# New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022

March 2017

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hpa health promotion agency

ISBN: 978-0-478-44901-3 (Online)

Prepared by the Health Promotion Agency and the Melanoma Network of New Zealand (MelNet) on behalf of the New Zealand Skin Cancer Primary Prevention and Early Detection Steering Committee (refer to Appendix B for history and membership details).

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# 1. INTRODUCTION

## 1.1 STRATEGY PURPOSE

The *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022* is a sector-led strategy to help inform programmes and activities to reduce the incidence and impact of skin cancer in New Zealand.

The strategy is directed at all professionals working in skin cancer control and has a particular focus on primary prevention and early detection. It includes an up-to-date analysis of both the epidemiology of skin cancer in New Zealand, including risk factors, as well as evidence-based interventions to reduce exposure to ultraviolet radiation (UVR) that causes harm.

Skin cancers are by far the most common cancers in New Zealand today, estimated to account for just over 80% of all new cancers diagnosed annually. Skin cancers also represent a significant cost burden on the New Zealand health system.

Evidence suggests that the best avenues for reducing New Zealand's skin cancer burden are primary prevention and early diagnosis. Therefore, all health professionals, including policy makers and the health and skin workforce, are encouraged to view this strategy as a call to action as well as an evidence-based source of information.

The strategy also is designed as a basis for fostering broader and greater engagement in skin cancer primary prevention by agencies that include the Ministry of Education (school and early childhood settings) and WorkSafe NZ (workplace settings) as well as local government and sporting and recreational bodies.

## 1.2. STRATEGY OVERVIEW

The *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022* builds on five previous strategies. As with earlier strategies, it has been developed by a New Zealand Skin Cancer Primary Prevention and Early Detection Steering Committee, comprising researchers and representatives of organisations working in skin cancer control. A key role of the Committee is to facilitate improved coordination and collaboration among organisations involved in skin cancer prevention and early detection in New Zealand.

The *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022* identifies five intervention pathways for reducing the incidence and impact of skin cancer:

- primary prevention
- early detection
- diagnosis and treatment
- rehabilitation, support and palliative care
- research, evaluation and surveillance.

The focus of this document is on the primary prevention and early detection pathways.

This document provides:

- an overview of skin cancer incidence, mortality and costs in New Zealand
- information about interventions to reduce the incidence and impact of skin cancer, with a particular focus on risk factors and interventions to reduce risk
- the New Zealand Skin Cancer Primary Prevention and Early Detection Outcomes Framework 2017 to 2022
- core consumer messages for primary prevention and early detection of skin cancer (Appendix A)
- an overview of the New Zealand Skin Cancer Primary Prevention and Early Detection Steering Committee, including its role and history and the 2016 meeting of the Committee (Appendix B).

# 2. SKIN CANCER IN NEW ZEALAND

**Skin cancers are commonly classified into two groups: cutaneous melanoma (melanoma) and non-melanoma skin cancer (also known as keratinocyte cancer[1]).** The non-melanoma skin cancer (NMSC) category includes mainly squamous cell (SCC) and basal cell (BCC) cancers. Of the three most common types of skin cancer (melanoma, SCC and BCC), melanoma tends to present the greatest potential threat to survival.

**Skin cancer is by far the most common cancer affecting New Zealanders**. It has been estimated (using 2005 data) that all types of skin cancer together account for just over 80% of all new cancers diagnosed annually (O'Dea 2009). Melanoma was the third most commonly registered cancer in 2013 for both men and women, accounting for 10.7% of all registrations. In the same year it was the 4th most common cause of death from cancer in men and the 7th in women (Ministry of Health 2016).

**Melanoma occurs much less frequently than NMSC but has a significantly higher mortality rate**. In 2013, melanoma accounted for 2,366 new cancer registrations and 356 deaths (Ministry of Health 2016). The age-standardised registration rate was 39.4 per 100,000 for males and 35.8 per 100,000 for females. The age-standardised mortality rate was 6.9 per 100,000 for males and 3.1 per 100,000 for females.

**In 2012 there were 2,369 diagnoses of melanoma-in-situ in addition to 2,324 diagnoses of invasive melanoma.** While both invasive melanoma and melanoma-in-situ are required to be notified to the Cancer Registry, the ratio of invasive to in-situ notifications varies widely by DHB. For example, from 2003 to 2012 in Capital Coast Health, 65% of combined melanoma registrations (invasive + in-situ; n=1724) were invasive, whereas in Tairawhiti, only 39% of the total (n=578) were invasive. This suggests some systematic differences among the DHBs in patient presentation, doctor recognition and biopsy, pathology reporting or notification, disease progression (although this is unlikely) or any combination of the above (MJ Sneyd, personal communication, 15 December 2016).

