Melanoma crude incidence rates among white South Africans climbing as in other countries: An urgent call for targeted skin cancer prevention and awareness campaigns

Melanoma, an aggressive cancer that is potentially fatal if not treated early, remains a public health challenge in several countries around the world.[1] Exposure to solar ultraviolet radiation (UVR) is a modifiable risk factor for melanoma among lightly pigmented people.[2] However, behavioural changes are required to reduce excessive sun exposure, and infrastructure and policy support are needed, particularly in high solar UVR environments. Large, multicomponent skin cancer awareness campaigns and interventions, such as those implemented in Australia, have shown some success.[3] Such activities are typically less expensive than melanoma treatment, which is costly to the individual and the country, especially a middle-income country such as South Africa (SA).[4] Using previously unpublished historical data and data from the SA National Cancer Registry (NCR), the crude incidence per 100 000 population for melanoma was compared with three other countries at different latitudes with significant melonoma burdens. In this study, we sought to describe trends in melanoma incidence in white South Africans, among whom melanoma is more common than in other population groups,[5] to inform skin cancer prevention efforts. Melanoma also occurs in black South Africans, albeit at a lower prevalence. However, in this population group, factors such as presence of scar tissue[6] and lack of early self-screening[7] rather than excessive sun exposure play a role in its causation.[8] We therefore focused our analyses on white South Africans, for whom avoiding excess sun exposure is critical to melanoma prevention.

The NCR is a pathology-based registry that receives reports on patients diagnosed with cancer from all public and private sector histology, cytology and haematology laboratories in SA. NCR crude melanoma incidence data from 2001 to 2017 were downloaded from the internet and data for 1991 to 2000 were provided as digital photocopies of archived hard-copy reports (data for 1991 included 1990; 1995 included 1993 and 1994). Crude melanoma incidence data for the Netherlands, England and Australia were downloaded from online cancer registry repositories, namely the National Cancer Registry of the Netherlands, the UK Statistics Authority and the Australian Cancer Database, respectively.

Joinpoint regression analysis determined changes in incidence trends by gender. Analysis entailed fitting the incidence data into a joinpoint model using log-linear regression that fits a series of straight lines joined at 'joinpoints' where changes in incidence trends are observed. The trend of each segment was expressed as the annual percentage change (APC), and the significance of each slope was determined using the Monte Carlo permutation technique. These analyses were carried out for SA and the three chosen comparison countries, and trends were compared.

Overall, during the period 1991 - 2017, SA, the Netherlands, England and Australia all demonstrated an increasing trend in melanoma incidence. The crude incidence of melanoma among white South Africans ranged between 11 and 42 per 100 000 population (Fig. 1A). Between 1990 and 2017, white SA males had a higher crude melanoma incidence per 100 000 population than white females. The Netherlands showed a more steady rise in crude melanoma incidence, which ranged between 12 and 40 per 100 000 population (Fig. 1B). England showed an increasing crude melanoma incidence ranging between 11 and 29 per 100 000 population (Fig. 1C). Australia had a higher overall incidence than the other countries, ranging from 37 to 72 per 100 000 population (Fig. 1D).

The Netherlands and Australia presented one statistically significant joinpoint for all study years for both males and females, indicating an overall statistically significant increase in APC (Table 1). The APCs for both genders in the Netherlands were higher than those for Australian males and females. There were two statistically significant joinpoints in trends for males in England, between 2002 and 2010 at a 4% APC and between 2010 and 2013 at an 18% APC. For SA, two periods of decline in crude melanoma incidence were observed, between 1990 and 1996 and between 1999 and 2010, with males and females showing similar reductions in incidence. However, the statistically significant APCs for early reporting years may reflect inaccuracies in historical data. Notably, data withholding occurred between 2005 and 2007,[9] reducing overall numbers and probably skewing those results. Despite these limitations, crude incidence data for white South Africans indicate increasing trends at incidence rates similar to Australia and the

Table 1. Statistically significant APC in melanoma crude incidence rates per 100 000 population by country, year period and gender

Country	Year	Gender	APC	95% CI	*p*-value
South Africa (white South Africans only)	1996 - 2000	Male	19.9	0.1 - 43.5	0.049
	2000 - 2010	Male	−3.8	−6.9 - −0.6	0.024
	2010 - 2017	Male	12.8	7.5 - 18.3	<0.001
	1996 - 2001	Female	15.3	2.5 - 29.7	0.021
	2001 - 2010	Female	-5.9	−9.6 - −2	0.006
	2010 - 2017	Female	13.6	8 - 19.3	<0.001
Netherlands	1997 - 2017	Male	6.2	5.9 - 6.6	<0.001
	1997 - 2017	Female	4.6	4.3 - 4.9	<0.001
England	2002 - 2010	Male	4.0	2.6 - 5.4	<0.001
	2010 - 2013	Female	18.2	4.8 - 33.3	0.013
Australia	1997 - 2017	Male	1.7	1.5 - 1.9	<0.001
	1997 - 2017	Female	1.1	0.8 - 1.4	<0.001

APC = annual percentage change; CI = confidence interval.

