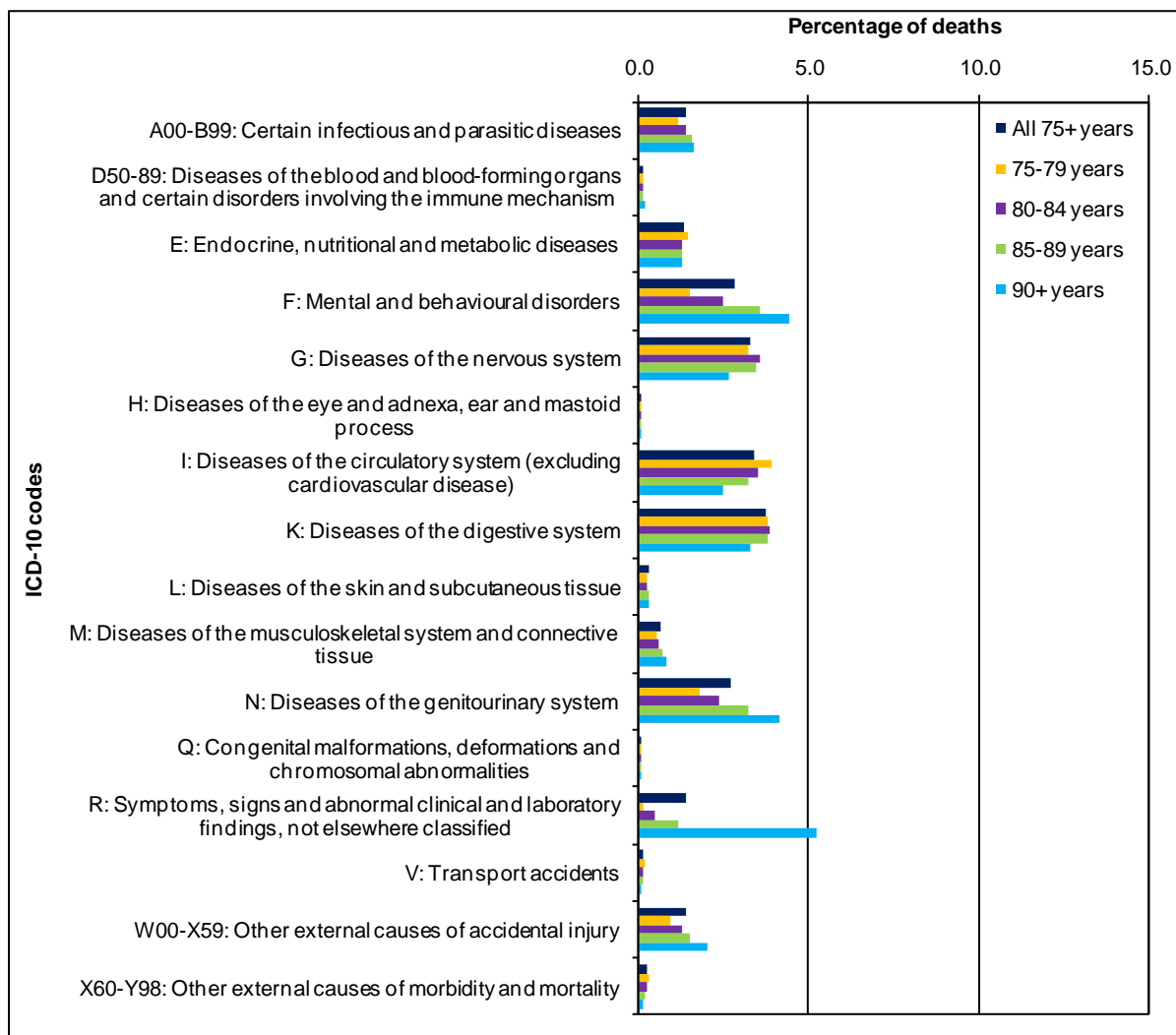
Source: South West Public Health Observatory from Office for National Statistics data

### 5.6.2 'Other' underlying causes by age and sex

Although there were similar patterns when males and females were considered separately, there were some differences in the proportion of deaths from each cause within each age group in males and females (Figures 5.6 and 5.7):

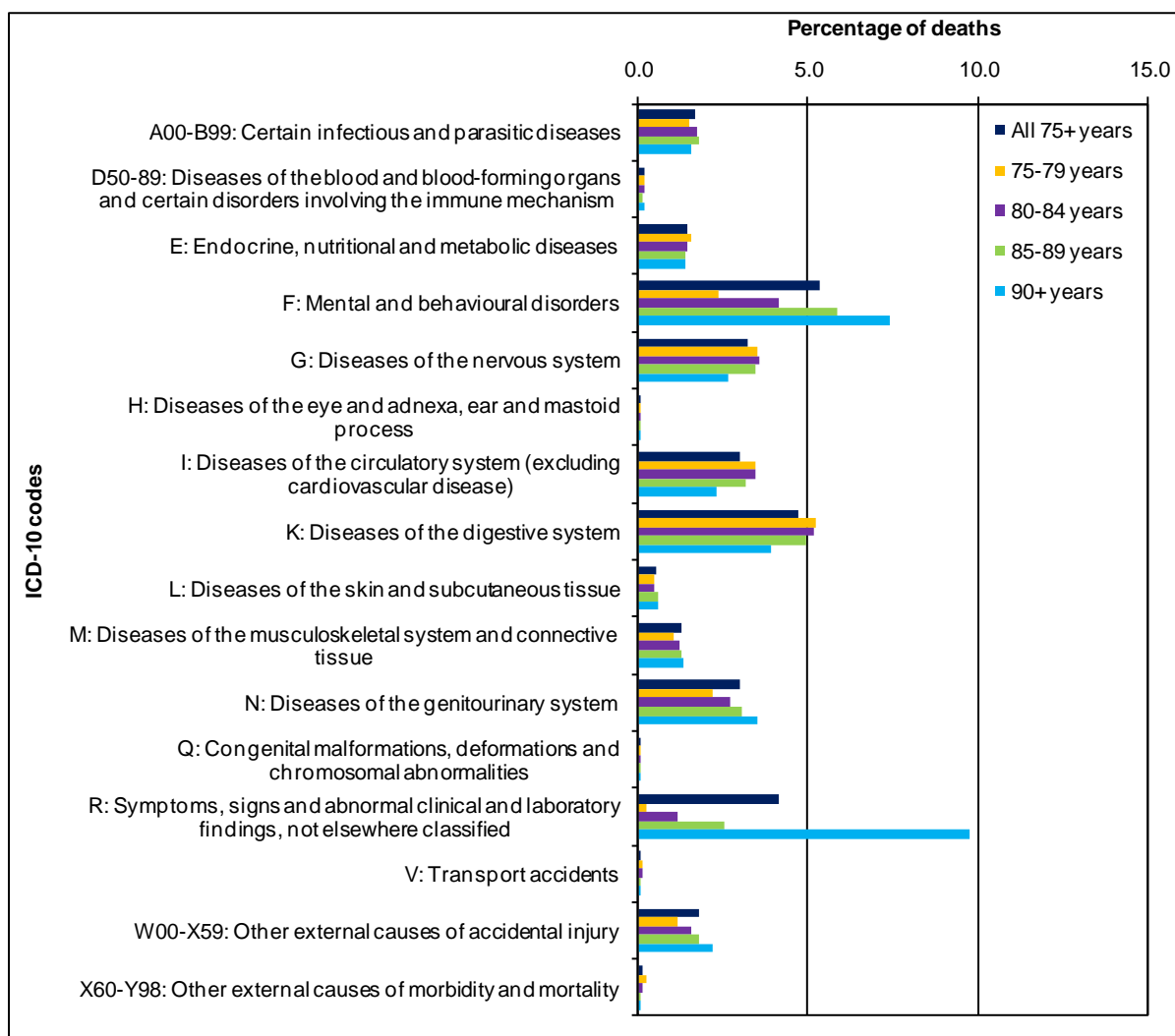
- In females, a higher proportion of deaths were from 'R: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified', 'F: Mental and behavioural disorders' and 'K: Diseases of the digestive system' compared with males (comparison for each age group,  $p < 0.05$  for all).

**Figure 5.6: Main underlying causes of death in the 'other' category for males: proportion of all deaths in people aged 75 and over by age, England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics data

**Figure 5.7: Main underlying causes of death in the 'other' category for females: proportion of all deaths in people aged 75 and over by age, England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics data

## 6.0 Underlying cause and place of death in people aged 75 and over in England

Where people die is likely to be influenced by the underlying condition leading to death. The previous report, *Variations in Place of Death in England* (South West Public Health Observatory, 2010), showed that there were differences in the cause of death according to the place of death, and in the place of death depending on the cause of death. For example, most deaths in hospices were from cancer while most deaths in hospital were from cardiovascular disease, Respiratory disease had the highest proportion of deaths in hospital compared with cancer, cardiovascular disease and 'other' causes of death. This section looks at the relationship between place and cause of death in older adults in more detail.

### 6.1 Cause of death for deaths in different places

Average numbers of deaths in people aged 75 and over by cause and place are presented in Appendix D, Figure D1. In summary, of deaths in people aged 75 and over in 2006–08:

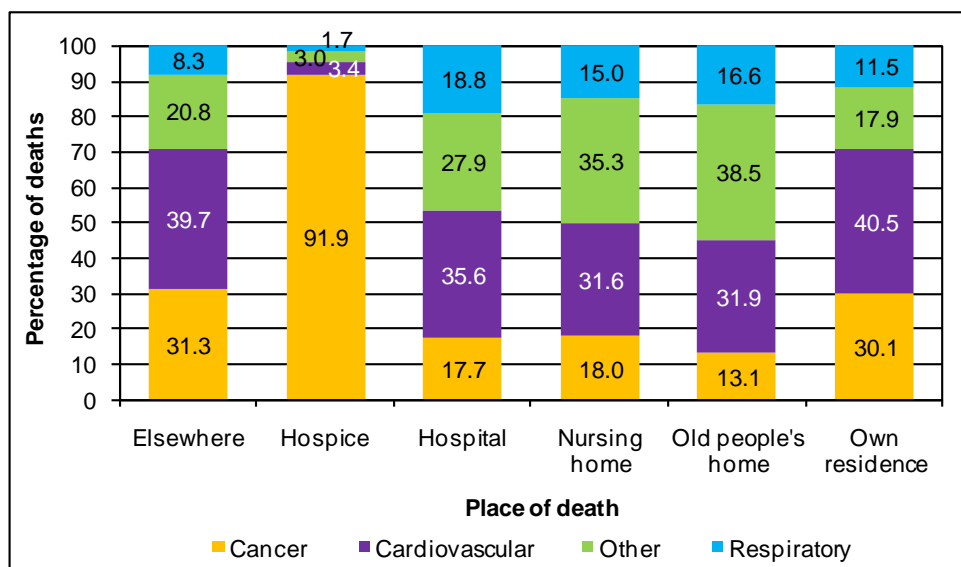
- For each main underlying cause, the greatest number of deaths occurred in hospital.
- Of deaths in hospital (183,479 deaths per year on average), the greatest number were from cardiovascular disease (65,266 deaths per year on average) with the fewest from cancer (32,393 deaths per year on average).

#### 6.1.1 Overview of cause of death according to place of death

There were differences in what people died of (underlying cause of death) in relation to where they died (Figure 6.1). Of deaths in people aged 75 and over in 2006–08:

- Cancer accounted for the largest proportion of deaths in hospices (91.9%).
- While 34.5% of deaths in the 75 and over age group were from cardiovascular disease, deaths from cardiovascular disease accounted for the largest proportion of deaths elsewhere (39.7%), at home (own residence) (40.5%) or in hospital (35.6%).
- 11.5% of deaths at home were from respiratory disease, though respiratory disease accounts for 16.4% of deaths in the 75 and over age group. This contrasts with deaths in hospital where 18.8% were due to respiratory disease.
- The largest proportion of deaths in nursing homes (35.3%) and old people's homes (38.5%) were from 'other' causes. In comparison, 'other' causes account for 27.5% of deaths in this age group.
- Nearly one-third of deaths at home (30.1%) were from cancer – this was greater than the proportion of cancer deaths in hospital (17.7%), nursing homes (18.0%) or old people's homes (13.1%) ( $p < 0.05$  for all).
- It should be noted that deaths elsewhere account for less than 1% of all deaths in people aged 75 and over and 3.1% of deaths are in hospices.

**Figure 6.1: Proportions of deaths from each underlying cause in each place of death in people aged 75 and over, England, 2006–08 (labels are percentage of deaths in each place)**

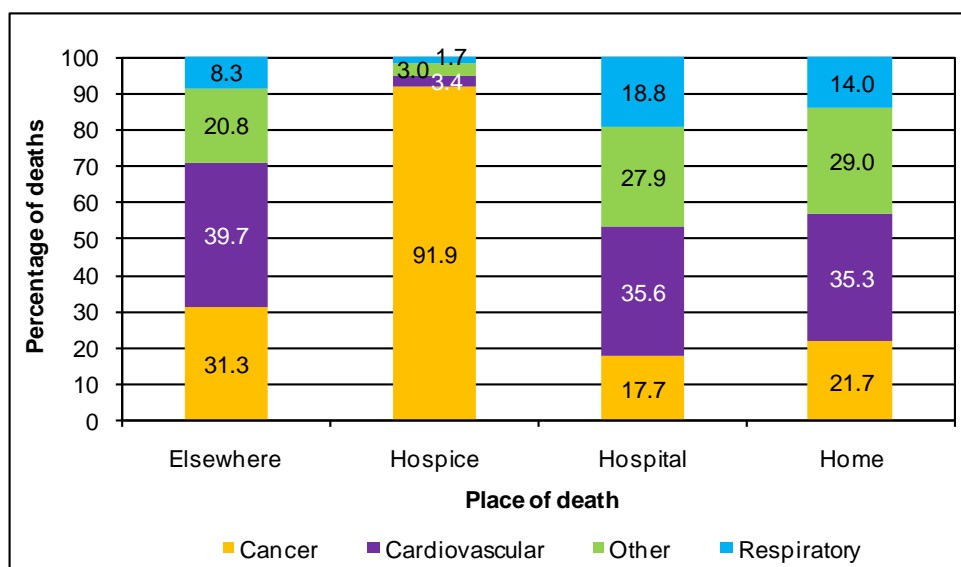


Source: South West Public Health Observatory from Office for National Statistics data

Deaths in nursing homes, old people’s homes and own residence were considered as a single group (‘home’), since this group represents an individual’s home (Figure 6.2). When deaths at ‘home’ were compared with deaths in other places, the underlying causes of death in the ‘home’ group were more similar to the proportions in hospital. Considering deaths in people aged 75 and over in 2006–08:

- The proportions of deaths from ‘other’ causes and cardiovascular disease at ‘home’ (29.0% and 35.3% respectively) were more similar to the proportion of deaths in hospital (27.9% and 35.6% respectively) (Figure 6.2).
- However, the proportion of deaths from cancer was higher at home than in hospital (21.7% compared with 17.7%) while the proportion of deaths from respiratory disease was lower (14.0% compared with 18.8%) ( $p < 0.05$  for all).

