



The burden of squamous cell carcinoma of the conjunctiva in Africa

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ABSTRACT

Squamous cell carcinoma of the conjunctiva (SCCC) is a relatively common cancer in Africa, although its precise incidence and geographic distribution have not been previously systematically studied.

Methods: Using the methods employed to produce national estimates of cancer incidence for the “Globocan” series of the International Agency for Research on Cancer, along with detailed information on cancer incidence by histological subtype from cancer registries in Africa, we estimate the numbers and rates of incidence by sex, age group, country and region of Africa.

Results: We estimate that the number of new cases occurring in 2018 to be about 6 200, with all but about 50 in sub-Saharan Africa, and 55% in females.

On a national basis, the geographic distribution of incidence rates resembles that of the prevalence of infection with HIV, with a strong correlation between them, especially in males.

Conclusions: We estimate that about one third of the total cases of SCCC occurring in Africa are HIV-related.

1. Background

Squamous cell carcinoma of the conjunctiva (SCCC) is relatively common in populations in sub-Saharan Africa [1]. The observation of relatively high incidence rates in tropical Africa was made 50 years ago [2] and led to investigation of possible aetiological factors. With the high occurrence in equatorial regions, an association with exposure to UV irradiation was suspected and has been confirmed at ecological [3,4] and (less certainly) individual level [5]. More striking, however, is the clear association with infection with HIV-AIDS. The evidence has been reviewed by the International Agency for Research on Cancer (IARC), who note the consistent marked increase in risk in persons infected with HIV-1, with a relative risk of about 10 [6]. The onset of the epidemic of HIV-AIDS was accompanied by a marked increase in incidence of this cancer [7,8].

In this report, we estimate the incidence (number of cases, and rates) of SCCC occurring in Africa in 2018, and the likely fraction attributable to HIV-AIDS.

2. Methods

We used the sources of information and methods employed to make national estimates of incidence for Globocan 2018 [9]. Since cancers of the eye, let alone subtypes such as SCCC are not reported in Globocan, we used the original sources used in the estimations to abstract information on SCCC. The sources were the cancer registries of Africa, listed in Annex A of Ferlay et al (Cancer incidence and mortality data: sources and methods by country GLOBOCAN2018_Annex_A.xlsx available at <http://gco.iarc.fr>).

From these datasets, we abstracted information on cases SCCC, by age and sex, defined by the codes of the International Classification for Oncology (3rd revision [10]) as follows:

Topography 69.0 (conjunctiva) plus Morphology 8000 – 8084

Topography 69.9 (Eye, unspecified) plus Morphology 8050 – 8084

In other words, including conjunctival cancers of unspecified cell type (cancer, carcinoma), and all squamous cell carcinomas of the eye. Malignant tumours of the eyelid are excluded.

Incidence rates were calculated for recent periods, for males and females, for 5 broad age groups (0–14,15–34,35–54,55–74,75+), and the age standardised incidence rates obtained (using the world standard

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Table 1
Estimated age standardised incidence rates and numbers of SCCC cases in 2018, by sex and region.

REGION	Males			Females		
	ASR (per 10 ⁵)	Number	HIV-related	ASR (per 10 ⁵)	Number	HIV-related
Middle Africa	0.35	162	20	0.58	270	46
Eastern Africa	1.25	1928	615	1.31	2225	958
Southern Africa	1.16	349	111	1.37	477	205
Western Africa	0.22	306	39	0.27	395	68
Sub-Saharan Africa	0.73	2745	785	0.83	3367	1277
Northern Africa	0.04	42	0	0.01	9	0
Africa	0.57	2787	785	0.64	3376	1277

population [11]. The national estimates were based on data from one or more cancer registries in the same country, as for Globocan 2018 [9]. Registry data collected by the African Cancer Registry Network (AFCRN) were available for 26 of the 48 countries of sub-Saharan Africa, and 5 of the 6 countries of Northern Africa (countries with populations < 150 000 were excluded from the analysis). For those countries for which no data were available, average incidence rates from selected neighbouring countries in the same region were used (method 9, [9]).

Data on the prevalence of HIV-AIDS in adults age 15–19 in the countries of Africa in 2017 were obtained from UNAIDS (<http://www.unaids.org/en/regionscountries/countries>)

3. Results

Table 1 shows the estimated incidence rates and numbers of cases by region of Africa. There was a total 6 163 cases, all but 51 in sub-Saharan Africa, and 55% in females. The highest rates are observed in Eastern and Southern Africa, while the incidence in North Africa is extremely low. In sub-Saharan Africa, incidence is slightly higher in females than in males.

