Unintended sunburn among New Zealanders

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Abstract. New Zealand has the highest rate of melanoma in the world. Reported weekend sunburn rates range from 17.0% to 19.0% over the 20 year period 1994 to 2013. Previous research has shown that nearly 14% of sunburns were unintended. To aid the reduction of sunburn it is important to examine those whose sunburns are unintended. However, to date very little work has been conducted in this area; to the authors' knowledge, only two studies reporting rates of unintended sunburn exist. The aim of this study is to describe unintended sunburn among New Zealanders aged 15 + using data gathered by the Health Promotion Agency in 2016.

Introduction

To reduce the New Zealand rate of melanoma, as well as other less deadly but more common types of skin cancer, it is important to reduce rates of sunburn.

Data from New Zealand (McLeod et al. 2017) and Denmark (Køster et al. 2010) have shown that, over summer months, a large proportion of those spending time outdoors become sunburned even though they were not attempting to tan (13.5% and 33% respectively). It is possible to classify those who had not attempted to tan, but become sunburned, as having experienced unintended sunburn.

The aims of this study were to describe respondent characteristics and statistical predictors of unintended sunburn using data from the Health Promotion Agency 2016 Sun Exposure Survey of New Zealanders aged 15 to 55+ years of age.

Methods

The Sun Exposure Survey (SES) 2016 is a telephone survey of a nationally representative sample of New Zealanders aged 13+ years. For the purposes of the current analysis, respondents aged 15+ were selected. Data was collected using Random Digit Dialling telephone interviews during the months of January, February and March 2016. Regions were selected for interview on the basis that the weather met the fine weather criteria in the preceding weekend. Respondents who met the outdoor status criterion of ≥ 15 minutes between 10am and 4pm on the target weekend, were selected for inclusion in the dataset for this study. Each interview area was assigned to a Meteorological Service weather station.

Measures

Unintended sunburn. The outcome variable unintended sunburn was created by using a cross tabulation of two dichotomous variables: 1. those who reported sunburn and 2. those who reported not attempting to obtain a tan. Sunburn was defined as any amount of reddening of the skin after being in the sun, while attempting to obtain a tan was defined as trying to obtain a suntan on the weekend just passed.

Socio-demographic characteristic included: target interview weekend, gender, age, skin type, prioritized ethnicity, region of residence and region of outdoor behaviour. Highest educational qualification and household income information were collected for respondents aged 18+ years.

Outdoor behaviour variables included: the respondents' duration outdoors to the nearest 15 minutes; whether the duration outdoors was longer than expected; the main outdoor activity; the amount of body area covered by clothing or a hat; whether sunscreen was used; and whether shade was used.

Respondents reported whether they believed the weather conditions were such that they could expect to get sunburnt if they went outside without protecting their skin.

Respondents' outdoor region and duration was matched to National Institute of Water and Atmospheric Research (NIWA) weather data including average ultraviolet radiation; average air temperature and average cloud cover on the target interview day.

Statistical Methods

Among those who had achieved the outdoor status criterion of being outdoors ≥ 15 minutes between 10am and 4pm on the target weekend, tabular analyses describe the characteristics of respondents who reported unintended sunburn. Associations between unintended sunburn and respondent characteristics were assessed statistically using the Chi-square test of independence for categorical outcomes. A multivariable logistic regression model was used to examine associations between unintended sunburn and respondent characteristics, respondent outdoor activity and sun protection behaviours. The analysis controlled for any potentially confounding effects of concurrent weather during the time the respondents are outdoors. Data was managed using SAS 9.4 and weighted statistical analyses were conducted using STATA 15. For more information on the methods used in this study, please see Health Promotion Agency (2016).

Ethical approval

All survey procedures were consistent with the Code of Practice of the Research Association New Zealand (Health Promotion Agency 2016). This study was granted approval by the University of Otago Human Research Ethics Committee reference number HD17/039.

Results

A total of 2,272 people were interviewed with the sample divided between teens (n = 486), adults (n = 1,270) and older adults (n = 516), and distributed by region according

to quota targets based on known population distributions (Health Promotion Agency 2016).

