

# **SOLAR ULTRAVIOLET RADIATION IN SOUTH AFRICA AND SUN-RELATED KNOWLEDGE, ATTITUDES AND BEHAVIOURS AMONG SOUTH AFRICAN ADULTS: PILOT STUDY RESULTS**

Caradee Wright and Patricia Albers

Climate Studies, Modelling and Environmental Health Research Group, CSIR, Pretoria, South Africa.

## **1. INTRODUCTION**

While some sun exposure induces a sense of well-being and synthesis of vitamin D (Reichrath, 2006), excess sun exposure has been associated with skin cancer, immune suppression and ocular cataracts (Gallagher and Lee, 2006). In South Africa, approximately 30% of all histologically-diagnosed cancers are skin cancers (Mqoqi et al., 2004). The adverse health effects from overexposure to solar UVR are largely considered to be preventable through the use of sun protection strategies, such as using shade and wearing sun protective clothing (Stanton et al., 2004). To date, no co-ordinated attempt has been made to carry out a large, nationwide survey of South African's perceptions towards sun exposure behaviour, sun-related knowledge and attitudes. Comprehensive, local research is essential to fully understand the implications of personal exposure to solar UVR in South Africa. This locally-derived information may then be translated into tailored messages for action and steps the public may take to protect themselves from the harmful effects of excess sun exposure. As a first step to developing a comprehensive South African SunSmart Research Programme, a pilot study of adult sun-related knowledge, attitudes and behaviours was carried out at a large research institute in South Africa to gauge baseline levels of understanding, question interpretation and unravelling of local issues pertaining to sun-related knowledge, attitudes and behaviours that have the potential to influence sun exposure and associated adverse health effects.

## **2. METHODS**

The study was carried out among all employees of the Council for Scientific and Industrial Research (CSIR) in South Africa. The staff base comprises ~2500 members with ~ 50% transformed according to Broad-Based Black Empowerment requirements. The intention of the pilot survey was to gauge an understanding of South African adults' sun-related knowledge, attitudes and behaviours to direct development of a full, nationally-applicable questionnaire. Ten questions were deemed sufficient in an email survey to encourage a response. The survey measures (Table 1) assessed sun-related knowledge, attitudes and behaviours. Sex was the only demographic measure collected; however, age and skin colour are important factors and will be included in the full study. The selection of questions included was not representative of all sun-related knowledge, attitudes and behaviour measures, however, provided some indication of those considered important, relevant for

piloting and practical for detecting further issues for exploration. Responses were either 'no' or 'yes', initially coded 1 and 2, respectively. Some respondents wrote 'unsure' and did not reply to some questions, and these 'non-responses' were coded 3 and 4, respectively. The survey was sent via email on 3 June 2010 to 2254 CSIR staff members with valid email addresses. Time calculated for completion, i.e. less than 5 minutes, was mentioned as an incentive to encourage staff to participate. Respondents were informed that survey item answers would be extracted from their response email, recorded and anonymously categorised before the email with name and email address was permanently deleted. No personal health information was requested. All ethical procedures were adhered to. Personal consent was assumed by agreement to complete and return the survey via email. All analyses were carried out using STATA/ IC 10.0 (STATA Corp, Texas, USA).

## **3. RESULTS AND DISCUSSION**

Of the 2254 email recipients, 512 participants (244 males, 265 females, 3 missing) completed the survey, representing a 22.5% participation rate. It was not possible to gauge representativeness of our sample in relation to all adults employed by the CSIR, or nationally, by ethnicity since this was not a survey measure. Ethnicity, together with other important demographics and personal health information would need to be collected in a future, full study that includes other factors including age, skin colour and education. The results for the measures of adult's sun-related knowledge, attitudes and behaviours are presented in Table 1. Approximately 30% of respondents had not been taught about sun protection and safe sun behaviours at school. In the South Africa education curriculum, sun safety was only formally introduced as part of Life Orientation in 1999, and prior to that, it was possibly only included dependent on teacher's knowledge and their willingness to educate about sun safety. Last year, the Cancer Association of South Africa (CANSA) published 'A guide for schools on sun protection' which includes grade-specific teaching content and activities (CANSA, 2010). Most participants (77%) had heard about the Ultraviolet Index (UVI), a measure of the level of UV radiation developed by the World Health Organisation, United Nations Environment Programme and the World Meteorological Organisation. The South African Weather Service (SAWS) previously broadcast daily UVI readings; however, this service no longer exists for several reasons including a lack of media support. Most respondents agreed that some sun exposure during

winter was beneficial for vitamin D production, with more males (85%) agreeing than females (75%).

