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## Disparities in cancer stage at diagnosis and survival of Aboriginal and non-Aboriginal South Australians



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### ABSTRACT

**Background/Aim:** This study tested the utility of retrospectively staging cancer registry data for comparing stage and stage-specific survivals of Aboriginal and non-Aboriginal people. Differences by area level factors were also explored.

**Methods:** This test dataset comprised 950 Aboriginal cases and all other cases recorded on the South Australian cancer registry with a 1977–2010 diagnosis. A sub-set of 777 Aboriginal cases diagnosed in 1990–2010 were matched with randomly selected non-Aboriginal cases by year of birth, diagnostic year, sex, and primary site of cancer. Competing risk regression summarised associations of Aboriginal status, stage, and geographic attributes with risk of cancer death.

**Results:** Aboriginal cases were 10 years younger at diagnosis, more likely to present in recent diagnostic years, to be resident of remote areas, and have primary cancer sites of head & neck, lung, liver and cervix. Risk of cancer death was associated in the matched analysis with more advanced stage at diagnosis. More Aboriginal than non-Aboriginal cases had distant metastases at diagnosis (31.3% vs 22.0,  $p < 0.001$ ). After adjusting for stage, remote-living Aboriginal residents had higher risks of cancer death than Aboriginal residents of metropolitan areas. Non-Aboriginal cases had the lowest risk of cancer death.

**Conclusion:** Retrospective staging proved to be feasible using registry data. Results indicated more advanced stages for Aboriginal than matched non-Aboriginal cases. Aboriginal people had higher risks of cancer death, which persisted after adjusting for stage, and applied irrespective of remoteness of residence, with highest risk of death occurring among Aboriginal people from remote areas.

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### 1. Background

Aboriginal and Torres Strait Islander Australians (referred to here as Aboriginal people) experience a 10-year lower life expectancy than other Australians [1]. Cancer accounts for 15%

of the gap in fatal burden [2]. While Aboriginal people have a similar age-adjusted cancer incidence to the general population [3–5], they experience a 50% higher cancer mortality rate and a 70% higher cancer burden from premature mortality [3,6].

A complex picture underlies this disparity, with Aboriginal people more likely to experience chronic, comorbid diseases, elevated exposures to cancer-related risks and lower participation in screening [7]. Aboriginal people experience a higher proportion of cancer types with high fatality rates [8,9], and generally more advanced cancer stages at diagnosis [10–15]. Marked variations in health risks apply, with Aboriginal people more likely to live in remote areas, where higher all-cause mortality rates generally apply than in major cities [6,15–17]. Five-year Aboriginal cancer

*Abbreviations:* ABS, Australian Bureau of Statistics; CanDAD, Cancer Data and Aboriginal Disparities; IRSAD, Index of Relative Socio-economic Advantage and Disadvantage; IRSD, Index of Relative Socio-economic Disadvantage; OR, odds ratio; NSW, New South Wales; SA, South Australia; SACR, South Australian Cancer Registry; SHR, sub-hazard risk ratio.

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survival follows a similar pattern, with survival decreasing with increasing remoteness [3,9,13,14,18,19].

While Australians as a whole have experienced increased cancer survival [20], there has not been a distinguishable increase among Aboriginal people, resulting in a widening disparity in cancer mortality [2,5,21].

Reporting invasive cancers to a population cancer registry is mandatory in all Australian states and territories, enabling national monitoring of incident numbers, primary sites and demographic

distributions by sex, age, and area of usual residence. However, stage of disease at diagnosis is not routinely recorded by most cancer registries [3]. Given the importance of early detection in maximising cancer treatment outcomes, and the prognostic relevance of stage, the lack of recording of stage is an important data gap [3,22].

There is a need for better evidence on the relationship of Aboriginal status with cancer site and stage, and sex, age, place of residence and socio-economic status [10]. Place of residence and socio-economic status can be assessed ecologically for this

**Table 1**  
Demographic distribution and tumour characteristics of cancers diagnosed among Aboriginal and non-Aboriginal South Australians from 1977 to 2010.