**Figure 6.2: Proportions of deaths from each underlying cause in each place of death in people aged 75 and over, England, 2006–08. Deaths in nursing homes, old people’s homes and own residence combined into a single group ‘home’.** (Labels are percentage of deaths in each place)



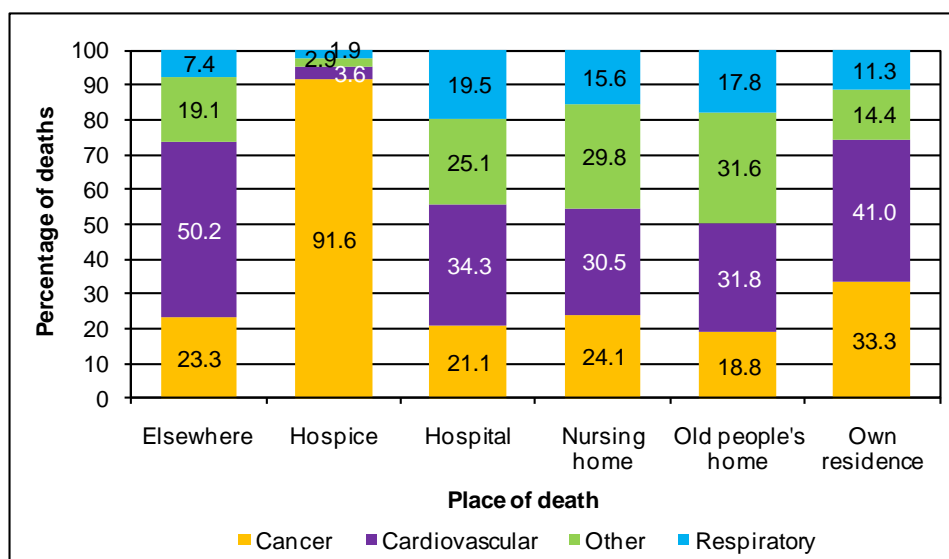
Source: South West Public Health Observatory from Office for National Statistics data

### 6.1.2 Cause of death according to place of death, by sex

For some places of death there were differences in the cause of death for males and females aged 75 and over (Figures 6.3 and 6.4):

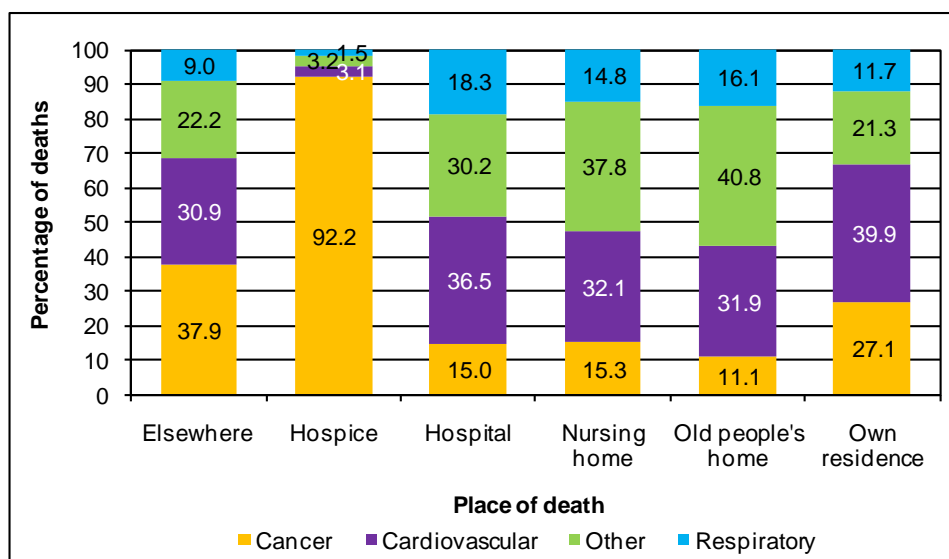
- Considering deaths in hospital, nursing homes, old people's homes or at home (own residence), a higher proportion of deaths in males were from cancer and a lower proportion from 'other' causes compared with females ( $p < 0.05$  for both), though deaths from cardiovascular disease and respiratory disease were more comparable.
- This contrasted with deaths that occurred elsewhere, where a higher proportion of deaths in females were from cancer (37.9%) and a lower proportion of deaths were from cardiovascular disease (30.9%) compared with males (23.3% cancer deaths and 50.2% cardiovascular deaths). ( $p < 0.05$  for both).
- The causes of deaths for people who died in hospices were similar in males and females.

**Figure 6.3: Proportions of deaths from each underlying cause in each place of death for males aged 75 and over, England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics data

**Figure 6.4: Proportions of deaths from each underlying cause in each place of death for females aged 75 and over, England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics data

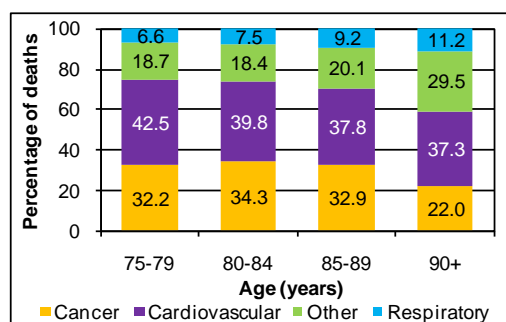
### 6.1.3 Cause of death according to place of death, by age

When different age groups of people with the same place of death were compared, there were differences in the proportions of deaths from different causes depending on age (Figure 6.5).

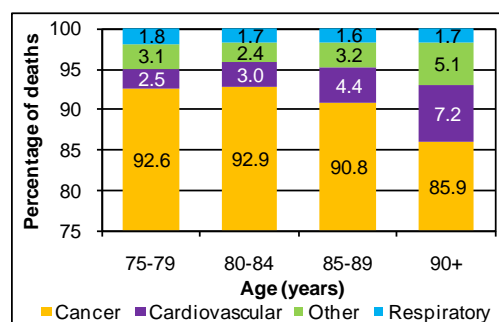
- For each place of death, the general pattern was a decrease in the proportion of deaths from cancer with increasing age, and an increase in the proportion of deaths from 'other' causes and respiratory disease.
- This reflects the changes in underlying cause of death with age.

**Figure 6.5: Proportions of deaths from each underlying cause in each place of death by age group, people aged 75 and over, England, 2006–08 (labels are percentages of deaths in each age group)**

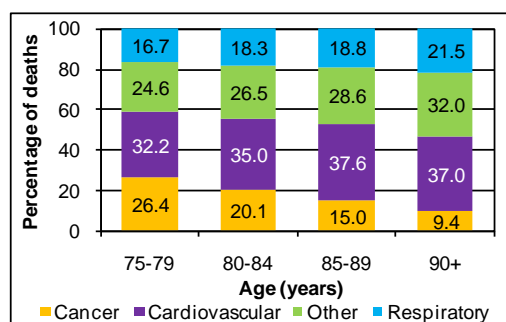
**(a) Deaths 'elsewhere' (n=8,252)**



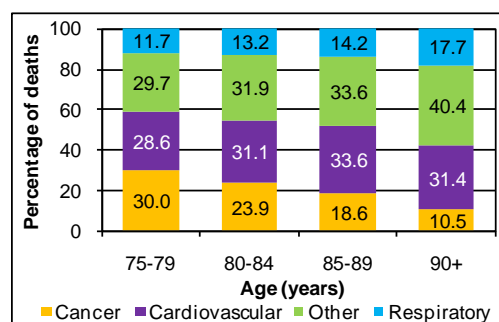
**(b) Deaths in hospices (n=29,447)**



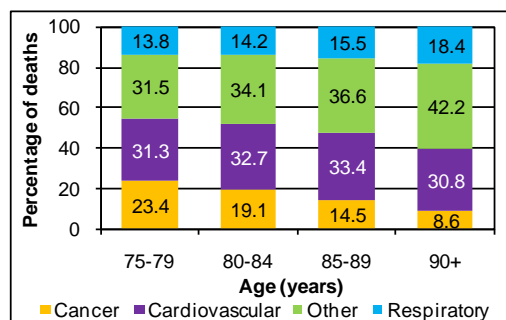
**(c) Deaths in hospital (n=550,436)**



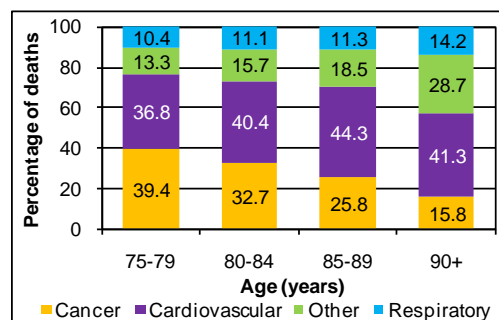
**(d) Deaths in nursing homes (n=113,574)**



**(e) Deaths in old people's homes (n=94,084)**



**(f) Deaths in own residence (n=146,034)**



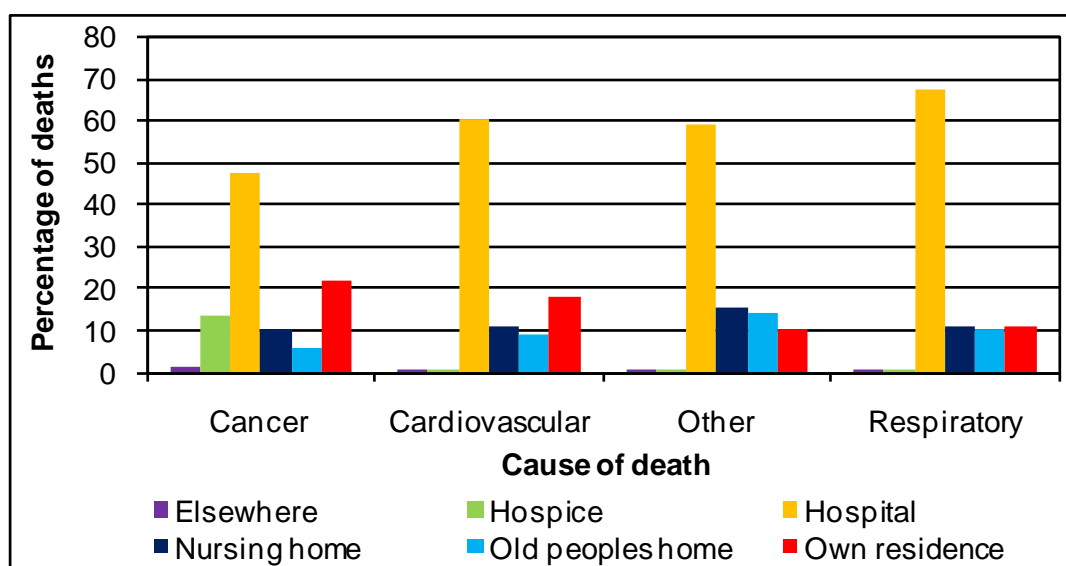
Source: South West Public Health Observatory from Office for National Statistics data

## 6.2 Place of death for deaths from major underlying causes

When the place of death was considered for each underlying cause of death, the largest proportion of deaths in people aged 75 and over occurred in hospital, though there were differences in place of death depending on the underlying cause (Figure 6.6):

- Fewer than half of deaths from cancer (47.7%) were in hospital compared with more than half of deaths from cardiovascular disease (60.2%), 'other' causes (59.4%) and respiratory disease (67.2%).
- The proportion of deaths at home (own residence) was highest for cancer (21.6%), followed by cardiovascular disease (18.2%), and with a lower proportion for deaths from respiratory disease (10.9%) or 'other' causes (10.1%) ( $p < 0.05$  for all).
- For each cause, except cancer, less than 1% of deaths were in a hospice. This compared with 13.3% of deaths from cancer.

**Figure 6.6: Place of death for deaths from different underlying causes in people aged 75 and over (proportion of deaths from each cause), England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics data

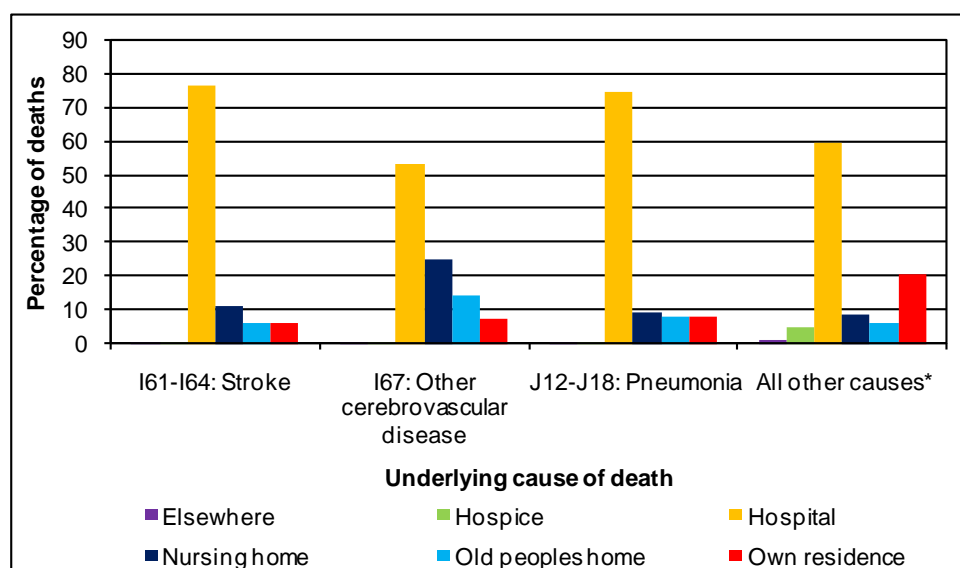
## 6.3 Place of death for deaths from selected underlying causes

Place of death was analysed for selected underlying causes that appeared in the ten most common causes of deaths in males and females aged 75 and over. Additional ICD-10 codes were grouped to create a more general 'stroke' and 'pneumonia' category to ensure that all deaths from these causes were identified. Deaths from senility and dementia are also important causes of death in the 75 and over age group and these will be discussed in a further report on *Deaths from Alzheimer's disease, dementia and senility in England, 2001 to 2009* from the National End of Life Care Intelligence Network.

