

## **Sunburn and sun protection in black skin**

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## **Abstract**

### *Background*

People with black skin are much less susceptible to sunburn than white-skinned individuals yet there are scarce data on self-reported incidence of sunburn and sun protection measures in people with deeply-pigmented skin.

### *Method*

An on-line survey tool was used to collect self-assessed data about demographic variables, sunburn incidence, and use of sun protection modalities.

### *Results*

Two-thirds of respondents with black skin living in the UK claimed never to have been sunburnt; a much higher proportion than those living in South Africa and Nigeria where 34% and 46%, respectively, reported never experiencing sunburn.

Similar results were seen in the reported use of sun protection measures between the countries with two-thirds of black people living in the UK claiming they never used any form of sun protection compared with about one-third of Black Africans.

Black people living in the UK were more likely to use sunscreen as a form of sun protection, whereas sunscreen was the least popular modality in the two African countries with shade being the most common form of limiting sun exposure.

### *Conclusion*

The findings provide some insight into the complexities of skin colour perception, incidence of sunburn and sun protection use among people with deeply-pigmented skin living in three countries with large differences in the solar UV environment.

## Introduction

Whilst laboratory studies have demonstrated an approximate 10-fold difference in the erythral sensitivity of white (skin types I/II) and black (skin type VI) skin <sup>1</sup>, advice on sun protection in people of colour is very similar to that for those with white skin <sup>2</sup>.

Yet for countries at latitudes greater than 40° N (or S), the maximum UV Index is about 10 and sun protection is generally recommended when the UV Index is higher than 3 <sup>3</sup>. A UV Index of 10 on white skin is equivalent to a UV Index of around 1 on black skin, well below the threshold when sun protection is recommended. Indeed, using sun protection assiduously by people with black skin who live in countries of low insolation may be detrimental to health as it can limit the production of vitamin D.

The purpose of this study was to record the incidence of sunburn and use of sun protection in people self-reporting with black skin who live in either a country of low insolation <sup>4</sup> (the United Kingdom (UK); population centre ≈53° N), moderate insolation (South Africa (SA); population centre ≈28° S) or high insolation (Nigeria; population centre ≈9° N).

## Method

Data were collected using an on-line survey tool (Survey Monkey in the UK and Google Forms in SA and Nigeria) during 2018 and participants were invited through social media networks. No identifying information was requested and participants were free to choose whether to respond to any or all of the questions.

The survey was designed to gather data about demographic variables (gender, age and perception of skin colour on an unexposed body site), sunburn incidence, and use of sun protection (shade, clothing and/or sunscreen), if any. Respondents were asked to indicate when they were last sunburnt, which we defined as whether the participant's skin had gone either red/purple, painful and sore, and/or peeling by the end of a day spent outside. The choices were: *never been sunburnt, within the past year or two, a few years ago, as a child, or cannot remember*.

## Results

There were 100 responses from the UK of whom 94 (69% female) identified themselves as having black skin. Corresponding figures for SA and Nigeria were 74 responses of whom 50 (68% female), and 44 responses of whom 41 (83% female), identified themselves as having black skin, respectively.

Eight respondents from SA were unsure of their skin colour but this is not unexpected given the range of dark skin colours of people living in this country <sup>5</sup>. Consequently, only those 50 South Africans who identified their skin colour as black were included in the analysis.

Most responses from the UK and SA came from people aged between 20 and 40 years, whereas two-thirds of responses from Nigeria were submitted by people in the 40-60 years age band. Out of a total of 94 respondents with black skin living in the UK, 62 (66%) claimed never to have been sunburnt; a much higher percentage than those living in both SA and Nigeria where 34% and 46%, respectively, reported never

experiencing sunburn ( $P < 0.001$ ; chi-squared test). This difference is not surprising given the much higher solar UV levels in Africa compared with the UK.

Similar results were seen in the reported use of sun protection measures - shade, clothing and sunscreen - between the countries with 66% of black people living in the UK claiming they never used any form of sun protection in their home country compared with just 30% and 36% of Black Africans living in SA and Nigeria, respectively, who reported never using sun protection ( $P < 0.0001$ ; chi-squared test).

When results were combined from all three countries, we found that those respondents who claimed never to have got sunburnt were much less likely ( $P < 0.0001$ ; chi-squared test) to use sun protection than those who reported experiencing at least one episode of sunburn (Table 1)

Finally, we found that black people living in the UK were more likely to use sunscreen as a form of sun protection than either shade or clothing, whereas sunscreen was the least popular modality in the two African countries with shade being the most common form of limiting sun exposure (Fig 1).

## **Discussion**

We present the results of an on-line survey of people identifying themselves as having black skin who are resident in either the UK, South Africa or Nigeria. Whilst respondents from the UK and Nigeria appeared to have no difficulty in identifying their skin colour, some of the respondents from South Africa indicated they were unsure of their skin colour.