	Aboriginal		non-Aboriginal		Odds Ratios	95% CIs
	N	%	N	%		
All cancers	950	0.4	219,234	99.6		
Diagnostic period						
1977–89	164	17.3	57,611	26.3	1.00	Reference
1990–99	286	30.1	67,640	30.9	1.49	1.23–1.80
2000–10	500	52.6	93,983	42.9	1.87	1.57–2.23
Sex						
Males	469	49.4	120,719	55.1	1.00	Reference
Females	481	50.6	98,515	44.9	1.26	1.11–1.43
Age						
0–24	38	3.9	3455	1.7	1.00	Reference
25–34	39	4.1	5426	2.4	0.65	0.42–1.02
35–44	121	12.7	11,808	5.4	0.93	0.65–1.34
45–54	187	19.7	24,405	11.2	0.70	0.49–0.99
55–64	262	27.6	44,744	20.4	0.53	0.38–0.75
65–74	174	18.3	61,688	28.1	0.26	0.18–0.36
75–84	100	10.5	51,387	23.5	0.18	0.12–0.26
85+	29	3.1	16,321	7.4	0.16	0.10–0.26
2011 IRSAD Quintile						
Q1 Most disadvantage	446	46.9	43,250	19.7	1.00	Reference
Q2	265	27.9	45,984	21.0	0.56	0.48–0.65
Q3	123	12.9	44,901	20.5	0.27	0.22–0.32
Q4	57	6.0	41,883	19.1	0.13	0.10–0.17
Q5 Least disadvantage	59	6.2	43,216	19.7	0.13	0.10–0.17
Geographic remoteness						
Major cities	397	41.8	161,548	73.7	1.00	Reference
Inner Regional	57	6.0	20,090	9.2	1.15	0.87–1.52
Outer regional	278	29.3	29,443	13.4	3.84	3.29–4.48
Remote	218	22.9	8153	3.7	10.88	9.21–12.85
Cancer site						
Head & neck (C01–C14)	62	6.5	4076	1.9	1.00	Reference
Oesophagus (C15)	21	2.2	2579	1.2	0.54	0.33–0.88
Stomach (C16)	33	3.5	5799	2.6	0.37	0.24–0.57
Colorectal (C18–C21)	90	9.5	31,395	14.3	0.19	0.14–0.26
Liver (C22)	30	3.2	1579	0.7	1.25	0.80–1.94
Gallbladder (C23–C24)	17	1.8	1844	0.8	0.61	0.35–1.04
Pancreas (C25)	28	2.9	5002	2.3	0.37	0.24–0.58
Lung, Trachea & Bronchus (C33–C34)	128	13.5	22,184	10.1	0.38	0.28–0.51
Haematopoietic & Reticuloendothelial (C42)	44	4.6	11,570	5.3	0.25	0.17–0.37
Melanoma of skin (C44 & M872–M879)	37	3.9	19,084	8.7	0.09	0.06–0.14
Breast (C50)	88	9.3	26,591	12.1	0.22	0.16–0.30
Vagina/vulva (C51–C52)	9	0.9	779	0.4	0.76	0.38–1.53
Cervix (C53)	40	4.2	2201	1.0	1.19	0.80–1.78
Uterus (C54–C55)	22	2.3	4586	2.1	0.32	0.19–0.51
Ovary (C56)	10	1.1	2937	1.3	0.22	0.11–0.44
Prostate (C61)	55	5.8	30,318	13.8	0.12	0.08–0.17
Kidney (C64)	23	2.4	4778	2.2	0.32	0.20–0.51
Bladder (C67)	17	1.8	5794	2.6	0.19	0.11–0.33
Brain (C71 exc M959–M972)	18	1.9	3570	1.6	0.33	0.20–0.56
Other & unspecified sites (C39 C76 C80)	55	5.8	7226	3.3	0.25	0.17–0.38
Lymphomas (M959–M972)	35	3.7	8904	4.1	0.50	0.35–0.72
Remainder combined	88	9.3	16,438	7.5	0.36	0.27–0.50

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