In males and females aged 75 and over, the place of death for deaths from stroke, pneumonia and other cerebrovascular disease differed from the place of death for all other causes combined and there were differences for males and females:

- Compared with the proportion of deaths in hospital from all other causes (59.7% of deaths in males and 54.8% for females), a significantly higher proportion of males and females aged 75 and over died in hospital from stroke (76.2% of deaths in males and 68.8% for females) and pneumonia (74.6% of deaths in males and 62.7% for females), and a significantly lower proportion died in hospital from other cerebrovascular disease (53.2% of deaths in males and 38.0% for females) ( $p < 0.05$  for all).
- In contrast, a higher proportion of males and females dying from other cerebrovascular diseases died in nursing or old people's homes (25.2% of deaths in males and 31.7% in females were in nursing homes; 14.2% of deaths in males and 23.6% of deaths in females were in old people's homes) ( $p < 0.05$  for all).
- Compared with the proportion of patients that died in their own residence from all other causes (20.5% of deaths in males and 15.2% for females), a significantly lower proportion of males and females died from stroke (6.1% of deaths in males and 5.4% for females), other cerebrovascular disease (7.0% of deaths in males and 6.3% in females) or pneumonia (7.9% of deaths in males and 7.6% for females) ( $p < 0.05$ ).

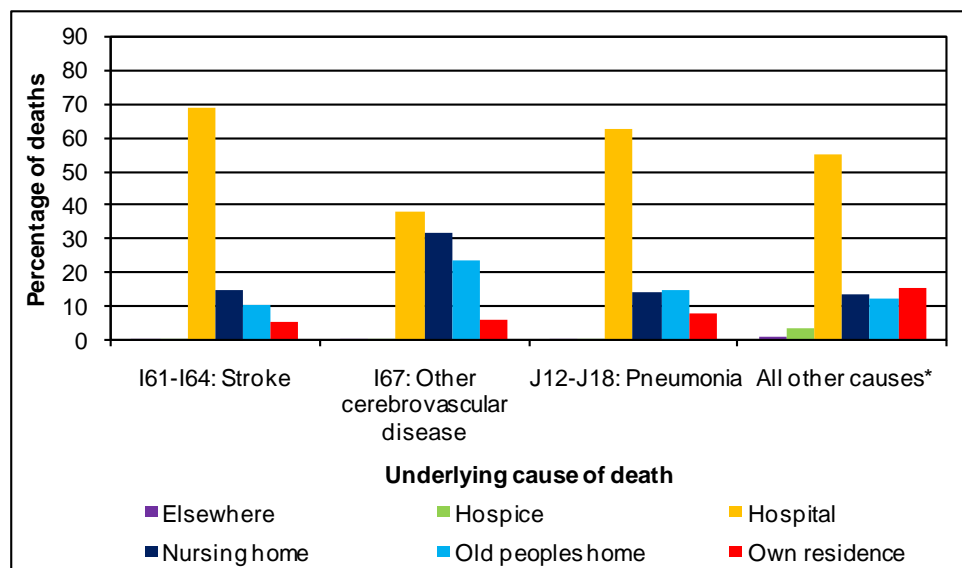
**Figure 6.7: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in males aged 75 years and over, proportion of deaths, England, 2006–08**



Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18)

Source: South West Public Health Observatory from Office for National Statistics data.

**Figure 6.8: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in females aged 75 years and over, proportion of deaths, England, 2006–08**



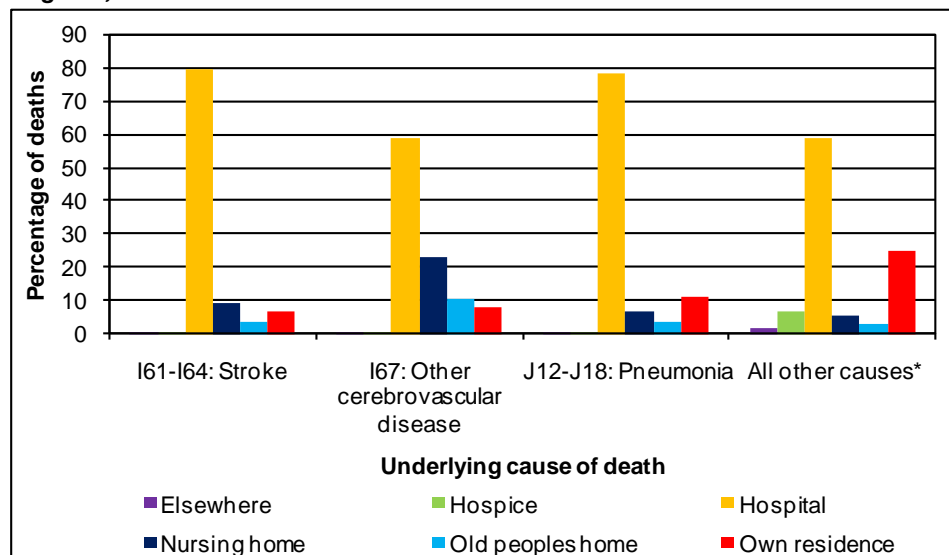
Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18)

Source: South West Public Health Observatory from Office for National Statistics data.

There were differences in the place of death in different age groups when deaths from stroke, pneumonia and other cerebrovascular disease were considered in people aged 75 and over:

- In males and females, for stroke, pneumonia and other cerebrovascular disease the proportion of deaths in hospital was lower in the 90 and over age group compared with the 75–79 age group, while the proportion of deaths in both nursing homes and old people’s homes was higher ( $p < 0.05$  for all).
- For stroke and pneumonia, in males and females place of death was similar across the age groups. The lowest proportion of deaths in hospital was for other cerebrovascular disease for all age groups.
- The proportion of deaths in hospital was lower for both males and females aged 90 and over than for all other age groups.

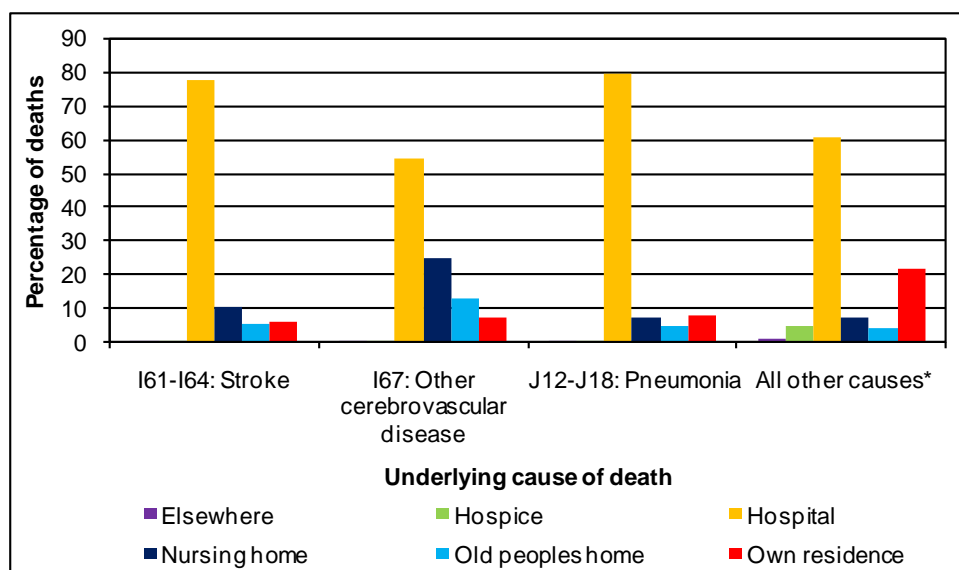
**Figure 6.9: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in males aged 75–79 years, proportion of deaths, England, 2006–08**



Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18)

Source: South West Public Health Observatory from Office for National Statistics data.

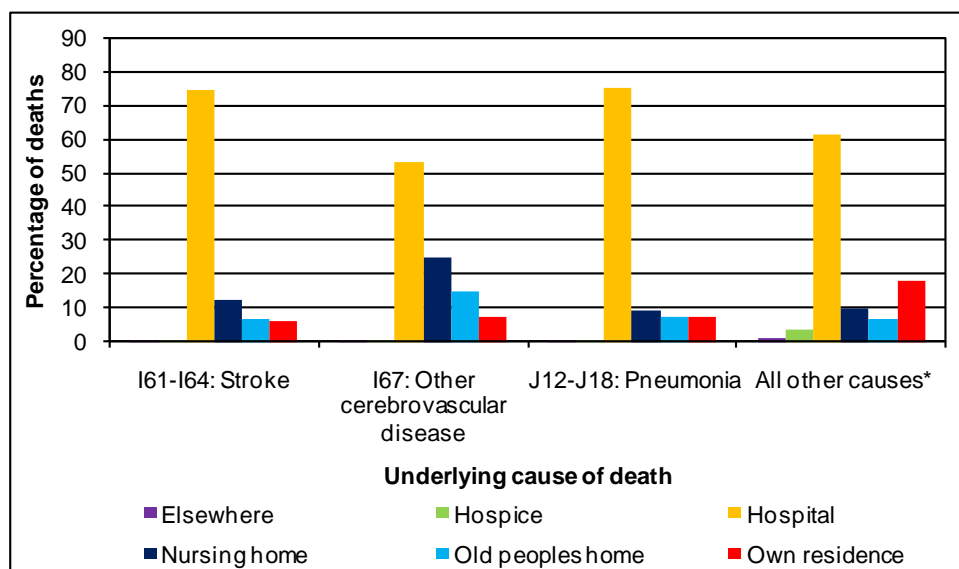
**Figure 6.10: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in males aged 80–84 years, proportion of deaths, England, 2006–08**



Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18).

Source: South West Public Health Observatory from Office for National Statistics data.

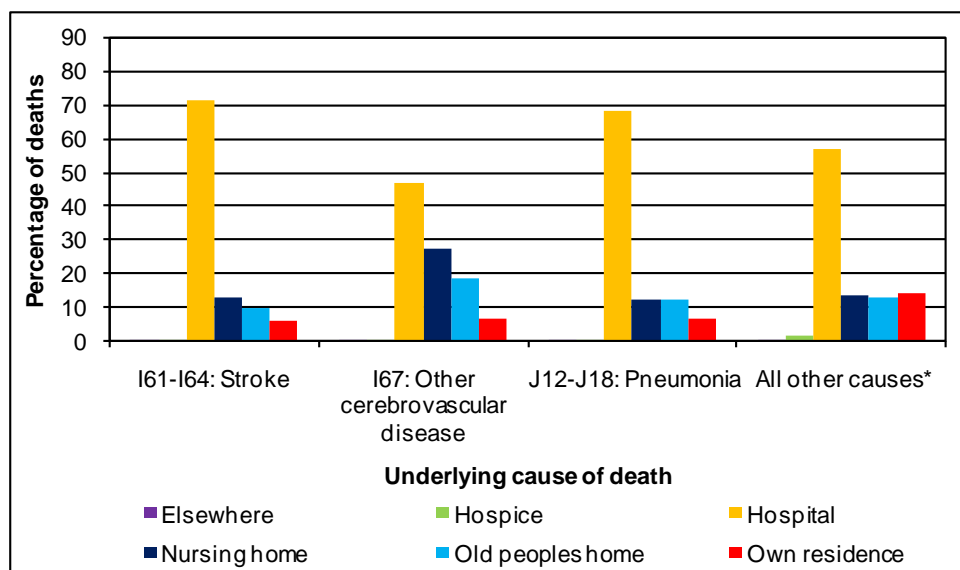
**Figure 6.11: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in males aged 85–89 years, proportion of deaths, England, 2006–08**



Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18)

Source: South West Public Health Observatory from Office for National Statistics data.

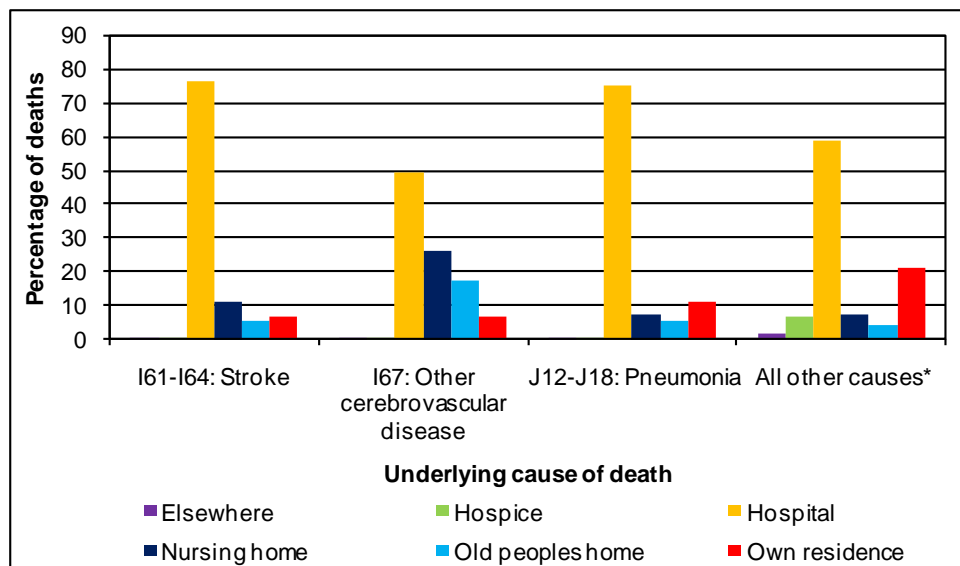
**Figure 6.12: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in males aged 90 years and over, proportion of deaths, England, 2006–08**



Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18)

Source: South West Public Health Observatory from Office for National Statistics data.

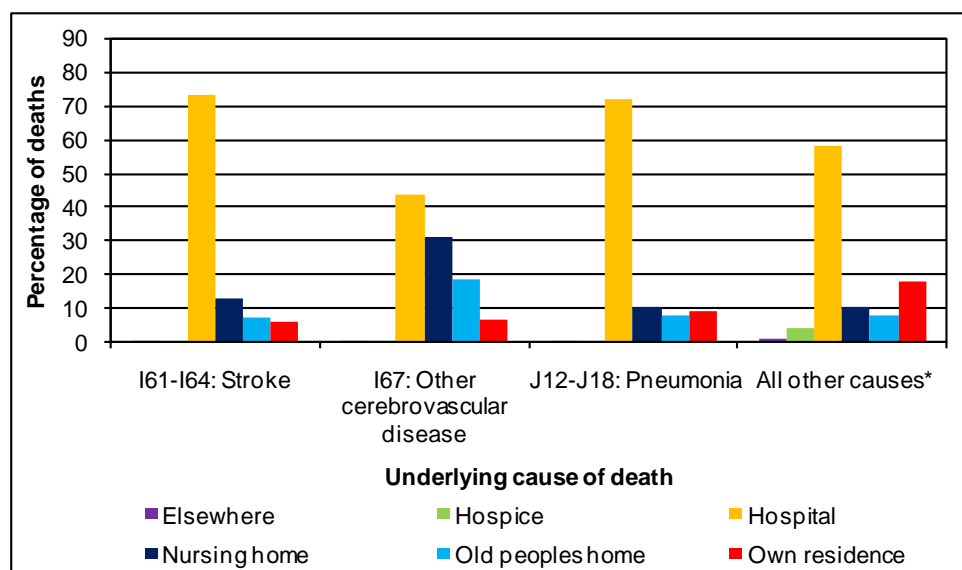
**Figure 6.13: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in females aged 75–79 years, proportion of deaths, England, 2006–08**



Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18)

Source: South West Public Health Observatory from Office for National Statistics data.