**NMSC is more common than melanoma but has a lower mortality rate**. In comparison to other malignancies, little is known about the incidence of NMSC. However, it is known that in white populations worldwide, NMSC has the highest incidence of all cancers (Lomas et al 2012) and NMSC is more commonly diagnosed in men than women (Madan et al 2010). While the incidence of NMSC in New Zealand is presently unknown, as new cases of NMSC are not registered with the Cancer Registry due to resource considerations (Ministry of Health 2015), a conservative estimate is that there are at least 67,000 new cases every year in New Zealand (O'Dea 2009). Worldwide, the ratio of BCC to SCC is about 4:1 while, in Australia, it is 5:2 (Lomas et al 2012). SCC has a

[1] The term "keratinocyte carcinoma" (KC) has been used increasingly to refer to BCC and SCC when they are considered jointly because they are carcinomas that share lineage with keratinocytes and histologically resemble epidermal keratinocytes (Karimkhani et al 2015). Karimkhani et al (2015) argue that use of the term "non-melanoma skin cancer" (NMSC) "reflects a historical under appreciation of their importance". Members of the New Zealand Skin Cancer Primary Prevention and Early Detection Steering Committee have retained reference to NMSC in this strategy as a more "consumer-friendly" term than keratinocyte carcinoma.

higher risk of metastasis and mortality (Narayanan et al 2010). According to a New Zealand regional analysis of data, the risk of being treated for any form of NMSC by the age of 80 years in 2006 was 52% for males and 33% for females (Brougham et al 2010). In 2013 there were 133 deaths from NMSC, representing 27.2% of all skin cancer deaths (Ministry of Health 2016).

**Skin cancer is a huge cost to New Zealand.** In 2006, the direct health-care treatment costs of skin cancer in New Zealand were conservatively estimated at $57.1 million ($5.7 million for melanoma and $51.4 for NMSC) (O'Dea 2009). Were it not for skin cancer, New Zealanders would have lived an additional 4,741 life-years in 2006 (melanoma accounted for 3,811 of the lost life-years and NMSC accounted for 930 of the lost life-years). In addition, these persons, if alive, would have made an economic contribution through employment of an estimated additional NZ$66 million in 2006 ($59.3 million for lost production from melanoma deaths; $6.7 million for lost production through NMSC deaths). Because of the huge numbers of diagnoses, skin cancer places an enormous burden on the health care system in New Zealand, and this burden will increase with the ageing population.

**Melanoma incidence and mortality rates in New Zealand are high.** New Zealand and Australia have the highest melanoma incidence rates in the world (Australian Cancer Network Melanoma Guidelines Revision Working Party 2008). A recent study found New Zealand has overtaken Australia as having the highest per capita rates of invasive melanoma in the world (Whiteman et al 2016). The mortality rate is consistently higher for males than for females but from 2003 to 2007 the age-standardised melanoma mortality rate in New Zealand women was 40% higher than in Australian women (Sneyd and Cox 2013). Between 1997 and 2012 overall rates of melanoma registration increased in men by 14% and about 5% in women, with much of the greatest increase (over 55%) in men aged 65 years and over. Over the same time, death rates from melanoma increased by 12% in men and were stable in women.

**NMSC incidence is likely to have increased.** The incidence of NMSC has been increasing globally (Lomas et al 2012) with Australia recording a 1.5-fold increase between 1985 and 2002 (Staples et al 2006). Although national NMSC incidence data are not routinely recorded or reported, clinicians have reported evidence that regional NMSC incidence also has increased (Brougham et al 2011) and described NMSC as a "neglected problem" in New Zealand (Brougham et al 2010).

**The incidence of melanoma and NMSC increases with age**. In 2012, the age-specific rates of melanoma increased from <1 per 100,000 for people aged less than 15 years to 256 per 100,000 in those aged 85 years and over. The median age for females diagnosed with invasive melanoma between 2008 and 2012 was 62 years and for males was 66 years. However, although cancer is very rare in young people, in 2013 melanoma was the fifth most common cancer registration in females aged 0 to 24 years: it did not appear in the top five in males 0-24 years. There is very little known about NMSC in New Zealand but, according to one regional study, the greatest increase in NMSC over a 10-year period was in the population over 50 years of age (Brougham et al 2011).

**Overall, melanoma incidence and mortality is consistently higher in males than females.** In 2013, the male incidence rate was 10% higher than the female rate and the mortality rate in men was more than double that in women (Ministry of Health 2016).

