

# ***The epidemiology of melanoma in NSW***

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*Sydney Health Projects Group  
School of Public Health*



**The University of Sydney**

**This report was prepared by:**

**Phoebe Holt** BA (Hons), PhD  
Senior Associate

**Michael Frommer** MB BS, DObstRCOG, MPH, FAFPHM, FAFOM  
Director and Adjunct Professor

**Sydney Health Projects Group**  
**School of Public Health**  
**The University of Sydney**

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# The epidemiology of melanoma in NSW

## 1 Introduction

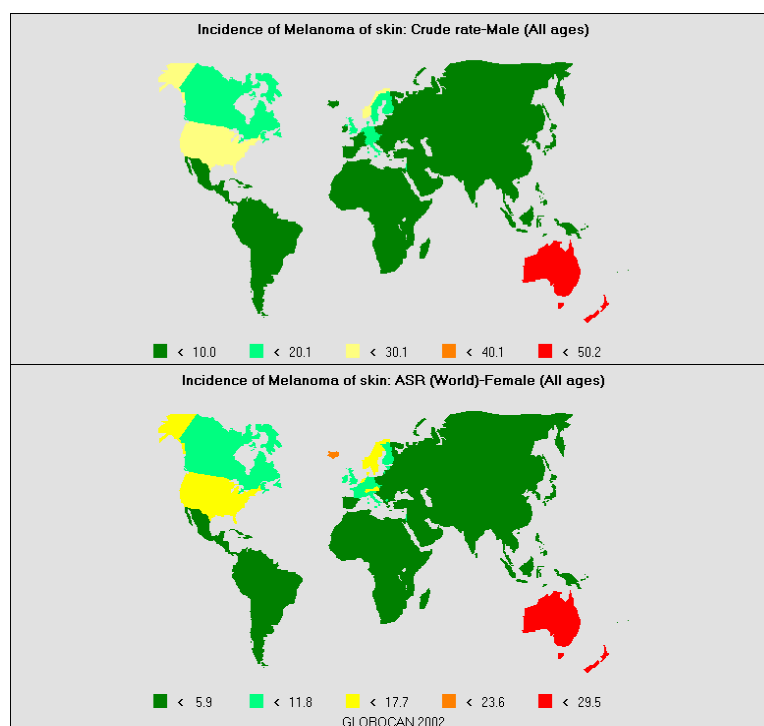
In this paper we review the epidemiology of melanoma in NSW. We highlight aspects of the epidemiology of melanoma that have important implications for the role, structure and development of the proposed NSW Melanoma Network.

## 2 Incidence

### 2.1 Overall incidence

Australia has the highest incidence of melanoma of the skin (melanoma) in the world, with New Zealand ranking a close second (See Figure 1). Age-standardised incidence rates in Australia in 2001 were 55.2 per 100,000 in males and 38.3 per 100,000 in females. The lifetime risk of melanoma up to the age of 75 years in Australia (2001) was 1 in 25 for males and 1 in 34 for females (AIHW, 2004). Melanoma was ranked as Australia's fourth most common cancer in males and third most common cancer in females in 2001 (AIHW, 2004).

**Figure 1.** Incidence of melanoma in males and females across the globe.



Source: Ferlay, Bray, Pisani and Parkin, 2004

On a regional basis, NSW incidence rates for melanoma were the third highest in the world over the period 1993-97 (36.9 per 100,000 in males and

25.9 in females). NSW ranked behind Queensland (51.1 per 100,000 in males and 38.1 in females) and Western Australia (41.5 per 100,000 in males and 30.7 in females). Over the same period the rates in NSW were more than twice those recorded in the USA (for whites) (15.4 per 100,000 in males, 11.6 females) (Tracey, Chen, and Sitas, 2004).

Age-standardised incidence rates for melanoma in NSW in 2003 were 58.2 per 100,000 for males and 37.6 for females (Tracey, Roder, Bishop, Chen and Chen, 2005). Melanoma was ranked as the third most common notifiable cancer in both males and females in NSW (2003), following prostate and bowel cancer in males, and breast and bowel cancer in females (Tracey et al, 2005). The age- standardised incidence of melanoma had the same rankings. These rankings exclude non-melanoma skin cancers, which are the most common cancers in Australia but are not notifiable.