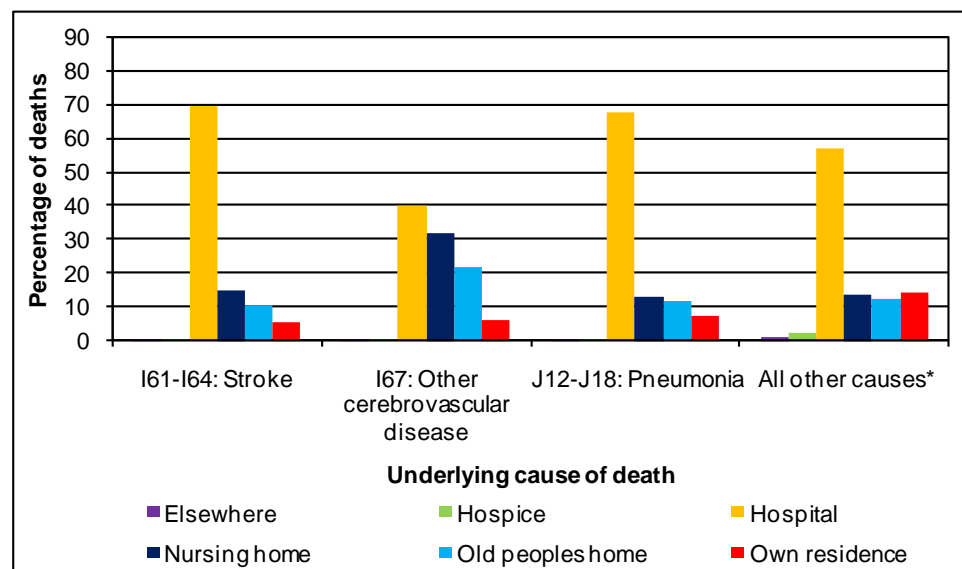
**Figure 6.14: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in females aged 80–84 years, proportion of deaths, England, 2006–08**



Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18)

Source: South West Public Health Observatory from Office for National Statistics data.

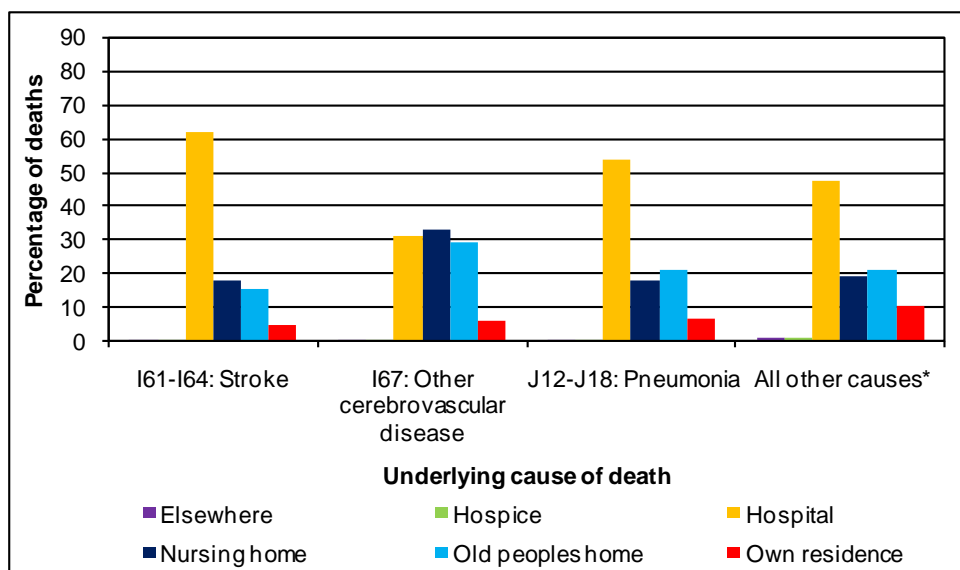
**Figure 6.15: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in females aged 85–89 years, proportion of deaths, England, 2006–08**



Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18)

Source: South West Public Health Observatory from Office for National Statistics data.

**Figure 6.16: Place of death for deaths from stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18) (underlying cause of death) in females aged 90 years and over, proportion of deaths, England, 2006–08**



Note: \*All underlying causes of death except for stroke (I61–I64), other cerebrovascular disease (I67) and pneumonia (J12–J18). Source: South West Public Health Observatory from Office for National Statistics data.

## 7.0 Deaths in people aged 75 and over by deprivation quintile

It is important to consider variations in the number of deaths by socioeconomic status, since more resources may be required to care for people dying in more deprived circumstances. The association between socioeconomic status and deaths in people aged 75 and over were evaluated using quintiles of deprivation based on the Income Deprivation Affecting Older People Index (IDAOP). In the analyses presented below, the most deprived quintile has geographic areas with the highest proportion of people aged 60 and over receiving means tested benefits, and the least deprived quintile has the lowest.

The deprivation quintile was assigned to the death on the basis of the geographic area in which the person lived and not on their individual circumstances. It is important to note that the deprivation quintile assigned to each death depends on the usual place of residence of the deceased person when they died and not on the place of death. Thus, if a person lived in a nursing or old people's home, it is this address that would be used to assign a deprivation index. The residential postcode recorded on the death certificate was used to identify the Lower Super Output Area (LSOA) (a small geographic area) of residence for the death and assign to that death the deprivation quintile of the LSOA (for further explanation, see '2.4: Analysis by deprivation quintile').

The analysis is presented in more detail in the sections below, however some key findings are:

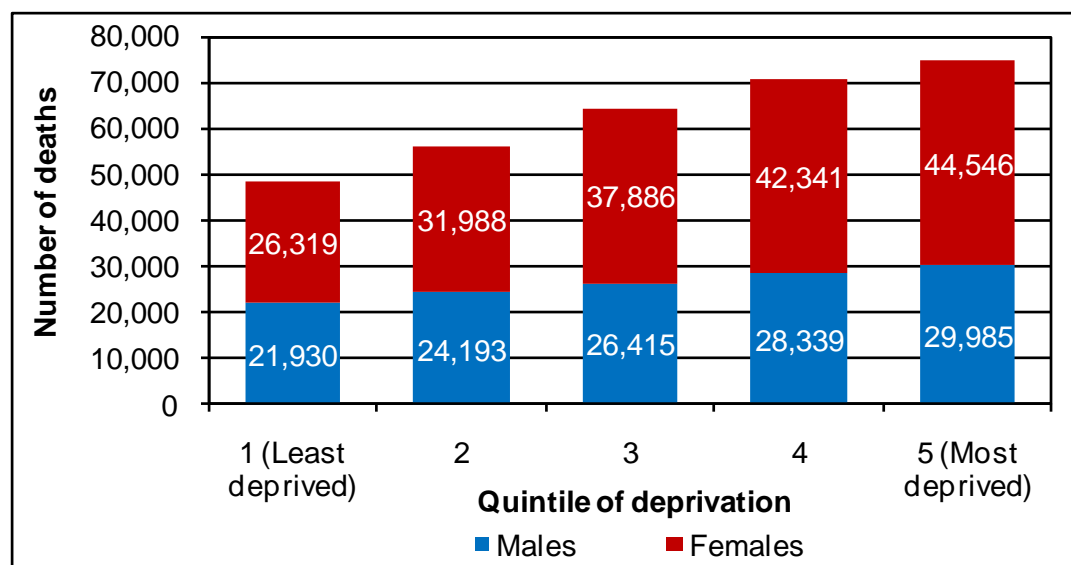
- More deaths in people aged 75 and over occurred amongst people living in more deprived areas.
- The proportion of deaths in people aged 75 and over in the most deprived areas decreased with increasing age.
- The proportion of deaths in the most deprived areas was higher in females than males; this was seen for deaths in all age groups aged 75 and over.

### 7.1 Deaths by quintile of deprivation and sex

Considering the average number of deaths per year in people aged 75 and over in 2006–08 (Figure 7.1):

- The number of deaths increased with increasing deprivation of the place of residence. There were fewer deaths in people living in the least deprived areas (48,249 deaths, 16.8%) compared with the most deprived (74,531 deaths, 22.9%) – this increase was also seen when males and females were considered separately.
- Differences in deaths by deprivation quintile were still observed even when differences in the population size in each quintile were taken into account by calculating crude mortality rates (Appendix E, Figure E1). The crude mortality rate increased with deprivation, with the most deprived areas having the highest mortality rate.
- The socioeconomic gradient in the location of care home beds (Appendix E, Figure E2) is likely to contribute to differences in deaths by deprivation, as over one-fifth of deaths in people aged 75 and over were in nursing homes or old people's homes.

**Figure 7.1: Average deaths per year in each deprivation quintile (Income Deprivation Affecting Older People Index) in people aged 75 and over, England, 2006–08**

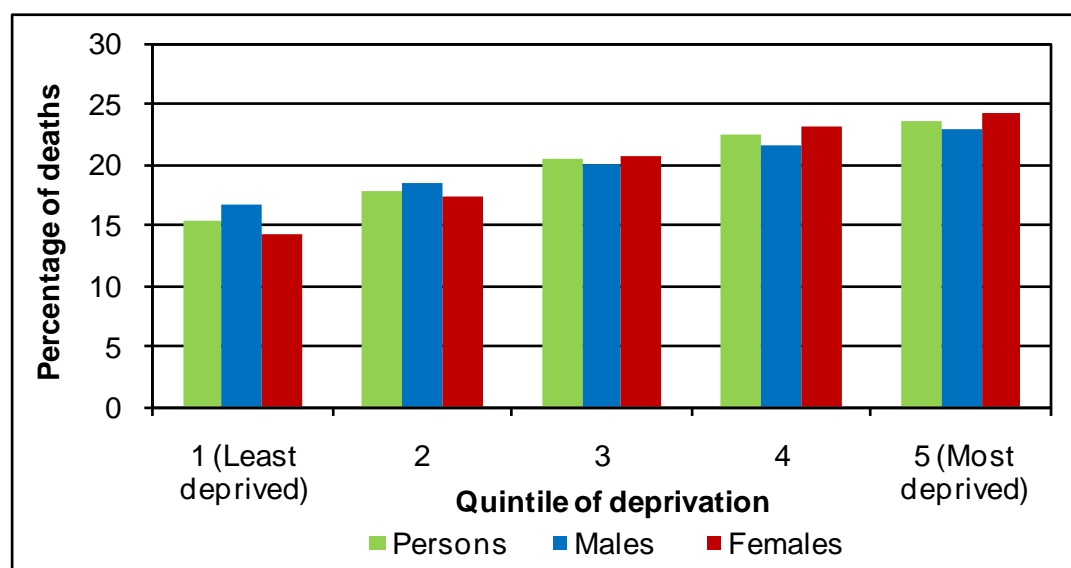


Source: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

Considering the proportion of deaths in 2006–08 in people aged 75 and over by deprivation quintile (Figure 7.2):

- A lower proportion of deaths in females occurred in people living in the least deprived quintile (14.4%) compared with males (16.8%), and a higher proportion of deaths in females occurred in people living in the most deprived quintile (24.3%) compared with males (22.9%) ( $p < 0.05$ , for both).
- The difference between the proportion of deaths in people living in the least deprived areas compared with the most deprived areas was greater for females (10.0%) than males (6.2%).
- Differences in the proportion of the population in each quintile do not appear to explain the differences in the proportion of deaths in each quintile (Appendix E, Figure E3).

**Figure 7.2: Proportion of deaths by deprivation quintile (Income Deprivation Affecting Older People Index) in males and females aged 75 and over, England, 2006–08**



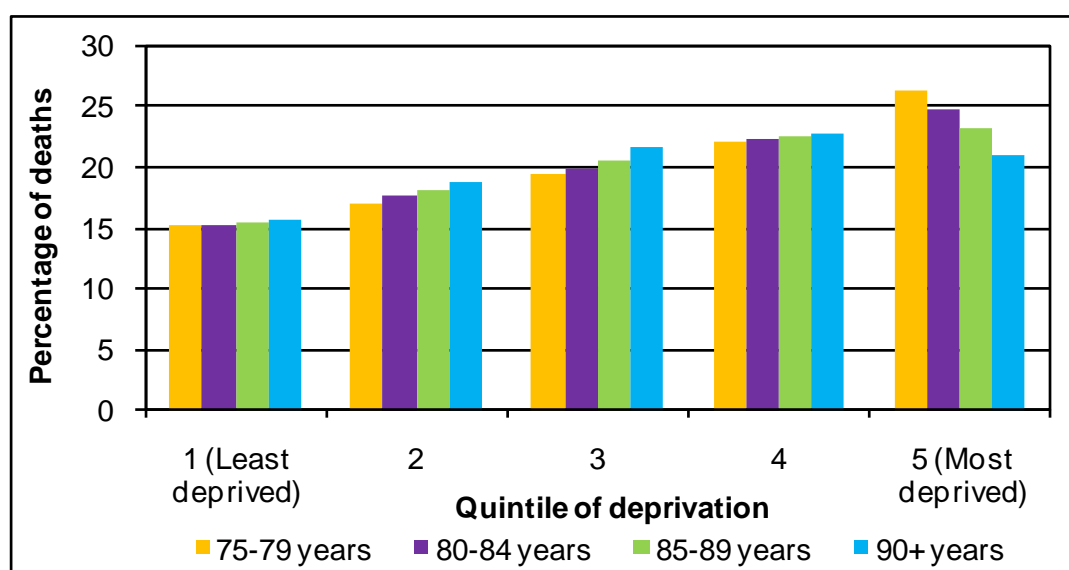
Source: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

## 7.2 Deaths by quintile of deprivation and age

The proportion of deaths in each quintile of deprivation depended on age group (Figure 7.3). Considering deaths in people aged 75 and over:

- In younger age groups of older people, there was a higher proportion of deaths in people living in more deprived areas compared with older age groups. The proportion of deaths in the most deprived quintile decreased from 26.3% of deaths in 75–79 year-olds to 21.1% of deaths in people aged 90 and over.
- The difference in the proportion of deaths in the most deprived quintile by age group was seen in males and females (Appendix E, Figures E7 and E8), with more deaths in females than males. For example, in the 75–79 age group, the proportion of deaths in people living in the most deprived quintile was 27.4% in females and 25.4% in males, and in the 90 and over age group the proportion of deaths in people living in the most deprived quintile was 21.7% in females and 19.4% in males.
- In males, females and persons, the distribution of deaths in each quintile differs to the proportion of the population in each quintile (Appendix E, Figures E4–E6), suggesting that there are factors other than the size of the population that contribute to the differences between the quintiles, such as risk of death.