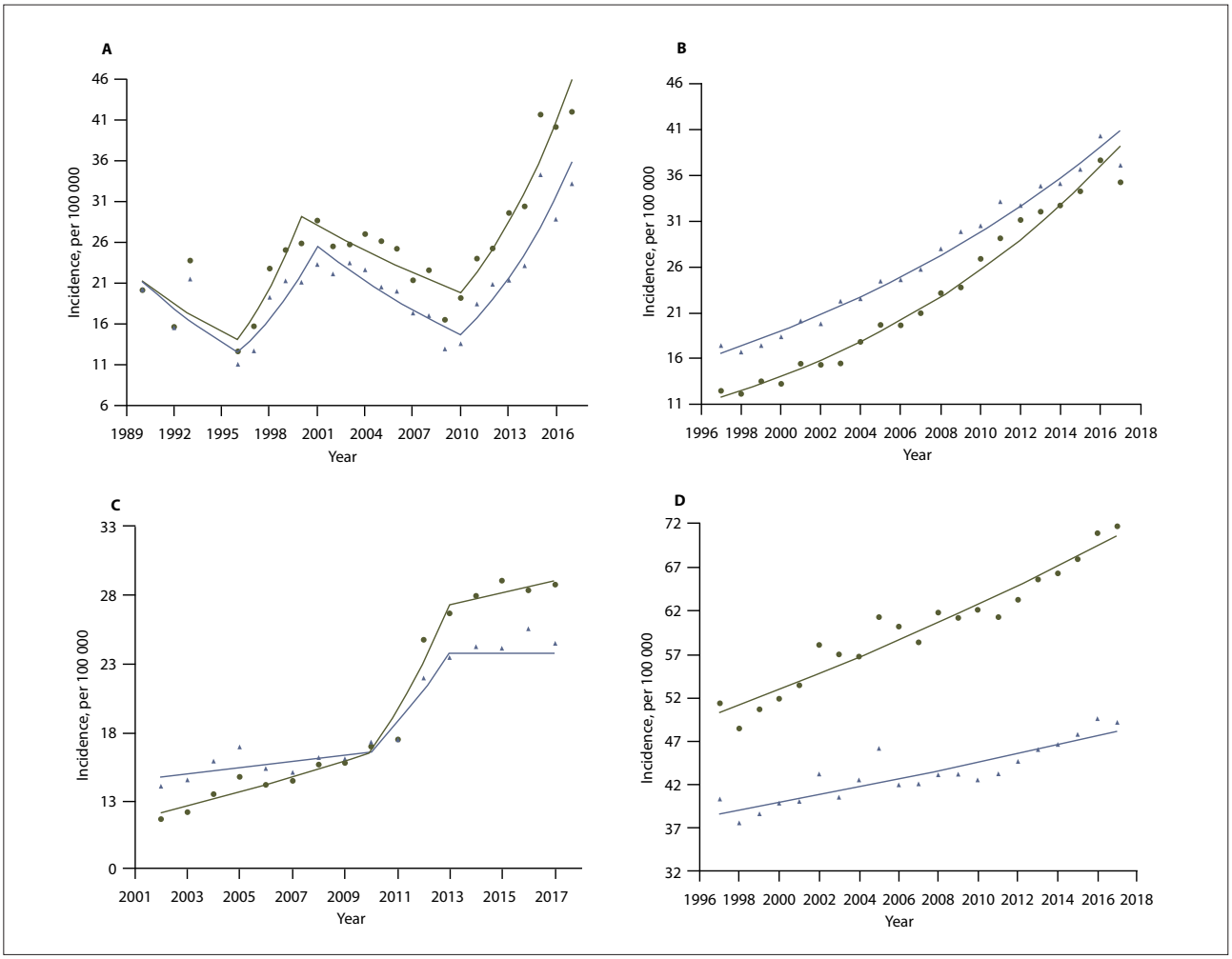

Fig. 1. Crude incidence rates per 100 000 population for melanoma for (A) white South Africans, (B) The Netherlands, (C) England, and (D) Australia, by gender (males = circles, females = triangles) from 2000 to 2017. Note that incidence scales are not the same for all plots.

Netherlands, the former a high solar UVR environment and the latter home to a populace among whom intermittent sun exposure is associated with melanoma.[10]

Our study highlights three important points for SA. First, the incidence of melanoma among white South Africans is high, given its comparability with melanoma incidence in countries such as Australia, the Netherlands and England. In fact, the SA NCR reports show that melanoma is among the top 10 cancers in SA each year.[11] Is enough being done to prevent melanoma in SA? Second, since this study used only the melanoma incidence for white South Africans and excluded other population groups, it is striking that the incidence rates were similar to those of other countries. This finding demonstrates the magnitude of the problem that white South Africans are facing. Melanoma incidence tends to be higher among white SA males compared with females. Nevertheless, the difference in crude melanoma incidence between the genders is not that significant. Are white South Africans being targeted from an early age with skin cancer awareness information and prevention advice?

Third, cancer data collection, including of melanoma, by the NCR has faced several challenges, such as the data withholding period and a lack of capacity and funding to ensure quality data for long-term trend analysis. Although ours was the first ~30-year study of crude melanoma incidence per 100 000, its accuracy is limited by the availability and quality of NCR data.

The Cancer Association of South Africa is one of a few organisations promoting melanoma prevention in SA. However, additional efforts targeting white South Africans, among whom melanoma incidence is significantly higher than in other population groups, are urgently required to curb melanoma incidence and embed positive behavioural change (such as using photoprotection and avoiding peak solar UVR periods during the middle of the day) in relation to excess sun exposure from an early age to help prevent melanoma.

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