Bellarine Peninsula Cancer Incidence Report: Update

Prepared by:

Professor Roger L Milne

Cancer Epidemiology Division

Cancer Council Victoria

Prepared for:

Health Protection Branch

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Background

In response to community concern about the incidence of cancer in the Barwon Heads area on the Bellarine Peninsula (Victoria, Australia), Cancer Council Victoria was approached by the Health Protection Branch of the Victorian Department of Health and Human Services, to carry out an analysis of data from the Victorian Cancer Registry (VCR).

The purpose of this type of analysis is to describe the incidence of cancer in a defined area relative to the population average, in order for any excess incidence to inform the investigation of potential exposures to environmental carcinogen(s). In this regard, a large excess in the incidence of a particular type of cancer would be of particular concern.

The aim of the analysis was to assess the incidence in a defined geographical area, relative to that of the general population of Victoria, of the following International Classification of Disease (ICD) code groupings of cancers for people of all ages: all cancers combined (C00-C96, D45-D47); liver cancer (C22); breast cancer (C50); testis cancer (C62); cancer of the brain and central nervous system (C70-C72); Hodgkin lymphoma (C81); non-Hodgkin lymphoma (C82-C86); multiple myeloma (C90); leukaemia (C91-C95); and other haematopoietic cancers (C88, C96, D45-D47). Further, given community concern about cancers diagnosed in young people in the area, an additional aim was to assess the incidence of all cancers combined for people aged between 10 and 34 years.

The analysis was carried out in 2019 for the period 2001-2016, based on data available at the time from the Australian Bureau of Statistics (ABS) and the Victorian Cancer Registry, and a report written and submitted to the Health Protection Branch. That report found no substantive evidence of increased incidence of cancer in the defined area in and around Barwon Heads for the period 2001-2016.

At the public hearing of the Community Affairs Reference Committee on "Investigations into possible cancer cluster on the Bellarine Peninsula, Victoria", held on the 1st of May 2020, questions were raised regarding the calendar period of the original analysis. Following that hearing, it was confirmed with the ABS that the required estimated residential population data prior to 2001 for the geographical areas studied in the original analysis did not exist. However, after further consultation, the ABS confirmed that it would be able to calculate (on special request) and provide the estimated residential population data required to extend the period of analysis back as far as 1982.

The Health Protection Branch then requested that Cancer Council Victoria carry out a second analysis, studying the same cancers as in the original analysis, with the addition of prostate cancer (ICD-10 code C61), and extending as far as possible in time, going back to 1982 and forward to 2019.

Data sources

The geographical area for this analysis was defined, as in the original analysis, by aggregating the following relevant contiguous Level 1 Statistical Areas (SA1s): 20303105036, 20303105016, 20303105017, 20303105035, 20303105034, 20303105032, 20303105031, 20303105033, 20303105042 (Figure 1). SA1s were defined based on Australian Statistical Geography Standard (ASGS), 2011 version.

Cancer incidence data were obtained from the Victorian Cancer Registry (VCR). The notification of cancers to the VCR has been mandated by legislation since 1982 and this registry is the most authoritative source of data on cancer incidence in Victoria. Cancer data available for this analysis are considered complete up to and including 2019.

Estimated residential population data for the defined area were calculated by the Australian Bureau of Statistics (ABS) for 1982 to 2019 based on the Australian census and births, deaths and migration statistics.

Based on the available data from both the VCR and the ABS, analyses were conducted for the period 1982-2019.