**Figure 7.3: Proportion of deaths in each deprivation quintile (Income Deprivation Affecting Older People Index) for each age group, people aged 75 and over, England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

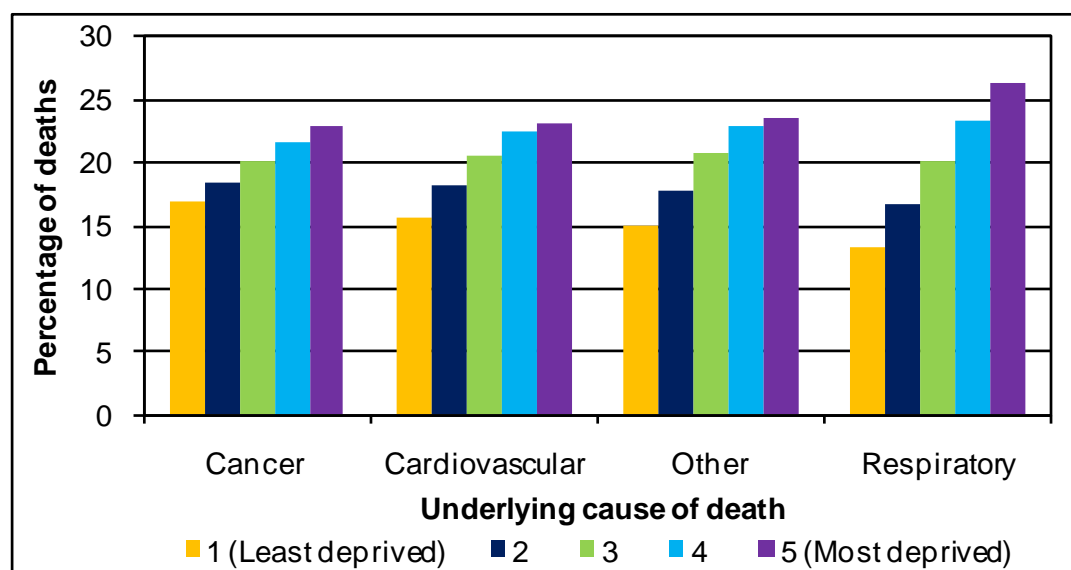
## 7.3 Underlying cause of death by deprivation

The distribution of the main causes of death varies with quintile of deprivation in people aged 75 and over (Figure 7.4 and Appendix E, Table E1):

- For all underlying causes of death, there was a higher proportion of deaths in the most deprived quintile compared with the least deprived. The difference in the proportion of deaths in the least and most deprived quintile was greatest for respiratory disease (a difference of 13%) and least for cancer (a difference of 6%).

- The underlying cause of death with the greatest proportion of deaths in the least deprived quintile was cancer (16.9%), followed by cardiovascular disease (15.7%), 'other' causes (14.9%) and respiratory disease (13.4%) ( $p < 0.05$  for all).
- In contrast, the underlying cause of death with the greatest proportion of deaths in the most deprived quintile was respiratory disease (26.4%) ( $p < 0.05$ ), while the proportions in the most deprived quintile for cancer (22.9%), cardiovascular disease (23.1%) and 'other' causes (23.6%) were more similar.
- Similar patterns were seen when the data were analysed for males and females separately (Appendix E, Figures E9 and E10).

**Figure 7.4: Proportion of deaths in deprivation quintile (Income Deprivation Affecting Older People Index) for each underlying cause, people aged 75 and over, England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

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<http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=15354&Pos=1&ColRank=1&Rank=272>

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# Appendices

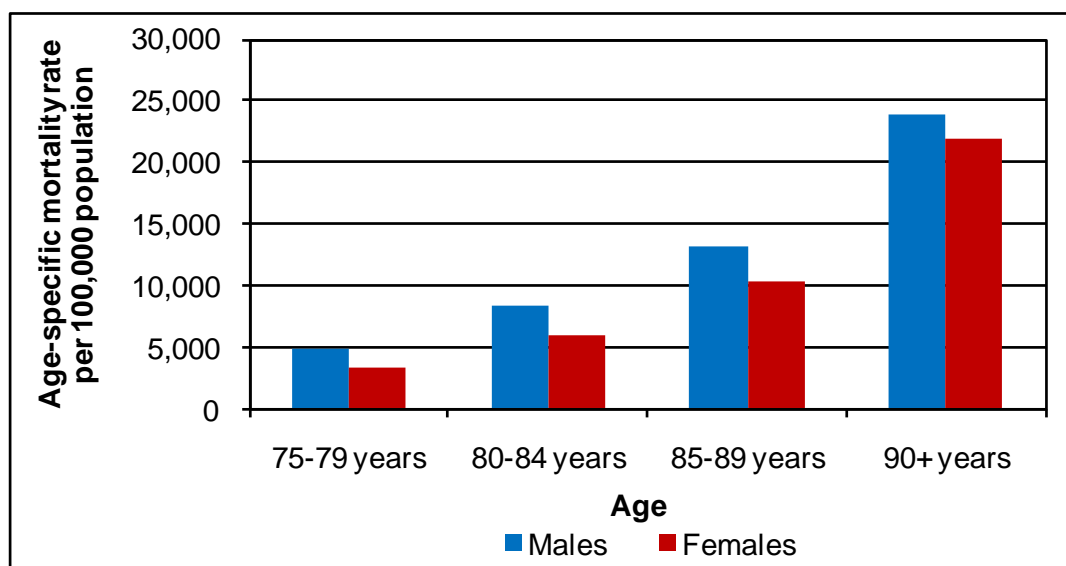
## A Mortality rates

The demographics of the background population will influence the number of deaths. Mortality rates were calculated to account for the influence of the background population on the number of deaths.

### A1 Overview of mortality rates in people aged 75 and over in England, 2006–08

- In 2006–08, the 3-year average age-standardised mortality rate in people aged 75 and over was 7,646 deaths per 100,000 population.
- The 3-year average age-standardised mortality rate for 2006–08 in people aged 75 and over was higher in males (8,556 deaths per 100,000 population) than females (6,735 deaths per 100,000 population).
- In all age groups aged 75 and over, the age-specific mortality rate (the crude mortality rate in each age group) was higher in males than females (Figure A1).
- Age-specific mortality rates increased with increasing age, with the lowest rates in the 75–79 age group (4,840 deaths per 100,000 males and 3,270 deaths per 100,000 females) and the highest rates in the 90 and over group (23,975 deaths per 100,000 males and 21,882 deaths per 100,000 females) (Figure A1).

**Figure A1: Age-specific mortality rates by sex in people aged 75 and over (three-year average rates per 100,000 population), England, 2006–08**



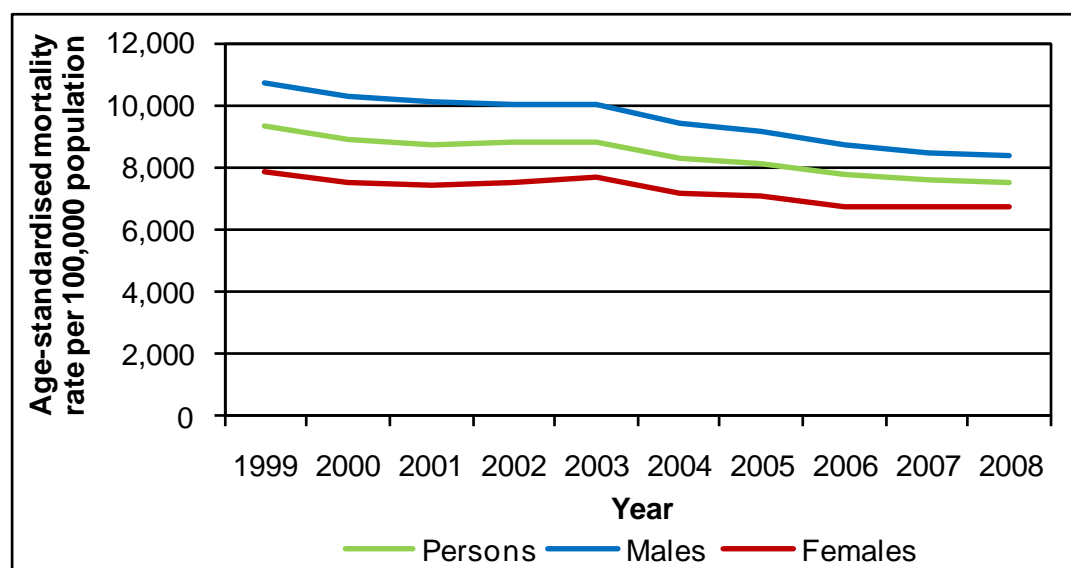
Source: South West Public Health Observatory from Office for National Statistics data

## A2 Trends in age-standardised mortality rates, 1999–2008

Age-standardised mortality rates from 1999–2008 are presented for people aged 75 and over in Figure A2 (i.e. rates are for 100,000 population aged 75 and over):

- Age-standardised mortality rates were higher in males than females (for all years,  $p < 0.05$ ).
- From 1999 to 2008, age-standardised mortality rates decreased in males, females and persons: from 10,746 to 8,556 deaths per 100,000 males aged 75 and over; from 7,875 to 6,735 deaths per 100,000 females aged 75 and over; and from 9,311 to 7,646 deaths per 100,000 people aged 75 and over; ( $p < 0.05$  for all).

**Figure A2: Age-standardised mortality rate per 100,000 population aged 75 and over (all causes of death), England, 1999–2008**



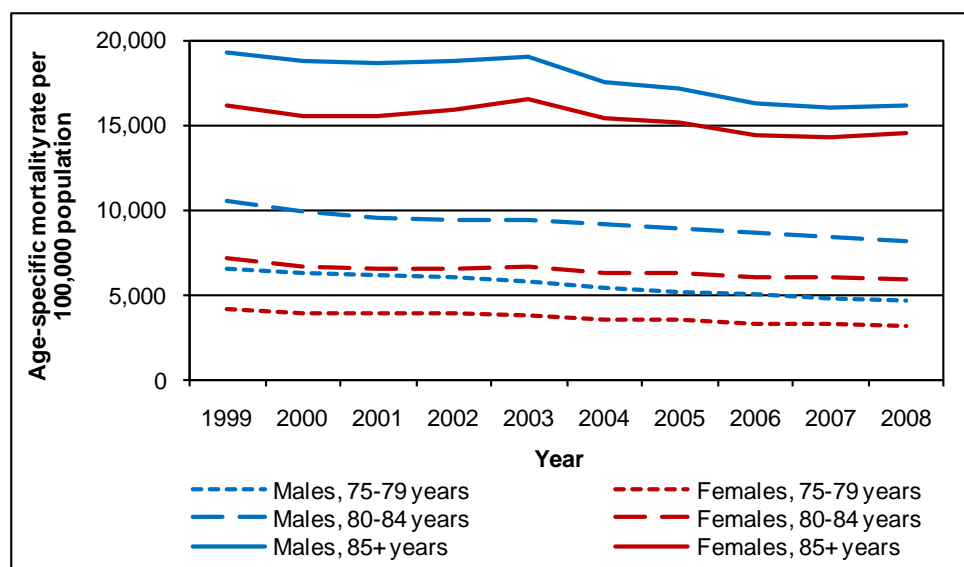
Source: South West Public Health Observatory from Office for National Statistics and United Kingdom Association of Cancer Registries Population Dataset

## A3 Trends in age-specific mortality rates, 1999–2008

Age-specific rates (the crude rate of deaths per 100,000 population in each group) are presented for the 75–79, 80–84 and 85 and over age groups for males and females separately for 1999–2008 (Figure A3). The two older age groups (85–89 years and 90 years and over) were combined because of the available populations.

- The age-specific mortality rate was higher in males than females in all years and for all age groups.
- In all age groups, age-specific mortality rates decreased from 1999 to 2008 (rate in 1999 compared with 2008,  $p < 0.05$ ).
- The trends in the mortality rates differ to the trends in numbers of deaths in each age group; for example, the number of deaths in males aged 80–84 years increased from 1999–2003 whereas the rate decreased. This suggests that changes in the number of deaths are partly due to changes in the size of the population in each age group.

**Figure A3: Age-specific mortality rates (per 100,000 population) in males and females, England, 1999–2008**



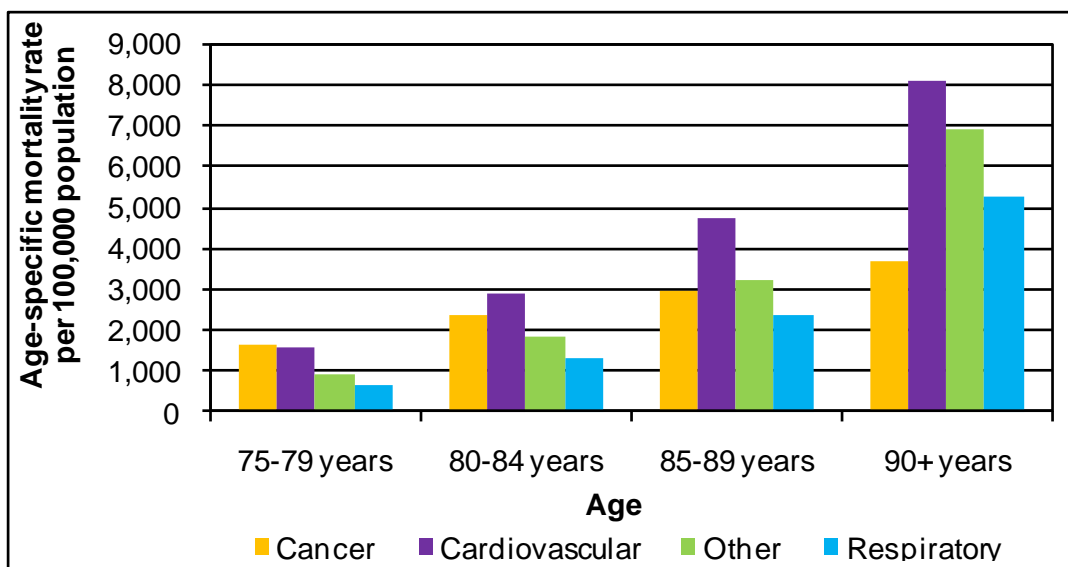
Source: South West Public Health Observatory from Office for National Statistics and United Kingdom Association of Cancer Registries Population Dataset

#### A4 Age-specific mortality rates of underlying causes of death in people aged 75 and over

Age-specific mortality rates for the four general causes of death were calculated for people aged 75 and over, to take account of the different background populations in each age group (Figures A4 and A5):