In NSW, 3,239 new cases of melanoma were reported in 2003 (1,885 in males and 1,354 in females). These cases represented 10.7% of all cancers for men and 9.2% of all cancers for women (Tracey et al, 2005).

## **2.2 Geographic variation**

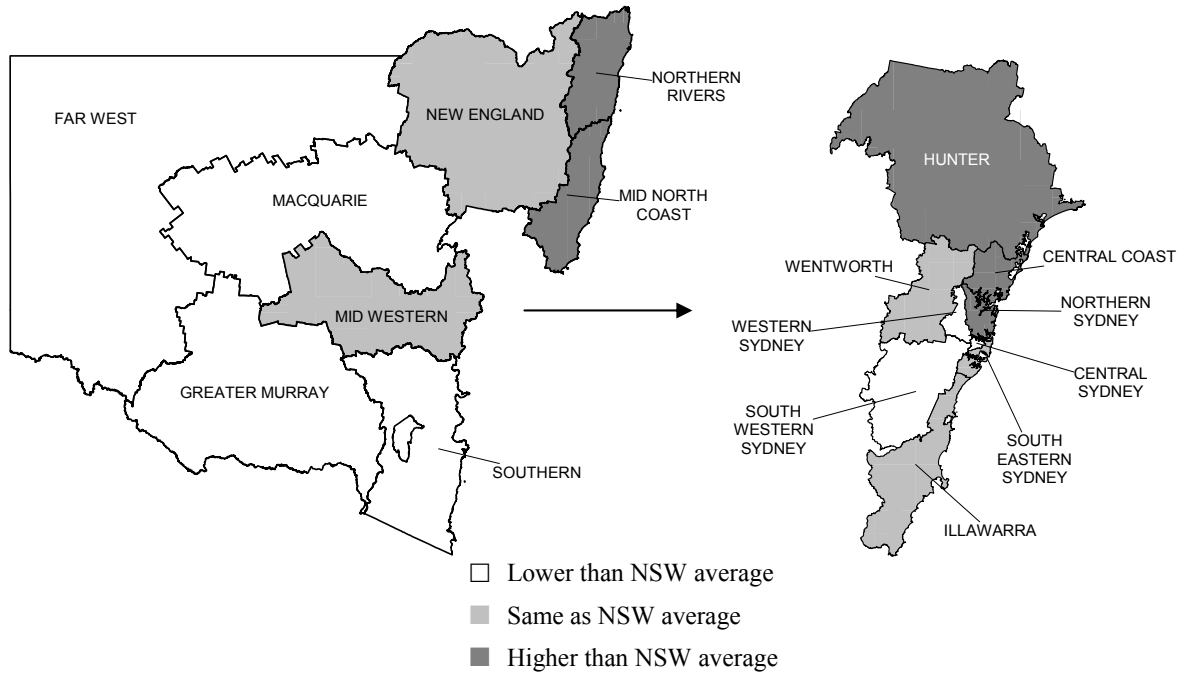
While the incidence of most cancers is similar across Australian States and Territories, melanoma incidence varies (see Figures 2 and 3). In general, a higher incidence of melanoma is observed in people living closer to the equator and those living near the coast (Nguyen, Armstrong and Coates, 1997; Goumas, O'Connell, Armstrong, 2002). During the period 1997-2001, Queensland had the highest age-standardised incidence of melanoma in males (77.9 per 100,000), followed by Western Australia (56.9), and NSW (55.1). Similar trends in incidence were found in females, except that high rates were also found in Tasmania. Incidence figures for females were as follows: Queensland, 53.1 per 100,000; Tasmania, 41.2, Western Australia, 38.8; and NSW and the Australian Capital Territory, 35.2 (AIHW, 2004).

During 1999-2003, the highest melanoma incidence rates within NSW in both males and females were found in coastal areas north of Sydney (the former Central Coast, Mid North Coast and Northern Rivers Area Health Services), in males in the Northern Sydney Area Health Service, and in females in the Hunter and New England Area Health Services. The lowest rates occurred in both males and females in the South-Western, Western and Central Sydney Area Health Services (Tracey et al 2005).