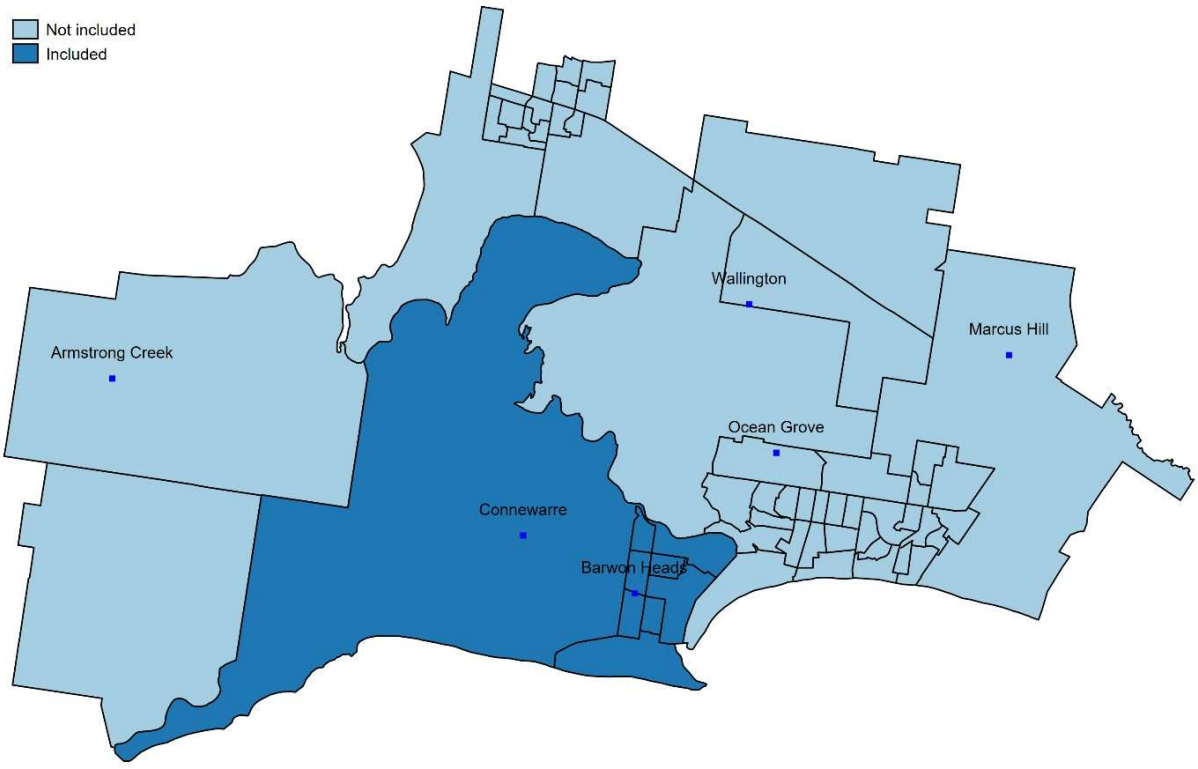

Figure 1: Map of the defined area on the Bellarine Peninsula, Victoria

Analyses

The cancer incidence for the pre-defined geographical area was assessed relative to the Victorian population by estimating standardised incidence ratios (SIRs). These are calculated by dividing the number of observed incident cases in the defined area by the number of expected cases, the latter calculated based on the average age- and sex- and year-specific incidence rates for the Victorian population. Only incident (newly diagnosed) cancers diagnosed in residents of the area during the study period (1982-2019) were considered; only those diagnosed in residents aged 10-34 years at diagnosis were included in the analysis of younger people.

The incidence rates used for this calculation were obtained from the VCR's annual incidence files. Exact 95% confidence intervals were calculated for the SIR, which are the most appropriate confidence intervals when the number of expected cancers is relatively low.

The SIR can be interpreted as an estimate of the relative incidence of cancer. An SIR of 1 would indicate that the cancer incidence for residents in the defined area of interest was the same as that for the general population of Victoria, while an SIR of 1.30 would indicate that residents had a 30% higher cancer incidence than the general population; conversely, an SIR of 0.70 indicates that residents had a 30% lower cancer incidence than the general population. The ninety-five percent confidence interval (95%CI) provides an indication of the degree of uncertainty about the estimated SIR, with a wider interval indicating greater uncertainty; the smaller the number of observed and expected cases, the greater the uncertainty. When a 95%CI includes 1, the corresponding SIR estimate, however large, cannot be excluded as a chance occurrence.

Results

On average, over the period 1982-2019, the defined area had a population of 3,205 persons (1,617 women), with 905 aged between 10 and 34 years. Over that period, a total of 688 incident cancers were observed in residents of the area, 18 of which occurred in residents aged 10 to 34 years at diagnosis.

The corresponding numbers for the period 1982-2000 were 2,492 persons (1,284 women), 789 aged 10-34 years, and those for the period 2001-2019 were 3,918 persons (1,949 women), 1,020 aged 10-34 years.