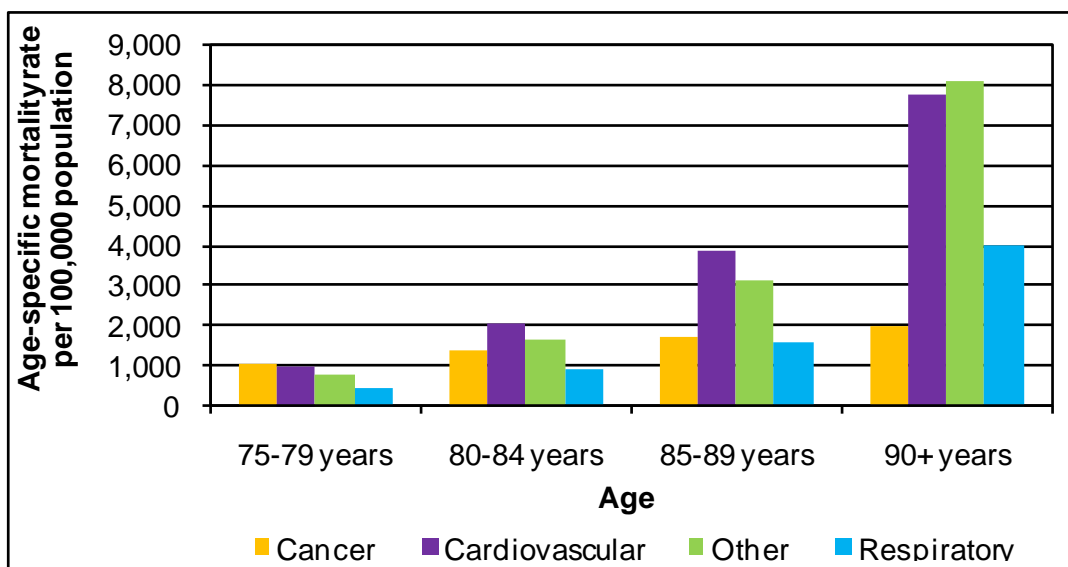
- For all underlying causes of death, age-specific mortality rates increased with age (comparing 75–79 years with 90 and over,  $p < 0.05$ ), though this increase was less steep for cancer.
- In the 90 years and over group, in males the highest mortality rate was cardiovascular disease (8,131 deaths per 100,000 population), but in females this was ‘other’ causes (8,123 deaths per 100,000 population).
- Generally, mortality rates were higher in males than females, except for the rate from ‘other’ causes in the 90 and over age group which was lower in males (6,922 deaths per 100,000 population) than females (8,123 deaths per 100,000 population) ( $p < 0.05$  for all).

**Figure A4: Age-specific mortality rates (per 100,000 population) of underlying causes of death in males, England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics data

**Figure A5: Age-specific mortality rates (per 100,000 population) of underlying causes of death in females, England, 2006–08**



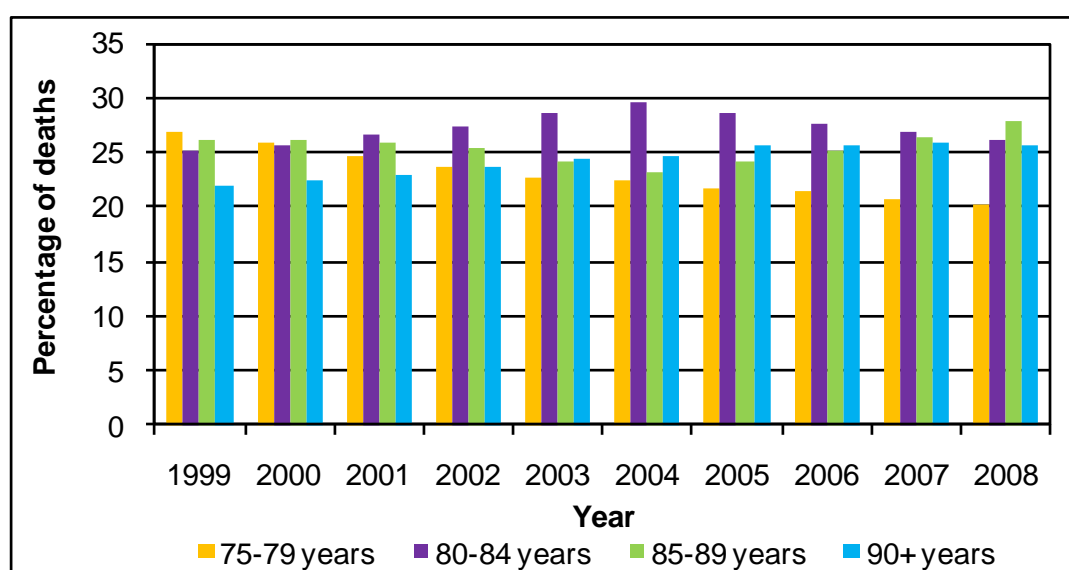
Source: South West Public Health Observatory from Office for National Statistics data

## B Trends in proportions of deaths, 1999–2008

### B1 Trends in proportions of deaths by age, 1999–2008

- The proportion of deaths in 75–79 year-olds decreased from 26.9% of deaths in people aged 75 and over in 1999 to 20.2% in 2008 (Figure B1) (1999 compared with 2008,  $p < 0.05$ ).
- The proportion of deaths in 80–84 year-olds increased from 25.0% of deaths in people aged 75 and over in 1999 to 29.6% in 2004 before decreasing to 26.2% in 2008 (1999 compared with 2004 and 2004 compared with 2008,  $p < 0.05$ ).
- The proportion of deaths in 85–89 year-olds decreased from 26.1% in 1999 to 23.1% in 2004 before increasing to 28.0% in 2008 (1999 compared with 2004 and 2004 compared with 2008,  $p < 0.05$ ).
- In contrast, the proportion of deaths in people aged 90 and over group increased from 22.0% of deaths in people aged 75 and over to 25.7% in 2008 (1999 compared with 2008,  $p < 0.05$ ).

**Figure B1: Proportion of deaths in each age group in people aged 75 years and over (proportion of deaths in people aged 75 and over), England, 1999–2008**



Source: South West Public Health Observatory from Office for National Statistics data

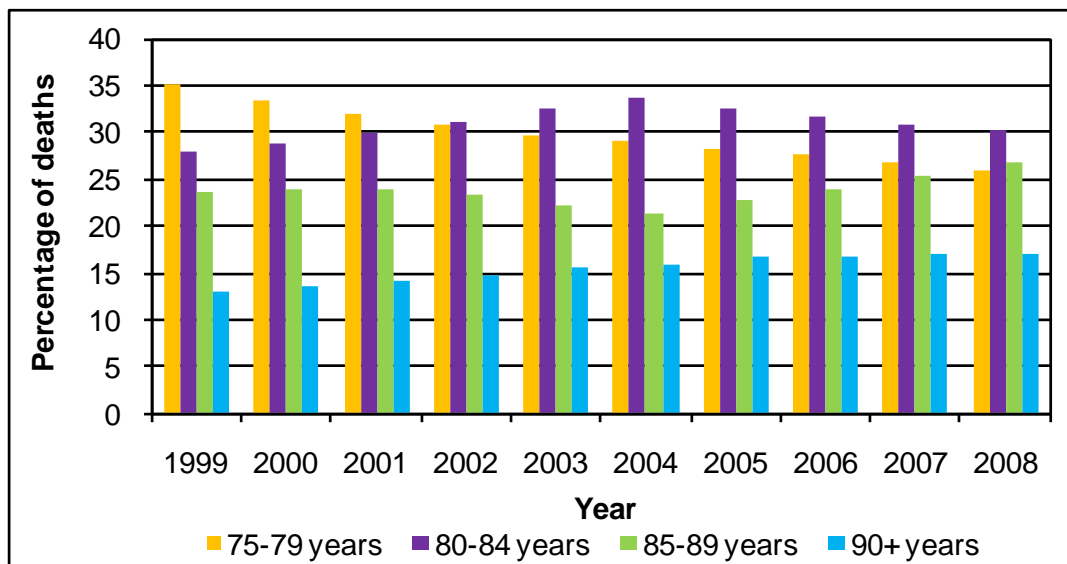
### B2 Trends in proportions of deaths by age and sex, 1999–2008

There are differences between males and females in the proportions of deaths in each age group in people aged 75 and over, though there are similarities in the trends from 1999–2008 (Figures B2 and B3):

- For all years, in the 75–79 and 80–84 age groups there was a higher proportion of deaths in males than females, though the proportion in the 85–89 and 90 and over groups was lower in males than females ( $p < 0.05$  for all).
- The proportion of deaths in 75–79 age group decreased from 1999 to 2008 in both males and females ( $p < 0.05$  for all).
- In males and females, the proportion of deaths in the 80–84 age group increased from 1999 to 2004 and decreased from 2004 to 2008 ( $p < 0.05$  for all).

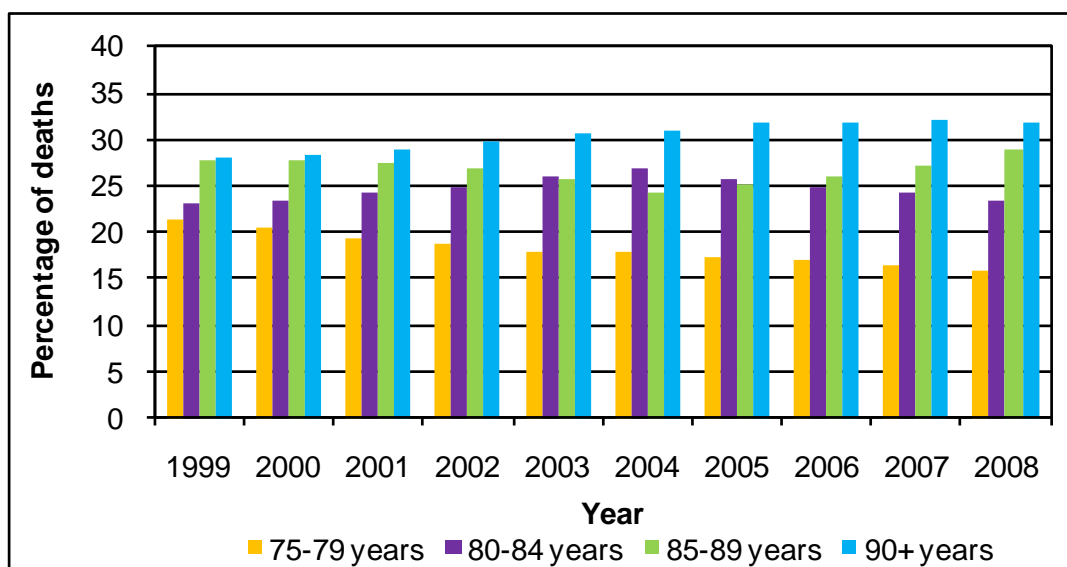
- In males and females, the proportion of deaths in the 85–89 age group decreased from 1999 to 2004 and increased from 2004–08 ( $p < 0.05$ , for all).
- In the 90 and over age group, the proportion of deaths was higher in 2008 than in 1999 in both males and females ( $p < 0.05$  for both).

**Figure B2: Proportion of deaths by age group in males aged 75 years and over, England, 1999–2008**



Source: South West Public Health Observatory from Office for National Statistics data

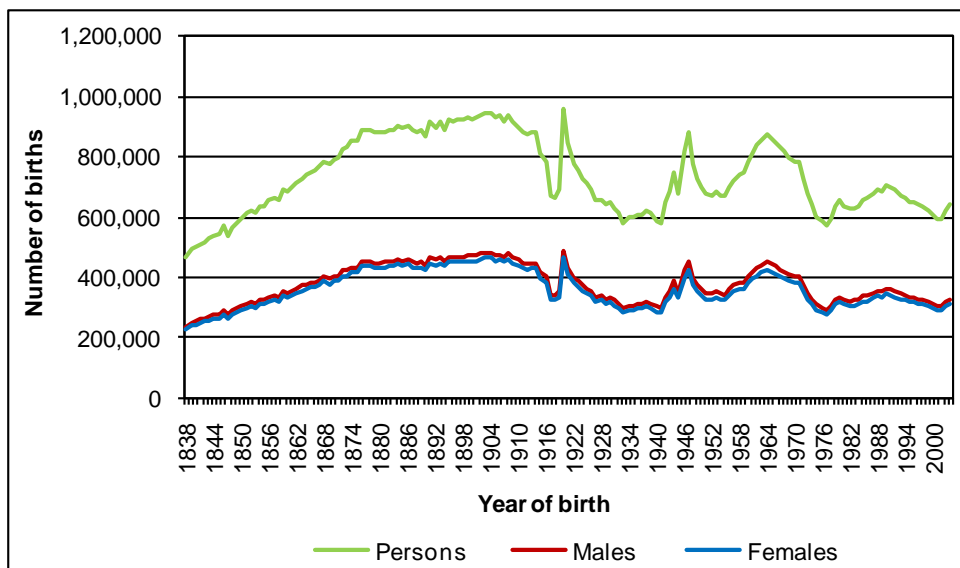
**Figure B3: Proportion of deaths by age group in females aged 75 years and over, England, 1999–2008**



Source: South West Public Health Observatory from Office for National Statistics data

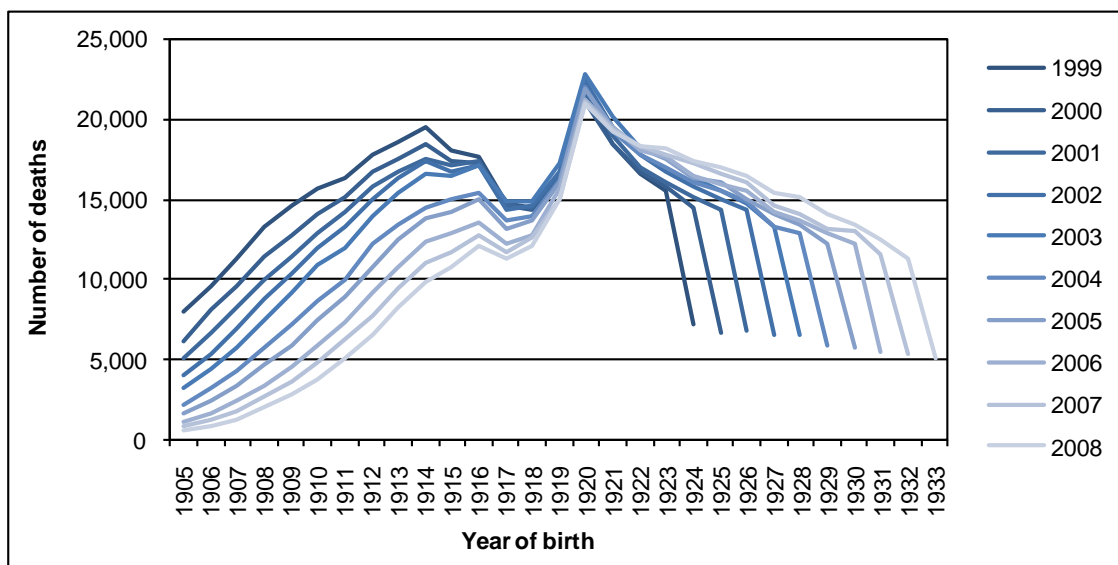
## C Trends in births and deaths

Figure C1: Number of live births in England and Wales, 1838–2004



Source: Office for National Statistics, Dataset PBH11, Live Births: 1838–2004, Occurrence Within/Outside Marriage and Sex

Figure C2: Number of deaths by year of birth in people aged 75 and over, for deaths in England in 1999–2008. (Year of birth from 1905 shown only.)