**Melanoma incidence and mortality are substantially lower among New Zealand Māori and Pacific peoples than among New Zealand Europeans.** In 2013 the age-standardised incidence of melanoma in non-Māori was about 5.5 times that in Māori New Zealanders (Ministry of Health 2016). Of the 2,366 new melanoma registrations in 2013, 42 were Māori and five were Pacific peoples (Ministry of Health 2016). Between 2000 and 2013, melanoma incidence rates in Māori fluctuated widely. In 2013, Māori men and women had age-standardised incidence rates of 6.1 and 8.4, respectively. Of the 354 melanoma deaths in the same year, nine were in Māori.

**Māori and Pacific peoples in New Zealand have a higher than expected risk of thick and more advanced melanoma, with poorer prognosis (Sneyd and Cox 2009; Sneyd and Cox 2011)**. From 2008 to 2012, the median thickness at diagnosis of invasive melanomas of all subtypes was significantly different in the three ethnic groups: 0.77mm in New Zealand Europeans (n=11,805, 95% CI 0.75-0.8), 1.1mm in Māori (n=141, 95%CI 0.8 to 1.60) and 2.8mm in Pacific peoples (n=30, 95% CI 1.05 to 5.85). Thirty-seven percent of melanomas in Pacific peoples were >4mm thick at diagnosis (n=11) compared to 15.6% in Māori (n=22) and 8.4% in New Zealand Europeans (n=990). Eighteen percent of melanomas in Pacific peoples were diagnosed on the basis of metastases (n=7) compared to 8% in Māori (n=13) and 3.6% in New Zealand Europeans (n=449) (MJ Sneyd, personal communication, 21 September 2016).

The distribution of melanoma subtypes, with different natural histories, varies by ethnic group. During the period 2008 to 2012, superficial spreading melanoma (SSM) registration rates were lower for Māori and Pacific peoples than for New Zealand Europeans. In New Zealand Europeans, 50.8% of all melanoma registrations were SSM compared to 42.04% in Māori and 26.3% in Pacific peoples. During the same period, acral lentiginous melanoma (ALM) registration rates were higher in Māori and Pacific peoples than in New Zealand Europeans. In New Zealand Europeans, 0.7% of all melanoma registrations were ALM compared to 4.46% in Māori and 18.42% in Pacific peoples (MJ Sneyd, personal communication, 21 September 2016).

However, when restricting the analysis to subtypes of melanomas, there was no statistically significant difference in median thickness of SSM (the commonest subtype) between New Zealand Europeans (median depth 0.65mm; 95% CI 0.62-0.65; n=6244), Māori (median depth 0.79mm; 95% CI 0.66-1.17; n=66) and Pacific peoples (median depth 1.13mm; 95% CI 0.42-2.9; n=10). Analysis of ALMs, although based on small numbers, shows no statistically significant difference in median thickness between New Zealand Europeans (median depth 2.0mm; 95% CI 1.41-2.5; n=86) and Māori (median depth 2.6mm; 95% CI 1.32-6.9; n=7), but a significant difference between New Zealand Europeans and Pacific peoples (median depth 6.0mm; 95% CI 3.18-17.05; n=6) (MJ Sneyd, personal communication, 21 September 2016). It is unknown how much of the discrepancy in thickness at diagnosis by ethnic group is due to delay in diagnosis, different biological behaviours of similar melanoma subtypes, or other factors that have yet to be identified.

# 3. INTERVENING TO REDUCE THE INCIDENCE AND IMPACT OF SKIN CANCER

The *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022* identifies five intervention pathways for reducing incidence, impact and inequalities with respect to skin cancer:

- primary prevention
- early detection
- diagnosis and treatment
- rehabilitation, support and palliative care
- research, evaluation and surveillance.

These pathways are consistent with corresponding pathways of the cancer control continuum in *The New Zealand Cancer Control Strategy* (Minister of Health 2003).

The focus of this document is on the primary prevention and early detection pathways as well as related issues for research, evaluation and surveillance (see Figure 1, page 22). This is consistent with evidence suggesting that the best avenues for reducing skin cancer burden are primary prevention and early diagnosis (Sneyd and Cox 2006). Furthermore, public investment in skin cancer primary prevention and early detection programmes shows strong potential for economic as well as health benefits (Gordon and Rowell 2015).

The pathways for diagnosis and treatment, along with support, rehabilitation and palliative care, are linked to the recommendations of the *Standards of Service Provision for Melanoma Patients in New Zealand – Provisional* (National Melanoma Tumour Standards Working Group 2013). Though clearly of importance, these areas fall outside the scope of the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022*.