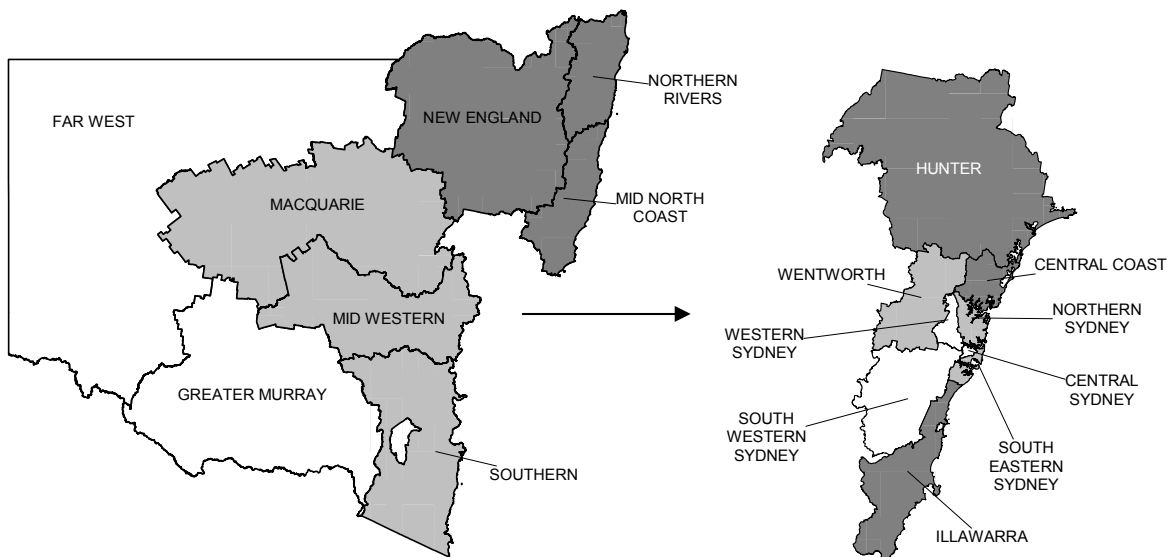
During the same time period, similar incidence rankings applied within the boundaries of new NSW Area Health Services, established in January 2005. For males and females, the North Coast Area Health Service had the highest incidence of melanoma. For males, Northern Sydney and Central Coast Area Health Services had the highest incidence, and for females the Hunter and New England Area Health Service. (Public Health Division, , 2004). Melanoma rates were much lower than the NSW average for both males and females in

Sydney South West and Sydney West Area Health Services, and for males in the Greater Southern Area Health Service.

**Figure 2. Incidence of melanoma in males in Area Health Services<sup>1</sup> in NSW, 1983-2000**



**Figure 3. Incidence of melanoma in females in Area Health Services<sup>1</sup> in NSW, 1983-2000**



<sup>1</sup> Area Health Service boundaries adapted from ABS (Cdata96) boundaries

Source: Goumas, O'Connell and Armstrong. 2002

### **2.3 Age at diagnosis**

Melanoma is frequently observed in young adults and middle aged persons (Armstrong, 2004). In 2002 and 2003, melanoma was the most common cancer in NSW in males aged 25-54 and in females aged 15-29 (The Cancer Council NSW, 2005; Tracey et al, 2005). However, 56% of new melanomas overall in NSW during 1983-2000 occurred in people aged 60 years and over (Goumas et al, 2002). In 2003, the median age at diagnosis of melanoma was 64 years in males and 58 years in females (Tracey et al, 2005).

### **2.4 Distribution by sex**

In 2003, 58% of new cases of melanoma in NSW were in males (Tracey et al, 2005). This figure has been consistent in recent years. Between 1983 and 2000, 56% of new cases were in males (Goumas et al, 2002). Males were 1.6 times more likely to be diagnosed with melanoma than females. It is estimated that, in NSW, one male in 24 and one female in 35 will develop melanoma before the age of 75 (Tracey et al, 2005).

### **2.5 Socioeconomic status**

The incidence of melanoma is positively associated with socioeconomic status in NSW (Smith, Taylor and Coates, 1996; Nguyen, Armstrong and Coates, 1997). The higher the socioeconomic status, the higher the incidence of melanoma in both males and females (Nguyen et al, 1997).