Source: South West Public Health Observatory from Office for National Statistics data

## D Further analysis of place of death

### D1 Place of death by age and sex: numbers of deaths

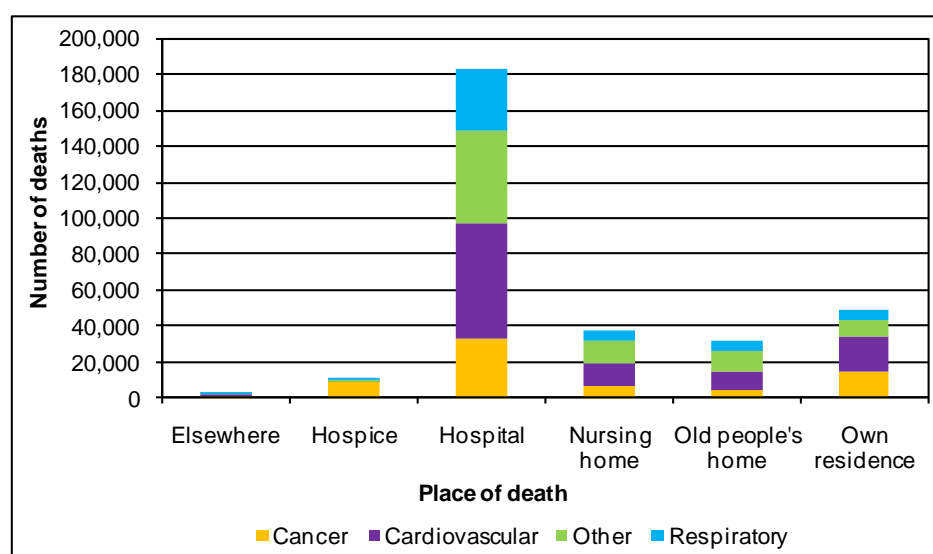
Table D1: Average numbers of deaths per year in people aged 75 and over, England, 2006–08

Sex	Place of death	Age at death				
		75–79 years	80–84 years	85–89 years	90+ years	All 75+ years
Males	Elsewhere	455	408	268	124	1,255
	Hospice	2,121	1,722	945	280	5,068
	Hospital	21,303	25,364	20,983	13,030	80,681
	Nursing home	2,054	3,213	3,426	3,091	11,785
	Old people's home	991	1,865	2,344	2,807	8,007
	Own residence	8,100	7,847	5,338	2,780	24,066
	<b>Total</b>		<b>35,024</b>	<b>40,419</b>	<b>33,305</b>	<b>22,113</b>
Females	Elsewhere	352	420	383	342	1,496
	Hospice	1,809	1,554	974	411	4,747
	Hospital	18,372	26,620	29,259	28,548	102,798
	Nursing home	2,392	5,053	7,282	11,346	26,073
	Old people's home	1,389	3,521	6,103	12,341	23,354
	Own residence	5,898	6,991	6,182	5,541	24,612
	<b>Total</b>		<b>30,212</b>	<b>44,158</b>	<b>50,183</b>	<b>58,528</b>
Persons	Elsewhere	806	827	651	466	2,751
	Hospice	3,930	3,276	1,919	691	9,816
	Hospital	39,675	51,984	50,242	41,578	183,479
	Nursing home	4,446	8,266	10,709	14,437	37,858
	Old people's home	2,380	5,386	8,447	15,148	31,361
	Own residence	13,998	14,839	11,520	8,321	48,678
	<b>Total</b>		<b>65,236</b>	<b>84,577</b>	<b>83,488</b>	<b>80,641</b>

Source: South West Public Health Observatory from Office for National Statistics data

### D2 Place of death by cause of death

Figure D1: Place of death by cause of death – average number of deaths per year in people aged 75 and over, England, 2006–08



Source: South West Public Health Observatory from Office for National Statistics data

## E Further analysis by deprivation quintile

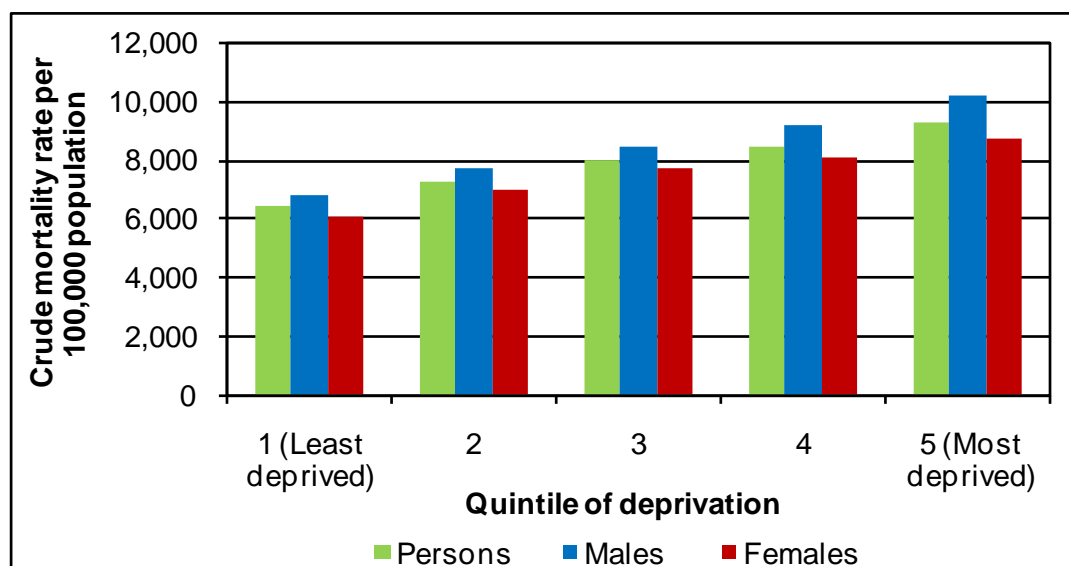
This Appendix provides additional analyses to support the information presented in '7.0: Deaths in people aged 75 and over by deprivation quintile'. Quintiles of deprivation were derived using the Income Deprivation Affecting Older People Index (IDAOPI), with the most deprived quintile including the geographic areas with the highest proportion of people aged 60 and over receiving means-tested benefits, and the least deprived quintile having the areas with the lowest proportion. (For further explanation, see '2.4: Analysis by deprivation quintile')

### E1 Crude mortality rates by deprivation quintile

Crude mortality rates were calculated for each quintile to account for the influence of differences in the population size on the number of deaths (Figure E1):

- The crude mortality rate increased with deprivation, with the most deprived areas having the highest crude mortality rate compared with the least deprived areas. This was seen when males and females were considered together and separately ( $p < 0.05$  for all).

**Figure E1: Crude mortality rate (per 100,000 population) by quintile of deprivation (Income Deprivation Affecting Older People Index), deaths in people aged 75 and over, for males and females, England, 2006–08**



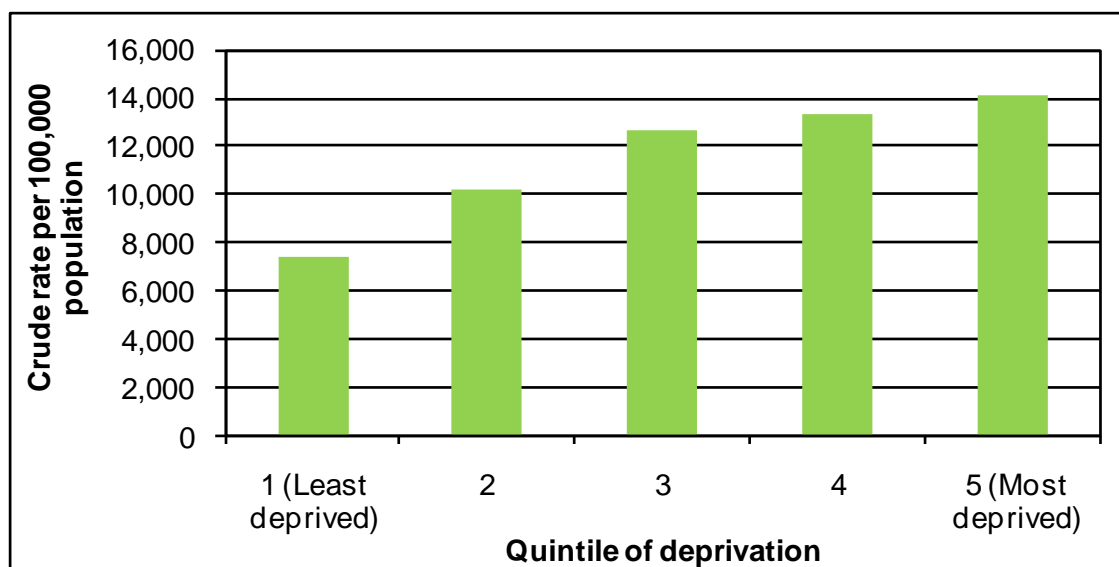
Source: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

### E2 Location of care homes by deprivation quintile

The number of care home beds, per 100,000 people aged 75 and over for each quintile of deprivation, are shown in Figure E2. All registered services were included – these include a variety of types of care home with different types of owner.

- Care homes are more likely to be located in more deprived areas (comparison of rate in least and most deprived quintile,  $p < 0.05$ ). There are almost twice as many care home beds per 100,000 people aged 75 and over in the most deprived area than in the least deprived area.

**Figure E2: Crude rate of care home beds per 100,000 persons aged 75 and over, England, 2010 by deprivation quintile (Income Deprivation Affecting Older People Index)**



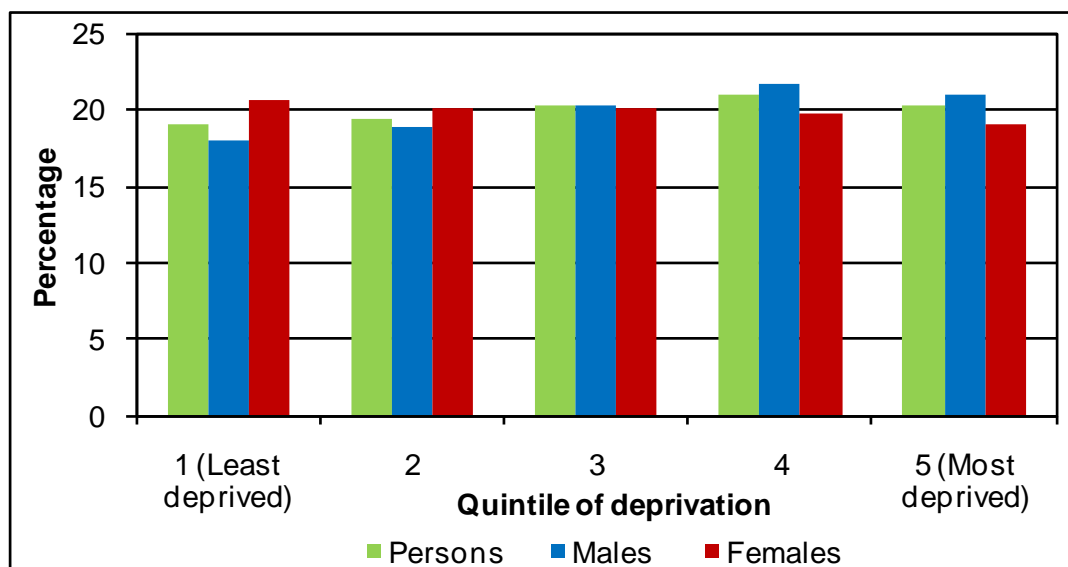
Notes: Data on care homes were obtained in August 2010 from the Care Quality Commission web site. Populations were average populations for 2006–08.

Source: South West Public Health Observatory from data from: Office for National Statistics; Communities and Local Government; Care Quality Commission; and United Kingdom Association of Cancer Registries Population Dataset

### E3 Population by deprivation quintile

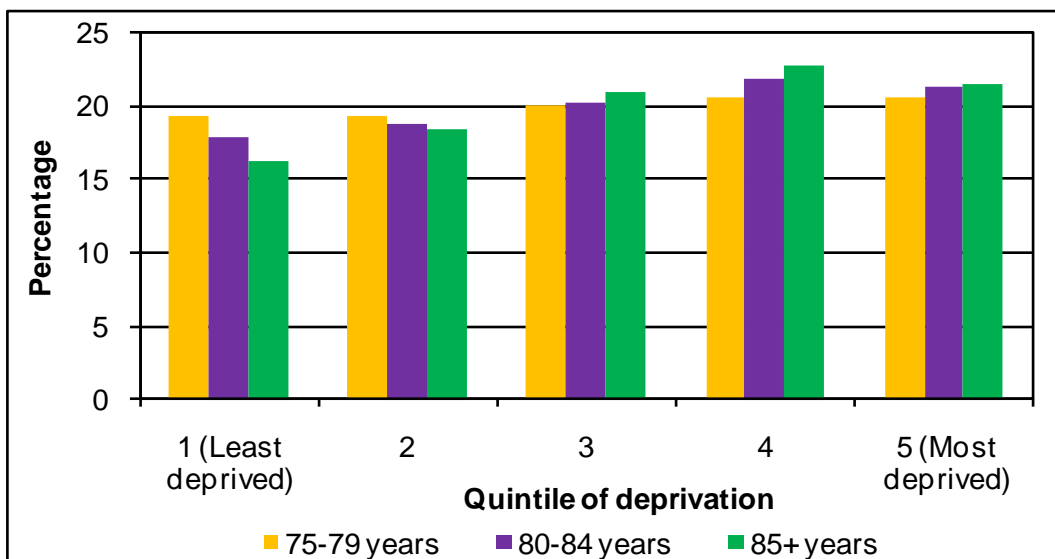
The proportion of the population in each quintile of deprivation was calculated for comparison with the proportion of deaths in each quintile of deprivation. The distribution of the population by deprivation is shown in Figure E3, while the distribution by age and deprivation is presented in Figures E4–E6:

**Figure E3: Proportion of population aged 75 and over in each quintile of deprivation (Income Deprivation Affecting Older People Index), for males and females, England, 2006–08**

