Introduction

Advances in the health of Australians diagnosed with cancer during the 20th century have not resulted in similar health outcomes across all population subgroups. Australians living in rural and disadvantaged areas are generally more likely to be diagnosed with advanced cancer and have lower prospects of survival.[2,3] They often have higher prevalence of risk factors such as smoking, obesity and lower levels of physical activity.[4,5] Impact of distance is also important, with cancer patients in rural areas experiencing greater difficulty accessing cancer care services.[6-8]

Achieving health equity for all Australians, regardless of race, income and place of residence, has been identified as one of the greatest health challenges Australia faces.[9] To effectively address this challenge the extent of health inequalities needs to be quantified, as was recommended by the World Health Organization Commission on the Social Determinants of Health.[10] Specifically, an understanding of spatial patterns of cancer helps health planners, service providers, other health professionals and the general public to assess current needs and understand the relative health burdens caused by each type of cancer.

A previous Cancer Council Queensland (CCQ) report[1] had a substantial impact in highlighting the geographical inequalities in cancer outcomes across the State and promoting research activities. The increasing application of emerging statistical and spatial techniques by other Australian[11] and international[12] cancer agencies to model small-area geographical data, as well as the relevance of the latest available statistics of geographical variation for informing policy and research priorities, increased the motivation for CCQ to produce a small-area cancer atlas showing the most recent spatial patterns in cancer incidence and survival outcomes for cancer patients in Queensland.

This report displays maps of incidence and survival by type of cancer and gender. Providing a visual representation of cancer outcomes is particularly useful for describing geographic patterns of disease as well as enabling targeted policy development and resource allocation to improve prevention, early detection and outcomes.[13]

Scope of this report

To provide more meaningful and stable estimates, the previous CCQ report[1] presented cancer incidence and survival estimates for only 14 broad geographical areas across Queensland. However the expanding application of Bayesian statistical methods and spatial mapping capability now makes it possible to generate robust estimates of variations in cancer outcomes using smaller, more detailed geographic areas.

This report examines the geographical variation in cancer incidence and survival in Queensland between 1998 and 2007 across Statistical Local Areas (SLAs) for the most common types of cancer. SLAs are spatial units defined by the Australian Standard Geographical Classification (ASGC). They are often based on the incorporated bodies of local governments, which are used to delineate responsibility for service provision and infrastructure. The SLA is also used as the standard area definition by most relevant data providers, in particular the Queensland Cancer Registry and Australian Bureau of Statistics. All SLA boundaries were adjusted to match the 2006 ASGC definitions. In 2006 there were 478 SLAs in Queensland with a median population of 5,810 (range: 7 to 77,523).

Cautions

The estimates presented in the maps have been adjusted (or smoothed) to account for small numbers of cancers and population sizes. Although maps allow for rapid visual assessment of large amounts of information, they have the potential to be visually misleading; the largest regions which may dominate the image are often the most sparsely populated and involve the smallest numbers of cancer cases.

Results are based on the area where people lived when they were diagnosed with cancer. Since cancer may develop many years before a diagnosis, it is possible that area of residence at diagnosis does not reflect where any initial exposure may have occurred.

It is important to note that the estimates presented in this report do not indicate the level of risk for any specific individual living within a particular area; rather they reflect the average risk for all people within an area after accounting for the risk in neighbourhood areas, the age and sex distribution of people diagnosed with cancer and, for survival, the underlying mortality rate.

The statistical evidence level for geographical variation was categorised as “Strong”, “Moderate”, “Weak” or “None” (see Methods). For the categories of “Weak” and “None”, it is likely that any observed variation is random variation, or primarily due to chance. However, even when there is “Moderate” or “Strong” statistical evidence of geographical variation, there remains some small possibility that the observed variation is due to chance.

Limitations

This report is not designed to identify clusters of cancers or provide definitive reasons for any observed geographical variation, as it is based solely on data from the Queensland Cancer Registry. It is unable to consider all the local environmental, clinical and public health issues that may be relevant to a detailed cluster investigation. For this reason any spatial patterns that are identified need to be viewed as areas for further research or investigation, and not as an end in themselves. Dedicated research studies are required to properly investigate and explain any significant findings in this report. Such studies could include investigating various person-specific factors such as smoking history, diet, alcohol consumption, residential and family history, as well as area-level factors such as access to and quality of health services and environmental exposures.

No adjustment for stage or spread of cancer at diagnosis has been included in this report. Complete staging data is not routinely collected by the Queensland Cancer Registry, as is the case for all cancer registries in Australia (although New South Wales collects a measure of degree of cancer spread). Therefore it is not possible to determine whether differences in the spread of disease at diagnosis (possibly due to screening for certain cancers), or differences in management strategies, are the predominant reasons for observed variations. Cancer Council Queensland is currently undertaking several research studies to examine these issues in more detail for specific cancers. Published results from New South Wales[3] found that similar levels of regional variation were observed regardless of adjusting for spread of disease at diagnosis, suggesting that earlier diagnosis was not the only explanation for geographical variations.

Cancer outcomes were examined by area-level socioeconomic status. Socioeconomic status was based on the Australian Bureau of Statistics Socioeconomic Indexes for Areas (SEIFA) classification, using the Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD). These are area-based measures, and therefore may not reflect the socioeconomic status of all individuals living within those areas.

To preserve confidentiality, the number of cancer cases in each SLA is not provided in this report; instead emphasis is placed on the overall patterns of variation across the State, and patterns by rurality and area-level socioeconomic status.