## 3.1 PRIMARY PREVENTION

According to the World Health Organization (WHO 2002), cancer prevention should be a key element in all cancer control programmes. Cancer prevention focuses on factors that can either increase a person's chances of developing cancer (risk factors) or reduce the risk of developing cancer (protective factors).

### *3.1.1 Skin Cancer Risk Factors*

A number of factors are known to increase skin cancer risk. Most risk factors, such as skin type, are non-modifiable. However, a number relating to exposure to UVR are potentially modifiable and, therefore, are the focus of most primary prevention activities.

A recent New Zealand study of melanoma found that 93% of risk in women was attributable to a combination of hair colour, a family history of dysplastic moles, personal count of large moles, facial freckling, place of occupation aged <18 years and personal history of NMSC. In men, 94% of risk was attributable to eye colour, skin colour, a personal count of large moles, a personal

history of NMSC, country of birthplace (New Zealand vs other country) and place of occupation aged <18 years (MJ Sneyd personal communication, 21 September 2016).

***Non-modifiable* personal and demographic risk factors for skin cancer include the following:**

- A previous personal history of melanoma and/or NMSC, or a family history of melanoma, increases the risk of melanoma.
- Age: The chance of developing skin cancer increases with age, possibly because older people have had more opportunities to be exposed to UVR and their capacity to repair the damage is diminished.
- Skin type: The chance of developing skin cancer is greater among those who sunburn readily and tan poorly - typically those with red or blond hair and fair skin that freckles or burns easily. Ethnic differences in skin cancer rates are mostly due to skin colour, which is determined by the amount of melanin produced by skin cells called melanocytes. These cells protect the skin from the damage produced by UVR. As a result, darkly pigmented people develop skin cancer on sun-exposed sites at lower rates than lightly pigmented people. However, incremental amounts of UVR do increase the risk of developing skin cancer for all people including those with more darkly pigmented skin (Pennello et al 2000). In New Zealand, people who identify as European have the greatest risk of developing skin cancer. Although there is no systematic collection of information relating skin type to ethnicity in New Zealand, self-report data suggest that there is heterogeneity of skin type among Māori and Pacific peoples (Marshall 2009; Reeder et al 2010; Nessvi et al 2011). Notwithstanding this, the incidence of melanoma in non-Māori is considerably higher than in Māori New Zealanders (Ministry of Health 2016).
- Type and number of moles (probably partly modifiable): Having more than 100 moles (compared with 0 to 15 moles) and having more than five atypical moles compared with no atypical moles, increases the risk of melanoma.
- Immune suppression: HIV, leukaemia and certain drugs used to treat organ transplants and other conditions may suppress the immune system, leading to skin cancers.

**The overarching and potentially *modifiable* risk factor for all skin cancer is exposure to UVR that causes harm.** Examples of specific risk factors that relate to exposure to UVR that causes harm include:

- history of sunburn
- intermittent excessive sun exposure
- sunbed[2] use.

[2] Throughout this document the term “sunbed” refers to all types of UVR tanning devices intended for cosmetic purposes.

Other potentially modifiable risk factors include:

- inadequate personal sun protection
- inadequate environmental, social and policy support for appropriate personal UVR protective practices.

**The use of sunscreen can reduce the risk of skin cancer if used regularly and appropriately.** Regular use of sunscreen in light skinned people can decrease the risk of developing SCC (Autier, 2009) and melanoma (Green et al 2011; Iannacone et al 2014). According to an analysis of data from the Norwegian Women and Cancer Study, the use of SPF ≥ 15 sunscreen by all women aged 40 to 75 years could potentially reduce their melanoma incidence by 18% (Ghiasvand R et al 2016). However, the use of sunscreen can be abused by people who intentionally expose themselves to the sun because of a false sense of security, where they believe they will develop a tan while avoiding sunburn so they extend their duration of sun exposure. This abuse of sunscreen can actually increase the risk of both melanoma and NMSC (Autier 2009).