Fig. 1a shows the incidence rates, per 100 000, by broad age group in sub-Saharan Africa, and North Africa, and Fig. 1b, the estimated numbers of cases, by age group, in SSA. In sub-Saharan Africa, the maximum incidence rate and number of cases is in age group 35–54. There is a female predominance of cases in all age groups (except childhood – 0–14).

Fig. 2 shows a map of Africa, with the estimated incidence rates by country for both sexes combined. The highest incidence rates are in Botswana (ASR 3.4 per 10⁵ in males, 3.9 per 10⁵ in females), Namibia

(4.0 & 2.9), Malawi (2.4 & 4.2), Mozambique (3.0 & 3.6), Zambia (2.7 & 2.5) Zimbabwe (2.6 & 2.5) and e-Swazini (3.2 & 0.9).

These are all countries with a high prevalence of HIV-AIDS. Fig. 3 shows the incidence of SCCC in those countries (26) of sub-Saharan Africa for which the national estimate was based on local data from one or more cancer registries, in relation to prevalence of HIV in adults, in males and females. There is a remarkably good correlation in males (Pearson’s $r = 0.83$), less strong in females ($r = 0.60$), the latter due to some very high HIV prevalence figures for small countries, for which the estimates of incidence of SCCC are relatively uncertain.

Assuming a relative risk of 10 [6] and the prevalence of HIV among adults published by UNAIDS (Eastern & Southern Africa: 5.2% in males, 8.4% in females; Western and Middle Africa: 1.6% in males, 2.3% in females; Northern Africa < 0.01%), we may estimate that about 2 000 cases of SCCC (about one third of the total) were caused by HIV infection in 2018 (Table 1).

4. Discussion

We used cancer registry data from Africa to derive estimates of the numbers of cases of SCCC occurring in 2018, using the methods developed for 36 other cancer types in Globocan 2018. Although population based cancer registration has been slowly expanding in extent and quality in recent years, with some 30 registries in sub-Saharan Africa meeting criteria rendering them suitable to contribute to the national estimates of Globocan (<http://afcrn.org/index.php/membership/membership-list>), the data they produce are not perfect. Most score between 4 and 7 on the quality (“q”) factor used to produce uncertainty estimates in Globocan, and only 6 of the countries of Africa have registries that aim to cover the entire population – usually only a

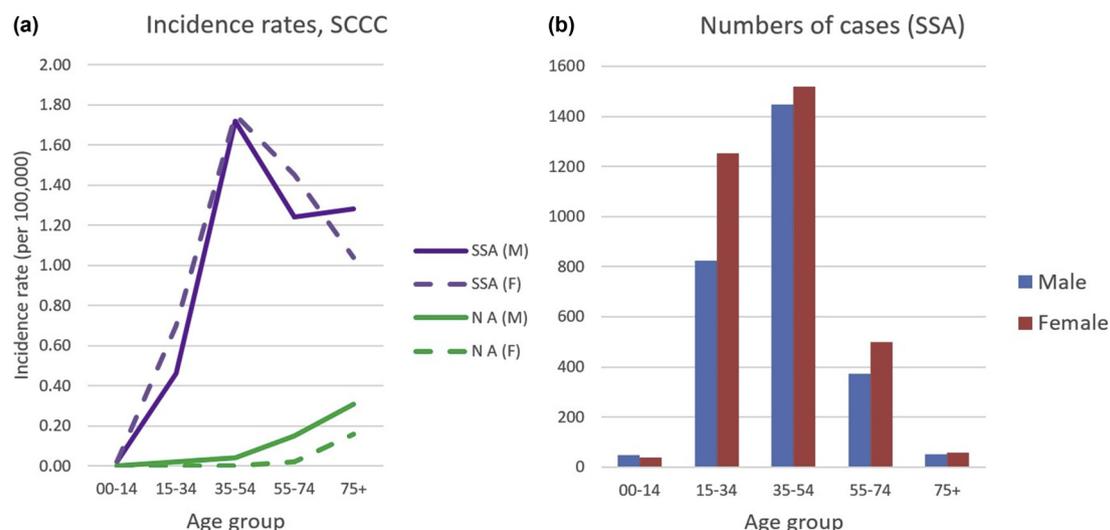


Fig. 1. (a) Incidence rates of SCCC, by age group and sex in sub Saharan Africa (SSA) and North Africa (NA). (b) Numbers of cases of SCCC, by age group and sex, in sub Saharan Africa.