Overall, n = 2,164 respondents, aged 15+ were included in the analysis. Of these, 88.5% reported an outdoor status of ≥ 15 minutes between 10am and 4pm on the target weekend. Sunburn was reported by 14.0% of the outdoor status respondents. Among those reporting sunburn, 12.6% were classified as experiencing unintended sunburn. Examination of those reporting unintended sunburn showed that 57.7% expressed that they wanted to avoid getting a suntan and 89% knew that the weather conditions were such that they could expect to get sunburned on the target day if they did not use adequate sun protection.

Examination of respondent socio-demographic characteristics (gender, age, skin type, prioritized ethnicity, region of residence, region outdoors, total household income and highest educational qualification information) by those reporting unintended sunburn showed that with the exception of the month of interview ($p<0.001$), no statistically significant ($p>0.05$) associations were detected. Other bivariate analyses also showed that the main activity the respondent participated in, the use of sunscreen, air temperature and cloud cover were not statistically significantly ($p>0.05$) associated with unintended sunburn.

A multivariable logistic regression model (Table 1) showed that the odds of unintended sunburn were highest for those:

- Whose target interview month was in January, compared to March.
- Who spent longer outdoors. For every extra hour outdoors, odds of unintended sunburn increased by nearly 1.4 times.
- Who spent longer outdoors than they had intended. Those who spent longer outdoors had nearly 2.5 times the odds of unintended sunburn, compared to those who had spent their intended time outdoors.
- Who did not seek shade. Those who had not used shade had 1.4 times the odds of unintended sunburn, compared to those who did seek shade.
- Who had less body coverage. For every 1% increase in clothing cover or hat use, there was a 1% decrease in unintended sunburn.

Average ultraviolet radiation became non-significant ($p>0.05$) in the multivariable logistic regression model and was removed.

Discussion

Nearly 13% of respondents reported experiencing unintended sunburn on fine summer weekends in 2016. No socio-demographic characteristics were associated with unintended sunburn, with the exception of the target interview weekend. Although it should be noted that target interview weekends were chosen to reflect a fine summer day in which it could be possible to become sunburned. The lack of associations for socio-demographic characteristics indicates that anyone outdoors during fine summer weekends are at risk for sunburn regardless of their biological or social characteristics.

A number of outdoor behaviour variables were found to be associated with unintended sunburn including: being outdoors for longer periods of time, or outdoors for longer than intended; not using shade; and not covering up sufficiently with clothing and a hat. It is essential to recognise the protection afforded by clothing that covers a greater proportion of the body as an important (if not one of the most important) forms of sun protection. For example, the use of a long-sleeve top compared to a sleeveless top, could reduce the odds of unintended sunburn by 14%.

Finally, the reduction of unintended sunburns is an important step towards the reduction in New Zealand's melanoma rate.

Table 1. Multivariable logistic regression analysis showing predictors of unintended sunburn.

Measure	**OR/Point estimate (95% CI)**	**p**
Target interview month		<0.001
January	2.36 (1.50-3.72)	
February	1.91 (1.16-3.12)	
March (reference)	1	
Expected time outdoors		0.001
More time outdoors than expected	2.48 (1.62-3.80)	
Less time outdoors than expected	2.07 (1.12-3.81)	
Did not have expected time outdoors	1.25 (0.84-1.86)	
About the same time as expected (reference)	1	
Used shade 'No'	1.38 (1.01-1.91)	0.049
Yes (reference)	1	
Duration outdoors	1.37 (1.26-1.49)	<0.001
Amount of body covered by hat/clothing	0.988 (0.980-0.995)	0.002

References

Health Promotion Agency 2016. Sun Exposure Survey Methodology Report, Report prepared by Key Research Limited. Health Promotion Agency Wellington.

Køster, B., Thorgaard, C., Philip, A., Clemmensen, I.H. 2010. Prevalence of sunburn and sun-related behaviour in the Danish population: A cross-sectional study. Scandinavian Journal of Public Health 38(5): 548-552.

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