### **2.6 Tumour size and pathology**

Most tumours diagnosed in NSW during 1983-2000 (53%) were <1mm in thickness. Only 10% were found to be  $\geq 3$ mm in thickness (Goumas et al, 2002).

The most common histopathological type of melanoma in NSW in 2003, apart from those melanomas not otherwise specified (49%), was superficial spreading melanoma (32%). Nodular melanoma was diagnosed in 9% of cases (Tracey et al, 2005)

During 1983-2000, thin tumours (<1mm) were most commonly observed in "superficial spreading and lentigo melanomas (about 74%), whereas thick tumours (3.0+ mm) were most common in nodular melanomas (40%)" (Goumas et al, 2002).

Among melanomas that were diagnosed between 1983 and 1995, the proportion of thin lesions generally decreased with age, while the proportion of thick lesions increased with age. Nodular and lentigo maligna melanomas were also found to be more common in older people (Nguyen et al, 1997). In addition, melanomas were found to be significantly thinner than in NSW as a whole in the old Area Health Services of Northern Rivers in males and in the

Hunter in both sexes. Conversely, melanomas were reported as significantly thicker in the Southern Region of NSW and in females only in the Illawarra Region (Nguyen et al, 1997).

## **2.7 Spread of disease**

In 88% of new cases of melanoma diagnosed between 1983 and 2000, the tumour was localized (Goumas et al, 2002).

Among melanomas that were diagnosed between 1983 and 1995, the proportion that were localized increased over the years of analysis. The proportion of NSW cases with regional or distant spread at diagnosis was found to increase with increasing age, and there was a corresponding fall in localised disease (Nguyen et al, 1997). A higher proportion of cases with distant spread at the time of diagnosis were found in Area Health Services that had a lower incidence of melanoma (Nguyen et al 1997).

Distant metastases were reported at the time of diagnosis in 51% of melanoma patients who had melanomas with histopathological type classified as 'other', or in whom histopathology was not specified.

## **2.8 Body sites**

Among both males and females in NSW, the most common sites for melanoma were the limbs (44%), the trunk (33%) and head and neck (16%) (Goumas et al, 2002). The most common site for melanomas in males was the trunk (42%), and in females, the lower limbs (35%)(Nguyen et al, 1997).

The highest proportions of superficial spreading melanoma and nodular melanoma were found on the trunk in males and the lower limbs in females, while lentigo maligna was most commonly found on the head and neck. Acral lentiginous melanoma was most commonly found on the lower limbs in both males and females. (Nguyen et al, 1997).

Approximately 92% of patients diagnosed with melanoma on the trunk or limbs had localised tumours at the time of diagnosis (Goumas et al, 2002).

## **2.9 Trends in incidence**

The incidence of melanoma of the skin has been rising in developed countries with fair-skinned populations for decades. The age-standardised incidence of melanoma rose by 19% in males and 7% in females in the 11 years from 1992 to 2002 (Tracey, Chen, and Sitas, 2004). However, there is evidence that this trend may be slowing in Australia. NSW data (1983-1996) suggest that, despite continuing increases in older age groups, particularly in males, incidence at younger ages is stabilising in males and declining in females (Marret, Nguyen, and Armstrong, 2001).

The proportion of patients who had melanomas with localised spread increased from 1983 to 1995 (Nguyen et al, 1997).

Melanoma incidence rates have been projected to 2010. Incidence is expected to remain constant in females, but increase in males. It is predicted that there will be a 29 percent increase in the number of new cases of melanoma from 2000 to 2010 (Tracey et al, 2003) (see Table 1).

**Table 1:** Numbers and projections of numbers of new cancers by site, NSW, 1996- 2010.

Site	1996 <sup>1</sup>	2000 <sup>1</sup>	2001 <sup>2</sup>	2006 <sup>2</sup>	2010 <sup>2</sup>
All cancers	23,074	28,889	29,511	32,246	34,433
Melanoma of skin	2,535	2,852	2,962	3,359	3,675

<sup>1</sup> actual    <sup>2</sup> projected

Source: NSW Cancer Registry, 2001 (Tracey et al, 2003)

### 3 Prevalence

Estimates of disease prevalence are important in the planning and management of health services because they give an indication of the numbers of individuals who might need continuing care. Prevalence of melanoma is influenced by incidence, duration of survival, and the proportion of people with melanoma who are 'cured'.