The results from the analyses conducted are summarised in the Table below. In the interests of protecting privacy, and in line with general VCR and ABS practice, for cancers for which the counts included fewer than 5 cases, the estimated SIR is given without the counts.

For all cancer groupings considered, the number of observed cases was generally similar to the number expected. This is reflected in the SIR estimates, which are relatively close to 1. The findings for all cancers and age groups for the period 1982-2000 were consistent with those for 2001-2019, with largely overlapping confidence intervals for all SIR estimates. Among the highest SIR estimates for the entire period studied (1982-2019) was 1.57 for Hodgkin lymphoma, 1.30 for leukaemia and 1.21 for all cancers in younger people (aged 10-34 years), but 95%CIs were wide, suggesting substantial uncertainty about these estimates. Further, the 95%CIs included 1, suggesting the observed estimates could be greater than 1 due to chance. The SIR for breast cancer was 1.24 with a 95%CI of 1.01-1.50, suggesting an excess incidence beyond what might be explained by chance.

A limitation of this analysis is that residents who moved out of the area and were later diagnosed with cancer will not have been included in the observed cancer counts. In addition, we were unable to adjust SIRs for known lifestyle-related cancer risk factors such as smoking, alcohol consumption and obesity (and in the case of breast cancer, reproductive and hormonal factors), which may at least in part account for SIR estimates that differ from 1.

Conclusions

This analysis assessed the incidence of selected cancers diagnosed in residents of a defined area on the Bellarine Peninsula over the period 1982-2019 and compared it with that expected based on the average incidence for Victoria. Although standardised incidence ratio estimates varied both below and above 1, no substantive evidence of increased incidence was found, other than for breast cancer, with an estimated 24% (95%CI 1%-50%) excess incidence relative to the Victorian average.

Table: Observed and expected cancer counts, and standardised incidence ratio estimates for the geographical area defined by nine SA1s* on the Bellarine Peninsula, Victoria: 1982-2019

Cancer	1982-2000				2001-2019				1982-2019			
	Obs	Exp	SIR	95%CI	Obs	Exp	SIR	95%CI	Obs	Exp	SIR	95%CI
All	266	256	**1.04**	(0.92-1.17)	422	437	**0.97**	(0.88-1.06)	688	692	**0.99**	(0.92-1.07)
Liver			**0.00**	(0.00-2.01)			**0.60**	(0.16-1.54)			**0.47**	(0.13-1.21)
Breast	37	29	**1.26**	(0.89-1.74)	68	56	**1.22**	(0.95-1.55)	105	85	**1.24**	(1.01-1.50)
Testis			**0.00**	(0.00-3.26)			**1.39**	(0.29-4.06)			**0.91**	(0.19-2.66)
Prostate	27	31	**0.87**	(0.58-1.27)	73	72	**1.01**	(0.79-1.27)	100	103	**0.97**	(0.79-1.18)
Brain and CNS			**0.73**	(0.15-2.14)			**0.92**	(0.34-2.00)	9	11	**0.85**	(0.39-1.61)
Leukaemia	10	7	**1.42**	(0.68-2.62)	17	14	**1.23**	(0.72-1.97)	27	21	**1.30**	(0.85-1.89)
Hodgkin lymphoma			**1.80**	(0.22-6.51)			**1.45**	(0.30-4.22)			**1.57**	(0.51-3.66)
Non-Hodgkin lymphoma	10	9	**1.07**	(0.51-1.97)	16	19	**0.86**	(0.49-1.39)	26	28	**0.93**	(0.61-1.36)
Multiple myeloma			**0.67**	(0.08-2.42)			**0.87**	(0.32-1.90)	8	10	**0.81**	(0.35-1.60)
Other haematopoietic			**1.26**	(0.41-2.94)			**0.37**	(0.10-0.95)	9	15	**0.61**	(0.28-1.16)
All (ages 10-34 years)	8	7	**1.15**	(0.50-2.26)	10	8	**1.27**	(0.61-2.33)	18	15	**1.21**	(0.72-1.92)

Obs, number of cancers observed; Exp, number of cancers expected (rounded); SIR, standardised incidence ratio; CI, confidence interval

* SA1 codes 20303105036, 20303105016, 20303105017, 20303105035, 20303105034, 20303105032, 20303105031, 20303105033, 20303105042.