**Exposure to UVR that causes harm increases the risk of all three major forms of skin cancer.** UVR is the major aetiological agent in the development of skin cancers. UVR causes DNA damage and genetic mutations, which subsequently lead to skin cancer (Narayanan et al 2010). Recent evidence suggests that cancer-causing mutations in skin cells continue to be generated for hours after sunlight exposure (Premi et al 2015). Severe blistering sunburns are associated with an increased risk of both melanoma and BCC (Armstrong and Kricker 2001). For these cancers, the experience of intermittent intense UVR seems to carry a higher risk than do chronic or cumulative exposures, even if the total amount of UVR received is the same. The risk of SCC, in contrast, is strongly associated with chronic UVR exposure (typical of outdoor occupational groups), but not with intermittent exposure. Total UVR exposure depends on the intensity of the UVR, duration of skin exposure, and whether the skin is protected by shade, clothing, broad-brimmed and other appropriately sun protective hats or sunscreen. Intervening to address the potentially modifiable risk factors identified earlier in this strategy is likely to reduce both NMSC and melanoma incidence.

**Exposure to UVR that causes harm at any age increases the risk of melanoma.** Childhood sun exposure is associated with the development of melanocytic nevi (moles), which are a risk factor for melanoma (Bauer and Garbe 2003). In a meta-analysis of sunburns and melanoma risk, increasing numbers of sunburns increased melanoma risk for all time periods (childhood, adolescence and adulthood) (Dennis et al 2008).

**Exposure to UVR from sunbeds increases the risk of melanoma and NMSC.** In 2009 the International Agency for Research on Cancer (IARC) of the World Health Organization classified UVR from sunbeds as “carcinogenic to humans” (Group 1) (El Ghissassi et al 2009). Sunbed use is associated with increased risk of early-onset melanoma (with risk increasing with greater use and an earlier age at first use) (Cust et al 2011; Gershenwald et al 2016). Recently a significant increase in truncal melanomas in females has been found in geographic areas with a high prevelence of indoor tanning (Le Clair 2016). Sunbed exposure to UVR on typically unexposed anotomical sites can be expected to result in an increase in melanoma incidence in these areas

(Le Clair 2016). Sunbed exposure also is associated with skin burns, premature aging, corneal burns, cataracts, ocular melanoma and photodermatoses (Lim et al 2011). In Australia it has been estimated that among those who had ever used a sunbed and were diagnosed between 18 and 29 years of age, three-quarters (76%) of melanomas were attributable to sunbed use (Cust et al 2011). Internationally, more than 450,000 cases of non-melanoma skin cancer and more than 10,000 melanoma cases each year are considered to be attributable to indoor tanning in the United States, Europe and Australia (Mackenzie et al 2014).

**The strength of UVR in New Zealand is greater than similar latitudes in North America.** The erythema (sun-burning) strength of UVR is usually given in terms of the UV Index (UVI), a scale first used in Canada and defined to range from 1 to 10 there. In the New Zealand summer, UVI values regularly exceed 13, even in the south of the country where UV is less intense. A NIWA study has shown that peak UVI values in New Zealand are about 40% more than at similar latitudes in North America (McKenzie et al 2006), as had also been found in comparison with Europe (Seckmeyer and McKenzie, 1992).

The single greatest factor determining environmental UVR is solar elevation (the angle of the sun relative to the Earth's horizon); the greater the solar elevation, the shorter is the absorption path through the stratospheric ozone layer. Throughout the day, the sun changes its position in the sky. From zero degrees at sunrise, solar elevation increases until it reaches its daily maximum at solar noon which, typically, does not coincide with midday. For example, during the New Zealand summer the sun is at its highest point around 1:30 pm. During summer, solar elevation is at its maximum, whereas during winter it is at its minimum.

Peak summer UVI in NZ is about 40% higher than at corresponding latitudes in the northern hemisphere because of: a) our lower ozone levels (a 7-10% effect), b) the reduced sun-earth separation during our summer compared with the northern hemisphere summer (a 7% effect) - due to the elliptical orbit of the earth around the sun, and c) our clearer unpolluted skies (a ~20% effect).

Other factors that affect UVR levels are clouds, reflective surfaces (snow, concrete, sand) and altitude (McKenzie et al 2006; McKenzie et al 2011). The effect of cloud is deceptive, as optically thin cloud like cirrus has minimal effect. Under broken cloud with the sun out (unobscured), cloud reflection can increase solar radiation above the clear sky intensity. Many surfaces reflect UVR and add to the overall UVR levels. While grass, soil or water reflect less than 10 per cent of incident UVR, sand reflects about 15 per cent, and sea foam about 25 per cent (UNEP Environmental Effects Assessment Panel 2016).

**There are a number of environmental factors that potentially can reduce an individual's UVR exposure**. These factors include the availability and quality of built and natural shade – factors guided by collective social policies and practices. For example, in recent years many primary schools throughout New Zealand have introduced management practices, built shade structures and planted trees in order to reduce the UVR exposure of students (Gies and Mackay 2004). The

need for local bodies to provide shade at recreational facilities has also been recognised (Reeder and Jopson 2006).