In estimating prevalence, it is important to make a distinction between people who have ever had a diagnosis of melanoma and those who have active disease. The latter obviously make up a subset of the former, as people who have ever had a diagnosis of melanoma include those who can be described as 'cured'. 'Cured' means that a patient has survived the melanoma that was originally diagnosed, and will die eventually of another cause, with no clinical manifestations of the original melanoma. Of course, an individual who has been 'cured' of a melanoma is at increased risk of a second primary melanoma, but the existence of elevated risk of a second primary is not synonymous with the presence of disease.

In assessing the patient load for melanoma services, it is helpful to know about two types of prevalence:

- 'Active prevalence', which refers to the number of people who have active disease, i.e. they have been diagnosed with a melanoma and have continuing manifestations relating to that melanoma (e.g. locoregional disease or metastatic disease).
- Prevalence estimates that enumerate individuals who have ever had a melanoma, regardless of its current status (active or 'cured').

In principle, it is possible to estimate overall prevalence and, as Brameld et al (2002) have done for all cancers combined in Western Australia, to estimate 'active prevalence' of melanoma. As far as we are aware, no estimates of

overall prevalence or 'active prevalence' of melanoma are available. Detailed population-based information on duration of survival (not just survival rates) in relation to tumour pathology and spread would be needed to make such estimates.

As a 'rule of thumb', overall cancer prevalence is approximately three times the incidence figure (NSW Cancer Institute fact sheet). This may be an over-estimate for melanoma, especially in regard to 'active prevalence', given the high proportion of melanomas that are 'cured' by complete excision early in the disease process, often during the initial diagnostic procedure itself.

## **4 Mortality**

### **4.1 Overall mortality**

Melanoma of the skin is ranked eighth among causes of cancer death in both men and women in Australia (AIHW, 2004). NSW has the highest mortality rates for melanoma after Queensland in males and the highest mortality rates after Western Australia and Queensland in females (AIHW, 2004). In NSW, melanoma ranked as the tenth most common cause of death for males and twelfth for females (Tracey et al, 2005).

In 2003, there were 407 deaths from melanoma of the skin (273 males and 134 females) in people who were residents of NSW at the time of diagnosis of their cancer. The age-standardised death rates for melanoma in NSW in 2003 were 8.7 per 100,000 in males and 3.5 per 100,000 in females (Tracey et al, 2005). In NSW, melanoma ranked as the tenth most common cause of death for males and twelfth for females (Tracey et al, 2005).

Between 1983 and 1995, three-quarters of NSW patients who died with melanoma died in a hospital or hospice (Nguyen et al, 1997).

### **4.2 Trends in mortality**

In Australia, melanoma mortality climbed gradually from 1931 to 1985. Since 1985, mortality rates have levelled off (Giles, Armstrong, Burton, Staples and Thursfield, 1996).

In NSW over the period 1983-95, the annual age-standardised mortality rate of melanoma in males increased by an average of 1.7% a year from 1983 to 1995. By contrast, the age standardised mortality rates in females decreased by 0.8% per year over the same period (Nguyen, Armstrong and Coates, 1997).

More recently, Tracey, Chen, and Sitas (2004) found no significant trend in age standardised mortality rates for melanoma in the ten years between 1993 and 2002 in either males or females.

In an analysis of data between 1994 and 1998, “there were fewer deaths from melanoma of the skin than expected...[among residents of] Central Sydney Area Health Service in males, and there was no area variation in the excess number of deaths in females” (Yu, O’Connell, Gibberd, Smith, Armstrong, 2003).

Taking stage of disease as a covariate, the five year relative excess risk of death for patients between 1992 and 1996 increased as remoteness from general service centres increased (Jong, Smith, Yu, O’Connell, Goldstein and Armstrong, 2004). The Accessibility/Remoteness Index of Australia (ARIA) used in this study defines remoteness based on the road distance between a patients resident locality and general service centres of various sizes.

## **5 Survival**

Australia is ranked first in the world for five-year relative survival following a diagnosis of melanoma of the skin for both males and females (AIHW, 2001).