Estimated age-standardised incidence, both sexes, 2018

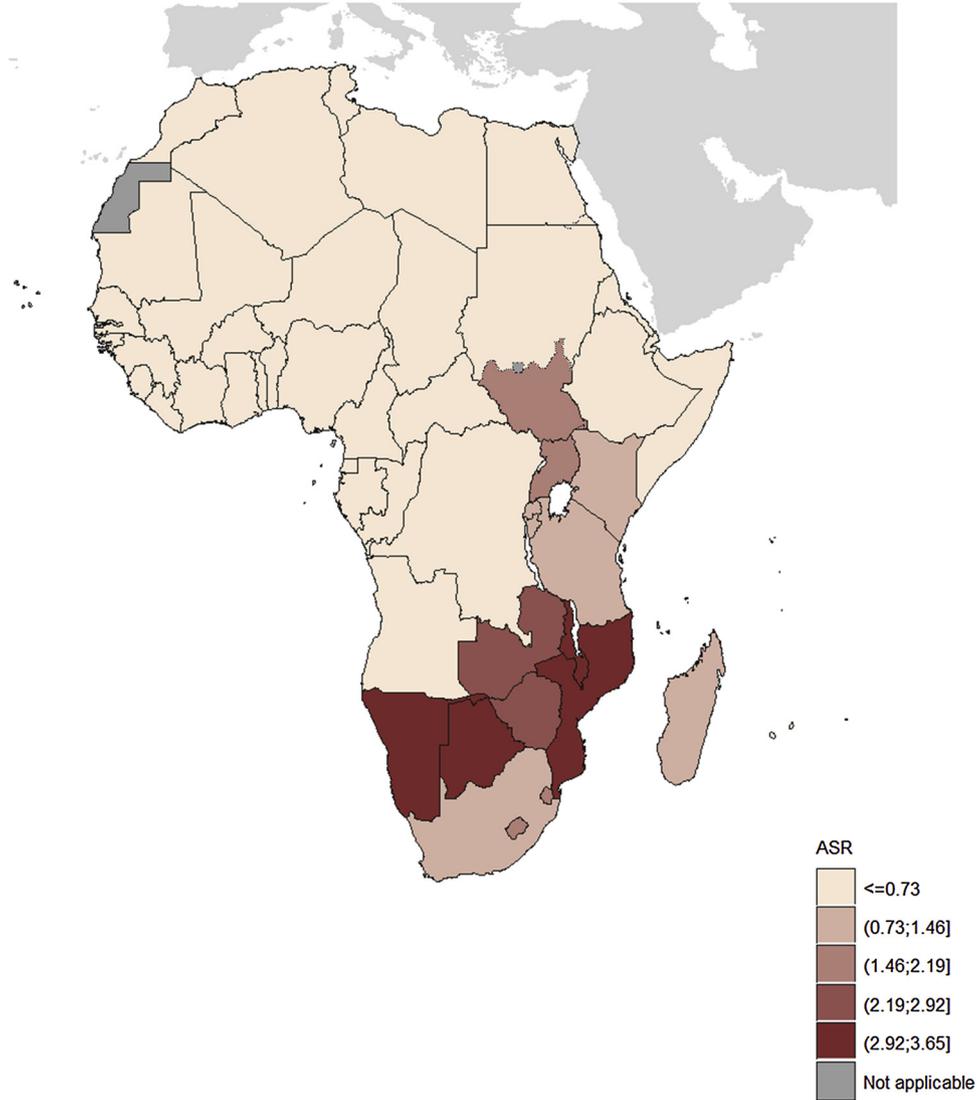


Fig. 2. Age standardised incidence rates, squamous cell carcinoma of conjunctiva – both sexes; by country.