**There are a number of personal protective behaviours that reduce skin cancer risk by limiting or minimising UVR exposure that causes harm**. These include reducing exposure to the sun at peak UVR hours, seeking shade, avoiding artificial sources of UVR (in particular sunbeds), wearing sun protective clothing (including close fitting sun glasses), and using sunscreen protection.

In the 2016 Sun Exposure Survey, 65% of respondents aged 18 to 54 years who were outdoors for at least 15 minutes the previous summer weekend reported they had everything that they needed to protect their skin from the sun (Trowland et al 2016). More than half of respondents (58%) reported having stayed in the shade at any time while outdoors, with 50% reporting that they used sunscreen.

Compared to all previous survey years, in 2016 there was a significant increase in the proportion of respondents who reapplied their sunscreen twice while outdoors. Compared to the 2013 survey, more respondents in 2016 reported that when outside they had worn clothing that covered the shoulders, upper arms and upper lower legs. Body areas that were most commonly left exposed to the sun were the neck (23% of respondents covered the neck with clothing), lower arms (11%) and hands (9%) (Trowland et al 2016).

In a 2009 population survey of 40 to 74-year-old New Zealand Europeans, 40% of men and 22% of women sometimes used sunscreen, and 33% of men and 41% of women usually used a sunscreen. In the same study, 5% of men and 29% of women had ever used a sunbed (Sneyd et al 2011).

In a recent similar population survey where participants could choose multiple sun protection measures, 61% of men and 73% of women usually used a sunscreen and 17% of men and 32% of women usually avoided the sun whereas 9% of men and 8% of women usually did nothing to protect themselves from the sun. When analysed by age, 66% of people aged 50 to 74-year-olds and 76% of 30 to 50-year-olds usually used a sunscreen. The same study showed that 8% of men and 33% of women reported ever using a sunbed. This percentage varied considerably by age in women but not in men, with 64% of women aged 30 to 50 years and 28% of women aged 50 to 74 years ever using a sunbed (MJ Sneyd, personal communication, 21 September 2016).

**Overall sunburn rates in New Zealand may be starting to decline.** The 2016 Sun Exposure Survey revealed that 15% of respondents aged 18 to 54 years who were outdoors for at least 15 minutes the previous summer weekend reported having been sunburnt (Trowland et al 2016). This proportion was significantly lower than the sunburn rate in 2013 (22%). Until 2016, sunburn prevalence appears to have remained reasonably steady over the last 13 years, or four waves of data collection in 2000 (24%), 2003 (21%), 2006 (23%) and 2010 (20%) (Armstrong et al., 2013). The 2016 rate (15%) could represent the beginning of a downward trend in sunburn. However, given the 2016 Sun Exposure Survey response rate of 27%, it is important to note that future survey waves with higher response rates are necessary to ensure credibility.

**Blistering sunburn rates in New Zealand continue to be of concern.** In a recent population survey, the proportion of 30 to 49 year olds who reported they had ever had blisters from sunburn was greater than in 50 to 74 year olds (61% compared to 53%). However, the proportion of women reporting blistering sunburn from all causes in both age groups was greater than in men: 64% of younger women compared with 57% in younger men, and 57% of older women compared to 49% in older men (MJ Sneyd, personal communication, 21 September 2016).

### *3.1.2 Addressing Skin Cancer Risk*

**Evidence suggests that one of the best avenues for reducing the burden of skin cancer is prevention of exposure to UVR that causes harm**. Armstrong (2004) concluded that around 65% of cutaneous melanoma worldwide, and as much as 95% in high UVR environments like Australia, were caused by UVR exposure and, therefore, were potentially preventable. Furthermore, as much as 99% of NMSC were also caused by UVR. Accordingly, he concluded that "it is to the control of sun exposure that the major efforts in skin cancer prevention should be directed" (Armstrong 2004). Sneyd and Cox (2006) estimated that in New Zealand in 2002, 328 new cases of melanoma were directly attributable to severe sunburn. They argued that if severe sunburn (with blisters) in the population was decreased by 10%, this could result in 28 fewer cases of melanoma per year and a reduction of about four deaths per year. Furthermore, because NMSC is also associated with sunburn, a reduction in severe sunburn in the population would result in fewer NMSC. Yet, with the exception of the most recent (2016) sunburn rates (Trowland et al 2016), among the New Zealand population 15 to 69 years there has been no significant reduction in the frequency of self-reported summer weekend sunburn since a 1994 baseline survey (Armstrong et al 2013).