For patients with melanoma of the skin diagnosed in Australia between 1992-1997, relative survival one year after diagnosis was 96.9% for males and 98.6% for females. Five years after diagnosis, relative survival was 90.0% for males and 94.6% for females. For patients with melanomas of the skin diagnosed during 1987-1991, relative survival ten years after diagnosis was 84.5% for males and 92.0% for females (AIHW, 2001).

In NSW, the five-year relative survival of people with melanoma from 1994-2000 was 89% in males and 93% in females. (Tracey, Chen, and Sitas, 2004). Survival rates within NSW have been increasing since 1980-1984 (Supramaniam et al., 1999; NSW Department of Health, 2002).

As regards geographical variation, survival from melanoma has been reported highest among individuals who were resident in the (former) Hunter Area Health Service at the time of diagnosis (92.9% five year relative survival) and lowest in the Southern Area Health Service (86.8%) (Yu, O’Connell, Gibberd, Smith, Armstrong, 2003). The low survival in the Southern Area Health Service may reflect the finding that this Area also had the highest proportion of thicker melanomas in NSW (Nguyen et al, 1997).

In a study of melanoma survival between 1983 and 2000, five-year relative survival was found to decrease with increasing age at diagnosis, particularly in females (Goumas et al, 2002). Not surprisingly, five-year relative survival decreased with increasing degree of spread of cancer and tumour thickness. Five-year relative survival was highest in people with superficial spreading or lentigo melanoma, and lowest in people with melanomas on the head and trunk (females only). Relative survival did not vary with socio-economic status (Goumas et al, 2002; AIHW, 2003). For males only, five-year relative survival was highest in areas of high melanoma incidence, rising from 85% in areas of low melanoma incidence to 89% in areas of high incidence. Relative survival

did not vary appreciably in relation to incidence for females (Goumas et al, 2002).

Interstate comparisons have shown that five-year relative survival in males is highest in Western Australia (93%) and similar in NSW, South Australia and Queensland (87-89%). In females, five-year relative survival is highest in Western Australia (96%) and similar for Queensland, NSW and South Australia (92-94%) (Goumas, O'Connell, Armstrong, 2002).

McKinnon et al (2003) reported that patients with thin ( $\leq 1$  mm) melanomas have a 10-year relative survival of 96.4%. A sub-analysis of patients attending a specialist melanoma service showed that patients who have ulcerated thin melanomas have a 10-year relative survival of 83%.

## **6 Implications for the proposed NSW Melanoma Network**

This review of the epidemiology of melanoma in NSW has five major implications for the establishment of the proposed Melanoma Network.

First, the incidence and mortality data themselves provide strong arguments for investing in the Network: melanoma ranks third for incidence among cancers in NSW; NSW has the third highest incidence of melanoma in the world; and NSW has the second highest rate of mortality from melanoma amongst the States and Territories of Australia. These facts alone underline the importance of systems to ensure that melanoma patients receive the best possible treatment, and that melanoma care is monitored in relation to guidelines and standards.

Second, gaps in the available epidemiological information highlight the need for the Network to have a leading role in improving the scope and quality of data collection. For example, limited data are available on patterns of melanoma care, and no estimates of melanoma prevalence are available.

Third, the epidemiological data highlight deficiencies in the quality of melanoma diagnosis and/or the quality of diagnostic information recorded. For example, information on the histopathological type of melanoma was not specified in almost half of all new cases of melanoma diagnosed in 2003.

Fourth, the Network is well placed to examine the factors underlying epidemiological trends, and to promote appropriate action in response to these trends at health system, health service and clinical levels. For instance, the incidence of melanoma in older people is increasing, especially men aged 60 years and over, while the incidence in younger people is stabilising. Is this due to effective prevention among younger people? Does it represent an increasing susceptibility with age? Or is it an age cohort effect, with people aged 60-plus developing cancer as a consequence of exposures that occurred prior to contemporary preventive policies?

Finally, the Network could be an ideal vehicle for examining variations in melanoma incidence and outcomes, and/or promoting the development of systems for examining variations. For example, epidemiological data show that Area Health Services with the lowest incidence of melanoma have the highest rates of thicker tumours and distant spread, and the worst survival. Because the Network's membership will inevitably represent different geographical regions, it will have a unique capacity to explore epidemiological findings of this nature.

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