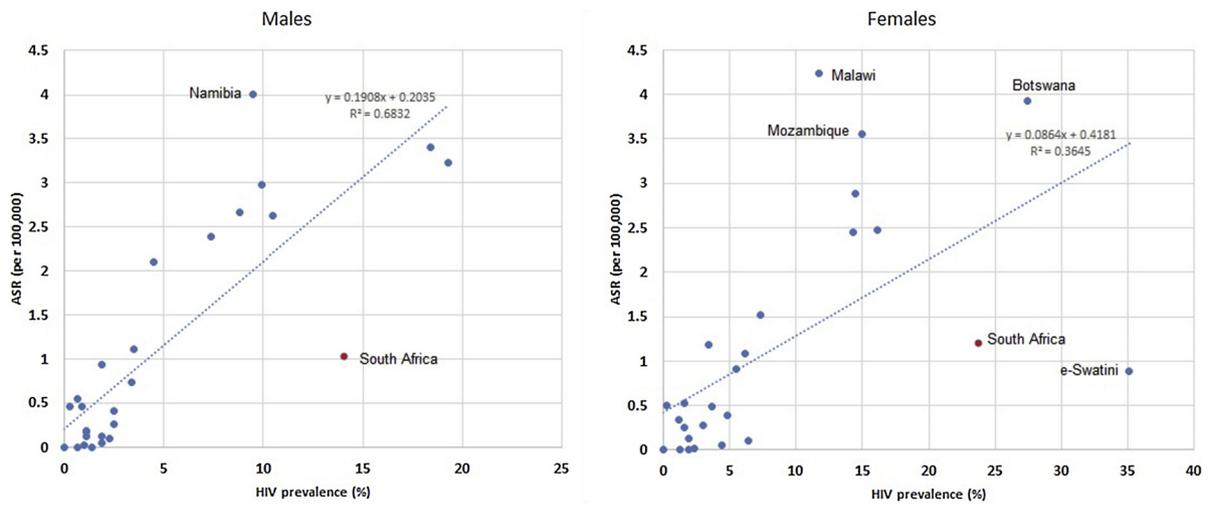


Fig. 3. Estimated incidence of SCCC in relation to prevalence of HIV in adults in 2017.

sample of 5–10% is involved. On the positive side, SCCC is not a difficult cancer to diagnose, being visible and simple to biopsy, and case ascertainment is likely to be much better than for internal tumours. We believe the estimates in this report are the best that can be made, with data currently available.

The observations confirm what has long been suspected concerning the geographic distribution of SCCC, and illustrate how this is largely mediated by the local prevalence of HIV-AIDS. Suspicion has fallen upon the human papilloma viruses (HPV) as the carcinogenic agents whose action is enhanced by immunosuppression (by HIV), primarily because HPV has been identified in tumour specimens from several case series, and also in case control studies [12,13]. In a meta-analysis Carreira et al [14] concluded that only the cutaneous subtypes of HPV seem to be a risk factor (with a relative risk of ~3); they also confirmed the increase in risk due to HIV (relative risk ~ 8).

In the present study, we did not examine the relationship between incidence and UV exposure, partly because it would be very difficult to adjust adequately for HIV, and partly because of the limited range of latitude in Africa (if this is to be used as a proxy for UV exposure). As noted above, UV exposure (including occupational exposures) has been identified as a risk factor for SCCC both on an ecological and individual level. Other risk factors include ocular pigmentation (pterygia and pingueculae) and smoking [1,15].

Availability of data and materials

The analysed data were abstracted from the AFCRN Database, which is hosted by the International Agency for Research on Cancer (IARC), under the terms of an agreement by which the confidentiality of data will be maintained.

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Authors’ contributions

Lucia Hämmerl: played an important role in interpreting the results and responsible for the preparation of the first draft of the article.

Jacques Ferlay: responsible for the analysis of data.

Margaret Borok: has contributed to the discussion of the results.

Carla Carrilho: has contributed to the discussion of the results.

Donald Maxwell Parkin: has designed the study and helped drafting of the article for publication in a scientific journal.

Ethical approval

The study used data from the African Cancer Registry Network database which included no personal identifiers; permission for access was granted by the Research Committee of AFCRN, and approval obtained from the registries whose data were used. The research was performed in accordance with the Declaration of Helsinki.

Data availability statement

The data that support the findings of this study are available from the African Cancer Registry Network (AFCRN). Restrictions apply to the availability of these data, which were used with permission for this study. Data, hosted by the International Agency for Research on Cancer (IARC), are available from AFCRN www.afcrn.org with the permission of the Research Committee of AFCRN, and approval obtained from the registries whose data were used.

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