**Well-designed interventions informed by the best evidence are of critical importance.** Recent evidence of the effectiveness of skin cancer primary prevention interventions is limited to particular settings and strategies.

One source of such evidence is a series of systematic reviews for the United States Community Preventive Services Task Force (Community Preventive Services Task Force 2016). An update of that systematic review, using the same methodology, was undertaken in the Department of Preventive and Social Medicine at the Dunedin School of Medicine (McNoe et al 2016). This update involved the collection and critical analysis of all relevant peer reviewed journal articles published in the past five years since the Task Force review. Inclusion and exclusion criteria were noted in the report with interventions conducted in health care settings excluded. The ability to make recommendations based on such reviews is largely dependent on the studies published, the quality of their design, execution, analysis and reporting, and the relevance of the outcomes measured.

Convincing evidence is available for some settings (most strongly for primary schools) and lacking for others – a pattern not changed markedly in the past five years. The recommended interventions and strategies that are supported by evidence are as follows:

*Recommended settings based on strong evidence:*

- Primary/middle schools
- Outdoor occupational settings
- Outdoor recreational and tourism settings

*Recommended settings based on sufficient evidence:*

- Childcare centres (for use of sunscreen, clothing, shade and combinations of protective practices)
- Multi-component interventions[3]
- Individually directed interventions (e.g., electronic media such as text messaging or Smartphone apps)

Both the Dunedin School of Medicine and Task Force reviews found that the evidence for mass media (alone) campaigns and interventions in secondary schools and college settings remains "insufficient". This does not mean that interventions in these settings are not effective - it may be that insufficient studies have been conducted, or there may be methodological issues with the study design. Consequently, these are among the areas where further suitably rigorously designed research is required.

To date the systematic reviews have addressed the effectiveness of interventions in positively changing behavioural and (some) health outcomes, but not their cost-effectiveness. In Australia, however, a review of the comprehensive SunSmart programme concluded that "sustained modest investment in skin cancer control is potentially excellent value for money" (Shih et al 2009). Furthermore, such a programme would return $2.32 for every $1 invested over 20 years, reduce the number of melanoma cases by 20,000 over that period and deliver $90 million in productivity gains each year. A second analysis identified the SunSmart programme in Victoria as one of a handful of cost-effective interventions for the future that would have a significant impact on Australia's health (Vos et al 2010).

**Skin cancer prevention initiatives are highly cost-effective and may also be cost saving.** Evidence of cost-effectiveness of skin cancer prevention was recently established by a systematic review of studies up to 31 August 2013 (Gordon and Rowell 2015). The review also included estimates of the direct health system costs for skin cancer in a number of countries, including New Zealand. Relative to the size of their respective populations, these costs were found to be highest for Australia, New Zealand, Sweden and Denmark.

As noted by Gordon and Rowell (2015), the cost burden of skin cancer will grow as incidence increases. For example, in the United States of America the annual spend for skin cancer treatment increased 126% between 2002-2006 and 2007-2011, with the annual spend increasing

[3] Sandhu et al (2016) define multi-component interventions as a combination of individually directed strategies (e.g., educational); multi-media campaigns; and environmental and policy changes (e.g., creating shade areas, distributing sunscreen, using school-based policies to restrict outdoor activities during peak UVR hours) in multiple settings within a defined geographic area in an integrated effort to influence UVR protective behaviours. They are usually delivered with a defined theme, name, logo, and set of messages. Programmes vary substantially, however, in duration (e.g., months to years) and number of components/strategies used.

more rapidly for skin cancers than for other cancers (Guy et al 2015). Gordon and Rowell (2015) concluded that "public investment in skin cancer prevention and early detection programmes [aimed at high-risk individuals] show strong potential for health and economic benefits" (Gordon and Rowell 2015). Guy et al (2015) also concluded that the substantial and increasing cost of the health and economic burden of skin cancer treatment highlights the importance of skin cancer prevention efforts, which may result in future savings to the healthcare system. According to a recent Australian study, a comprehensive skin cancer prevention programme has a potential return of $3.20 for every dollar invested (Shih et al 2017).

**The importance of primary prevention is cited in key policy documents developed for New Zealand**. A focus on primary prevention was supported by the *Melanoma Guidelines Implementation Plan* (New Zealand Guidelines Group 2010), which noted that prevention initiatives undertaken over an extended period of time have the greatest potential for health gain and are, therefore, of the highest priority. The prevention initiatives proposed in the plan focused on the primary health care setting, recognising that GPs and practice nurses have a role in advising on cancer prevention. However, current international evidence of effectiveness is insufficient to recommend specific interventions in primary health care settings that target adults over 24 years old for skin cancer prevention counselling (Moyer 2012; Lin et al 2011). A New Zealand survey undertaken in 2011 among primary health care workers and consumers found that consumers would be open to receiving sun safety messages from their GPs (UMR Research 2011). The research recommended the inclusion of prevention messages on GPs' dashboards and providing them with appropriate information to provide to consumers.

