

Annex 2 Epidemiologic studies used for estimation of population attributable fraction and descriptive studies of disease distribution

Section 1. Assessment of population attributable fraction

This section lists the references of the case-control and ecologic studies examined for estimation of PAF.

Melanoma

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Section 2: Studies examined for incidence/mortality/case-fatality rates

Non-melanoma skin cancers

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Annex 3 Disease worksheets

Section 1: Worksheet for: Cutaneous malignant melanoma (CMM)

Case definition and sequelae: (ICD-10) C43.

The disability weights used in this study are listed in Table A3.1.

Table A3.1 Disability weights (Dutch weights)

Disease phase/treatment	Disability weight
Primary treatment, no evidence dissemination	0.190
No evidence of dissemination after initial treatment	0.190
Primary treatment, lymph node but no distant dissemination	0.430
In remission	0.190
Disseminated melanoma	0.810
Terminal phase (Dutch weight for end-stage disease)	0.930

Analysis of published case-control studies indicates a PAF for malignant melanoma of around 0.2, with non-significant variation by latitude ($p = 0.18$, see graph below). As noted in this document (Section 2.3) this is likely to underestimate the true PAF for two reasons:

- Measurement error in assessing UVR exposure
- The reference group is not a truly ‘non-exposed’ group. Rather it is a less exposed portion of a population being compared to a more exposed portion of the same population.

This estimate, based on case-control studies, however, refers to how much of the inter-individual variation in risk of CMM within a single population can be attributed to inter-individual variation in UVR exposure. This is a different parameter from that estimated by population-level (ecological) analyses, which estimates how much of the difference in incidence rates between populations is attributable to differences in population-specific average ambient levels of UVR exposure.

In an ecological analysis, Armstrong et al (1) estimated a PAF of 0.96 in males and 0.92 in females, based on comparison of white and black populations in the USA. The black population is the reference ‘unexposed’ population. Yet there may be constitutional differences between these two populations that contributes to the difference in incidence between the groups but is unrelated to UVR exposure. Armstrong also calculated a PAF based on a comparison of ethnically similar white populations in two different locations, NSW in Australia and the United Kingdom. The calculated PAF was 0.89 in males and 0.79 in females. The population living in the UK is the reference ‘unexposed’ population.

If one plots incidence rates derived from Jones et al (2) for the states of Australia, against the latitude of the capital city (to represent UVR exposure), a PAF can be calculated, using the low rate in Tasmania as the incidence rate in the ‘unexposed’. The calculated PAF is 0.70 in males and 0.66 for females. (Using the latitude of the middle of the state, the PAF is 0.62 for males and 0.59 for females).

Interestingly, a similar plot of age-standardized incidence rate for melanoma (from Globocan 2000 (3)) against latitude of the capital city for European countries reveals a reverse gradient, with a higher incidence of CMM at higher latitudes. This presumably reflects the complexity of the relationship between measures of UVR exposure and melanoma incidence. It may be that ecologic data from Australia provide the best ecologic estimate of PAF as the variation in melanoma incidence by latitude (as a proxy for UVR exposure) is less confounded by ethnic and behavioural differences, than estimates based on inter-country data.

Figure A3.1 represents the PAF derived from all relevant identified case-control studies that have used as the exposure measure, episodes of sunburn, or intermittent high intensity exposure. There were less data on other types of exposure, e.g. occupational exposure, and for melanoma it is likely that it is this intermittent pattern of UVR exposure that is most important. Studies used to derive the PAF are listed in Table A3.2. Note that some studies provided more than one data point, as different measures of exposure were included in the same study, e.g. different ages at which sunburn was experienced (childhood, adolescent or adult).