South Africa has a multi-ethnic population that is officially grouped into Black African, Coloured (mixed European [white] and African [black] or Asian ancestry), Asian/Indian and White. The population of South Africa in 2017 was 56.7 million (48% male), with approximately 81% Black African, 9% Coloured, 3% Indian/Asian and 8% White. In a study of 390 Black African population, most individuals were sun-reactive skin type V with brown and dark brown skin<sup>6</sup>. Thus, while the population group is termed 'Black African', skin colour among South African Black Africans is not typically black but is brown or dark brown.

We found that in the UK, a country where the UV index reaches a maximum of 7, two-thirds of respondents claimed never to have experienced sunburn. When we extended the responses to include *never been sunburnt*, *sunburnt as a child*, or *cannot remember*, indicating that sunburn has never or rarely occurred, the number rose to 83% for the UK, and approximately two-thirds for both SA and Nigeria.

In a country of low insolation, such as the UK, less than 20% of people with black skin recalled experiencing sunburn in adult years. However, it can be difficult to self-assess erythema on black skin and so the incidence of sunburn might possibly be higher than reported here.

The prevalence of polymorphic light eruption, the most common photodermatosis, is said to be 10% to 20% in Western Europe and the USA <sup>7</sup> and photosensitivity reactions do occur in black skin <sup>8</sup>. It is possible, therefore, that a proportion of black people in the UK who reported an episode of sunburn in recent years might be describing a photosensitive reaction rather than normal sunburn. Indeed, sunburn in people with black skin is sufficiently rare in UK sunshine that if it does occur, individuals may wish to seek medical advice to exclude the possibility of an abnormal response to sunlight.

People living in all three countries use sun protection, with sunscreen being the most popular modality in the UK but least popular in SA and Nigeria. Sunscreen is relatively expensive in Africa and the cheaper brands can be opaquely white as well as sticky and unpleasant to use; hence likely reasons why it is the least used. As an alternative, clays are commonly used in South Africa as topical photoprotectants, especially by rural African women. Whilst these clays offer broad spectrum protection, they provide only a low SPF of typically around 4 <sup>9</sup>.

In both SA and Nigeria shade is claimed to be the most common form of sun protection, a finding in accord with the results of a study among South African informal workers <sup>10</sup>. Not only does shade provide protection against solar UV radiation, it is also especially effective against the heat of the sun, as unlike solar UV where the sky contributes around one half of the UV exposure to the skin, infrared radiation is confined almost entirely to the direct component of sunlight.

Sun protection not only protects against sunburn and reduces the risk of skin cancer but can help in the management of disorders of pigmentation, such as vitiligo, albinism, melasma and post-inflammatory hyperpigmentation, which are a common problem and can cause significant distress in people with darker skin <sup>11</sup>.

The main limitation of this study is the self-report of sunburn and use of sun protection. However, the findings may help provide some insight into the complexities of skin colour perception and sun protection use among people with deeply-pigmented skin living in three countries with large differences in the solar UV environment. As cancer associations and others develop appropriate messages and advice for people with black skin, there is a need to understand the full range of perceptions, challenges and opportunities for sun protection among these population groups.

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Table 1 The number of respondents who reported ever having been sunburnt in relation to sun protection

<b>Ever been sunburnt?</b>	<b>Use sun protection in home country?</b>	
	<b>Yes</b>	<b>No</b>
No	33	65
Yes	60	27

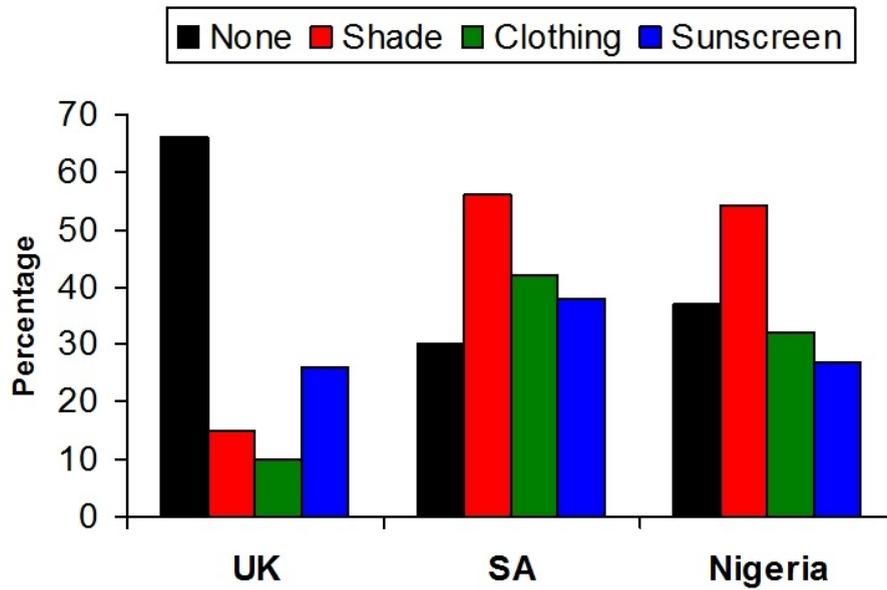


Fig 1 The percentage of respondents with black skin from the UK, South Africa (SA) and Nigeria who reported using different forms of sun protection (including none)

212x135mm (96 x 96 DPI)