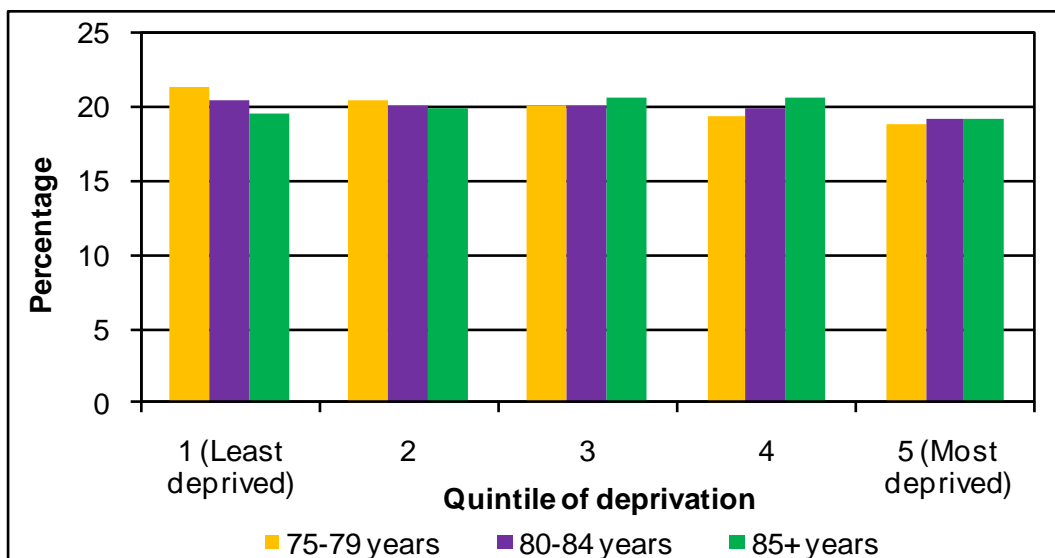


Source: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

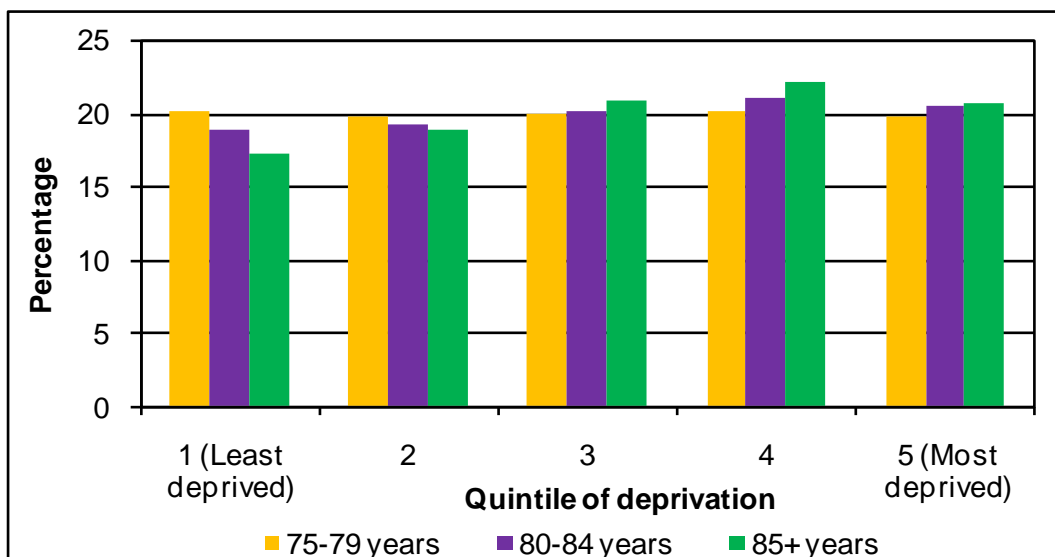
**Figure E4: Proportion of population aged 75 and over in each quintile of deprivation (Income Deprivation Affecting Older People Index) by age group, England, 2006–08**



**Figure E5: Proportion of male population aged 75 and over in each quintile of deprivation (Income Deprivation Affecting Older People Index) by age group, England 2006–08**



**Figure E6: Proportion of female population aged 75 and over in each quintile of deprivation (Income Deprivation Affecting Older People Index) by age group, England 2006–08**



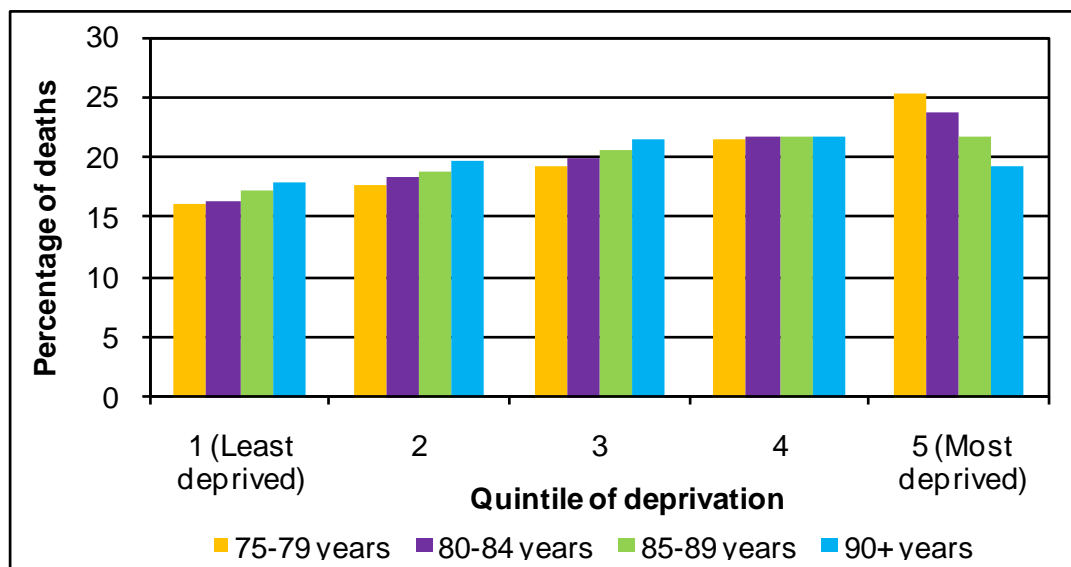
Source: All charts this page: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

### E4 Deaths by quintile of deprivation, age and sex

The distribution of deaths by quintile of deprivation and age is discussed in section '7.2: Deaths by quintile of deprivation and age'. Figures E7 and E8 present the proportion of deaths in each deprivation quintile for males and females aged 75 and over:

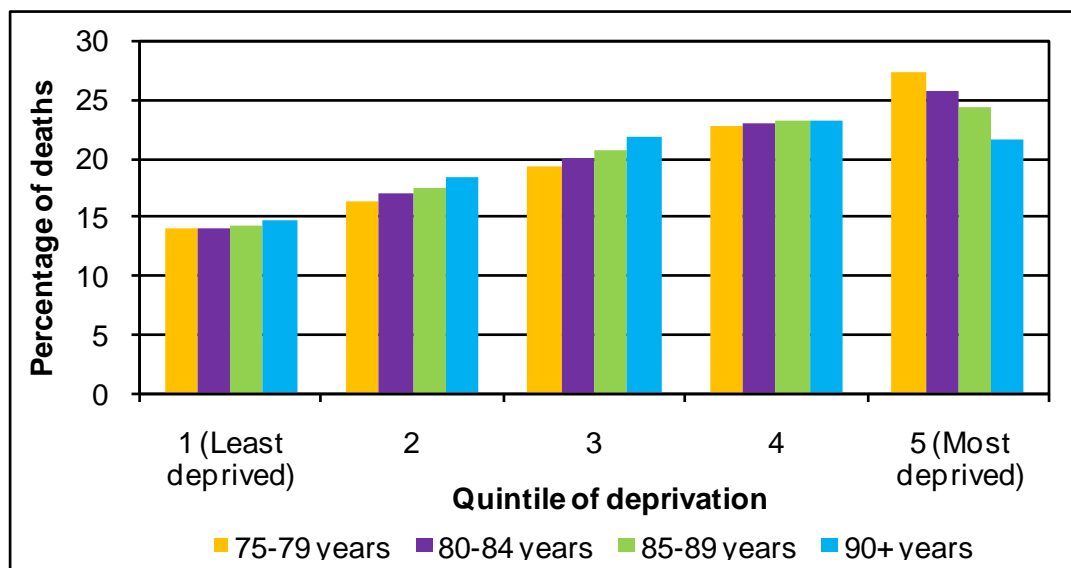
- The proportion of deaths in each quintile of deprivation depended on age group in males and females.

**Figure E7: Proportion of deaths in each deprivation quintile (Income Deprivation Affecting Older People Index) for each age group in males aged 75 and over, England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

**Figure E8: Proportion of deaths in each deprivation quintile (Income Deprivation Affecting Older People Index) for each age group in females aged 75 and over, England, 2006–08**



Source: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

## E5 Underlying cause of death by deprivation

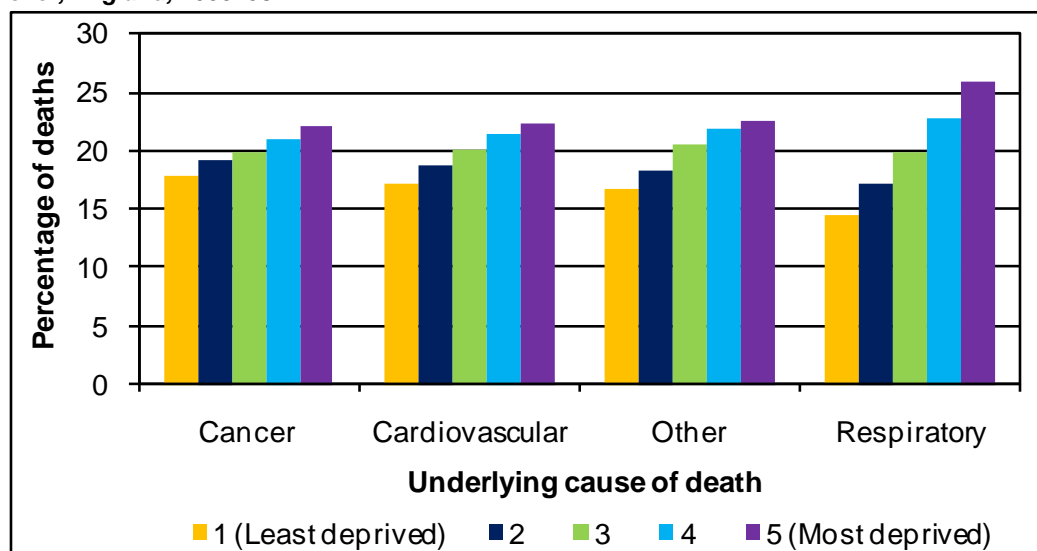
The average number of deaths in people aged 75 and over by main underlying cause and deprivation quintile is presented in Table E1. The proportion of deaths in each deprivation quintile for each main underlying cause for males and females is given in Figures E9 and E10.

**Table E1 : Average number of deaths per year in people aged 75 and over, by underlying cause of death and deprivation quintile, England, 2006–08**

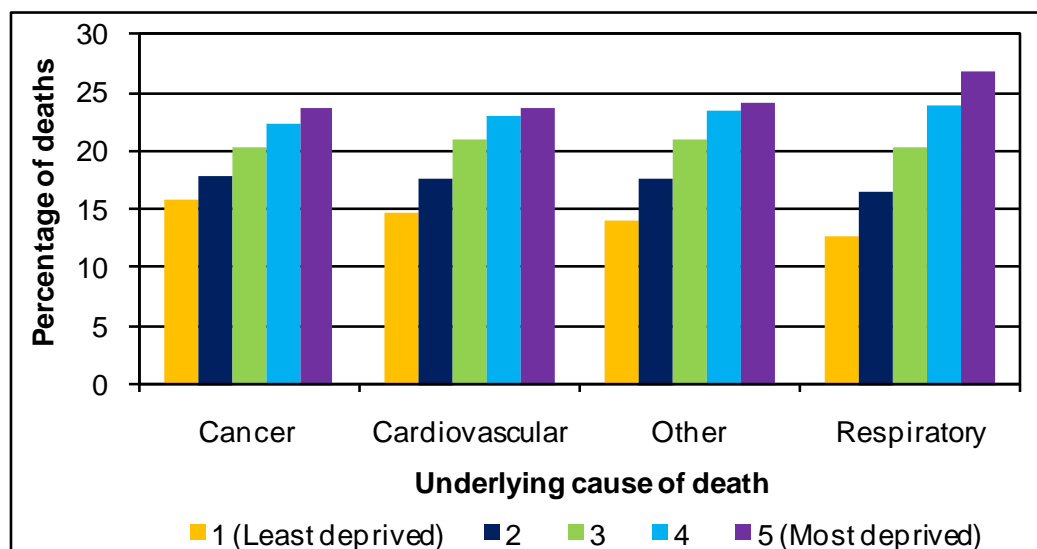
Quintile of deprivation	Underlying cause of death				
	Cancer	Cardiovascular	Other	Respiratory	All causes
1 (Least deprived)	11,444	17,018	12,898	6,889	48,249
2	12,541	19,667	15,371	8,602	56,182
3	13,642	22,319	17,987	10,353	64,301
4	14,693	24,287	19,693	12,007	70,680
5 (Most deprived)	15,545	25,050	20,342	13,594	74,531
<b>All quintiles</b>	<b>67,865</b>	<b>108,342</b>	<b>86,290</b>	<b>51,445</b>	<b>313,942</b>

Source: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

**Figure E9: Proportion of deaths in deprivation quintile for each underlying cause in males aged 75 and over, England, 2006–08**



**Figure E10: Proportion of deaths in deprivation quintile for each underlying cause in females aged 75 and over, England, 2006–08**



Source: Charts this page: South West Public Health Observatory from Office for National Statistics and Communities and Local Government data

## Further information

This report is available online at:  
[www.endoflifecare-intelligence.org.uk](http://www.endoflifecare-intelligence.org.uk)

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## About the National End of Life Care Intelligence Network

The Department of Health's National End of Life Care Strategy, published in 2008, pledged to commission a National End of Life Care Intelligence Network (NEoLCIN). The Network was launched in May 2010. It is tasked with collating existing data and information on end of life care for adults in England. This is with the aim of helping the NHS and its partners commission and deliver high quality end of life care, in a way that makes the most efficient use of resources and responds to the wishes of dying people and their families.

Key partners include the National Cancer Intelligence Network (NCIN), which will work closely with the Network to improve end of life care intelligence; and the South West Public Health Observatory, lead public health observatory for end of life care, which hosts the NEoLCIN website. The SWPHO has been commissioned to produce key outputs and analyses for the Network, including the national End of Life Care Profiles.

See [www.endoflifecare-intelligence.org.uk](http://www.endoflifecare-intelligence.org.uk) for more information about the Network and its partners.

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