Few respondents (11%) thought that it is safe to get sunburnt once or twice a year while a quarter (25%) liked to have a suntan because it makes them feel healthier. This is an interesting finding, given that sunburn risk is present during sun tanning behaviour. Approximately 35% and 22% of male and female respondents, respectively, thought that darker skin protects against skin cancer. While this statement is in some ways plausible, health statistics for South Africa do report cases of melanoma among Asian, Black and Coloured populations, although aetiology is an important consideration.

More than a third of respondents had experienced sunburn last summer despite 75% stating that they had regularly used some form of sun protection. More information is needed to understand what sun protection items, i.e. hat, sunscreen, protective clothing, etc, South Africans prefer to use and how they use these items when outdoors. Few respondents (~10%) had sunbathed regularly last summer to try to get a suntan, with slightly more females (~5% more) agreeing that they had sunbathed regularly.

For the chi square test results, three results indicated a statistically significant difference between the results given by males and females. Men were likely to answer differently to women regarding 'sun exposure during winter is good for vitamin D production' (OR 2.03, CI: 1.20-3.42,  $p = 0.007$ ); having 'heard about the UVI' (OR 1.65, CI: 1.07-2.53,  $p = 0.022$ ); and that 'dark skin protects against skin cancer' (OR 1.92, CI: 1.28-2.86,  $p = 0.001$ ). However, the value of interpreting these findings is limited at this stage beyond assisting with the design of future questionnaires. Specifically, additional demographic variables, especially ethnic group and age, as well as measure of socio-economic standing, must be included.

Several limitations, errors and biases were apparent during this pilot study. The CSIR employee base is not representative of the broader South African public and these results cannot be used for the design of sun awareness campaigns. Also, there was a concern that respondents answered 'correctly' rather than truthfully. Since ethnic group was not included as a questionnaire measure, results were not analysed by ethnicity. This is an important error given that there was a concern that the sample probably comprised more from a single ethnic group and that there may be a general perception that the skin is the only organ at risk of excess sun exposure, without acknowledging the eyes and the immune system, as well as the risk of underexposure and associated detrimental psychological and physical health effects.

#### 4. REFERENCES

- CANSA. A guide for schools on sun protection. 2009 Cancer Association of South Africa. Johannesburg, South Africa.
- Gallagher RP, Lee TK. 2006. Adverse effects of ultraviolet radiation: A brief review. *Prog Biophys Mol Bio.*92:119-131.
- Mqoqi N, Kellett P, Mqoqi F, Jula M. 2004. Incidence of histologically diagnosed cancer in South Africa, 1998-1999. National Cancer Registry, Department of Health, Pretoria, South Africa.
- Reichrath J. 2006. The challenge resulting from positive and negative effects of sunlight: How much solar UV is appropriate to balance between risks of vitamin D deficiency and skin cancer? *Prog Biophys Mol Bio.* 92:9-16.
- Stanton WR, Janda M, Baade PD, Anderson P. 2004. Primary prevention of skin cancer: a review of sun protection in Australia and internationally. *Health Promot Int.*19:369-378.

**Table 1. Key sun-related attitudes, knowledge and behaviour outcomes for all respondents and by sex**

Variable	All adults <i>n</i> = 512 (%)	Males <i>n</i> = 244 (%)	Females <i>n</i> = 265 (%)
<i>Knowledge</i>			
Taught about sun protection / safe sun behaviour at school	30.2	31.5	29.0
Agreed winter sun exposure good for vitamin D production	80.2	85.2	75.8
Heard about Ultraviolet Index (UVI)	77.1	81.9	73.5
<i>Attitude</i>			
Think it is safe to get sunburnt once or twice a year	11.5	13.9	9.4
Think darker skin protects against skin cancer	28.5	35.6	22.2
Like to have suntan because it makes me feel healthier	25.9	27.4	24.9
<i>Behaviour</i>			
Sunbathed regularly last summer to try to get a suntan	10.9	8.6	13.2
Sunburnt last summer	38.8	39.3	38.8
Regularly used sun protection, i.e. hat, sunscreen, and/or protective clothing, last summer	75.3	71.7	78.8