*The Guidelines Implementation Plan* highlighted that patients have a right to consistent, evidence-based information. Also, the *Standards of Service Provision for Patients with Melanoma in New Zealand – Provisional* requires that "patients are offered evidence-based information on risk factors, prevention and early detection" (National Melanoma Tumour Standards Working Group 2013). More recently, the *New Zealand Cancer Plan: Better, faster cancer care 2015-2018* identifies the importance of more people being aware of cancer risks and doing something about them (Ministry of Health 2014).

### *3.1.3 Addressing Sunbed Risk*

Governments around the world are taking action to restrict the use of sunbeds for cosmetic purposes. France was the first country to restrict sunbed use among minors in 1997, and a growing number of European countries have followed suit, including Spain, Germany, Belgium and the United Kingdom. In 2009, Brazil became the first country in the world to ban sunbeds across its entire population (Pawlak et al 2012).

In Australia, all states have introduced a total ban, resulting in a dramatic reduction in the availability of harmful artificial UVR sources in that country (Sinclair et al 2016). Long-term benefits to the health of the population and a reduction in costs to the health system are expected to result.

According to a nationwide audit undertaken in January 2016, there were at least 172 sunbed premises operating commercially in New Zealand (McNoe and Reeder 2016). In New Zealand,

these premises operate under a voluntary code of practice. While repeated surveys of sunbed operators conducted by Consumer NZ since 2012 have consistently found poor practices among sunbed operators in New Zealand, they have found a slow increase in compliance with the requirements of the voluntary standard (Consumer NZ 2016).

The Auckland Council Health and Hygiene Bylaw and Code of Practice 2013[4] sets performance standards for sunbed operators and requires registration of commercial services. Based on findings of consumer and public health unit surveys, the bylaw and code appear to have produced an improvement in compliance with the voluntary standard among services within the Auckland Council region (Consumer NZ 2016; EMF 2015).

The Health (Protection) Amendment Act enacted on 30 June 2016[5] prohibits the commercial provision of artificial UV tanning services to people under the age of 18 in New Zealand, "thereby protecting the vulnerable under-18 group while allowing adults to make their own choices" (Coleman 2016). Based on an analysis of public consultation, the Ministry of Health is investigating whether licensing of premises and operators, and the introduction of mandatory standards, are appropriate (Coleman 2016).

### *3.1.4 Vitamin D and Sun Exposure*

While sun exposure is a major cause of skin cancer, it also is the main source of vitamin D for most people in New Zealand. Therefore, it is important to balance the risks of skin cancer from too much sun exposure with maintaining adequate vitamin D levels.

According to a survey undertaken in 2010, most general practitioners (87%) were concerned that "patients may not be getting enough vitamin D", and 81% also thought that "skin cancer prevention messages contribute to the development of vitamin D deficiency" (Reeder et al 2012). Partly in response to these findings and also that 97% of those surveyed said that they would value clinical guidelines, the Ministry of Health and the Cancer Society of New Zealand developed the *Consensus Statement on Vitamin D and Sun Exposure in New Zealand* (Ministry of Health and Cancer Society of New Zealand 2012). *The Companion Statement on Vitamin D and Sun Exposure in Pregnancy and Infancy in New Zealand* (Ministry of Health 2013) was developed to be read in conjunction with the *Consensus Statement*.

According to the *Consensus Statement*, with sufficient exposure to ultraviolet B (UVB) from sunlight, a healthy person should be able to synthesise all of their vitamin D requirements in their skin. However, there is no scientifically validated, safe threshold level of UVR exposure that allows for maximal vitamin D synthesis without increasing skin cancer risk. Advice on sun exposure, therefore, requires balancing the risk of skin damage and skin cancer against the risk of vitamin D deficiency. Results of a recent New Zealand study suggest that vitamin D status is increased by regular small sun exposures and that greater exposures result in only small additional increases (Scragg et al 2016).

[4] Health and Hygiene Bylaw and Code of Practice 2013. Accessed from http://www.aucklandcouncil.govt.nz/en/licencesregulations/bylaws/pages/healthandhygienebylaw.aspx
[5] Health (Protection) Amendment Act 2016. Accessed from http://www.legislation.govt.nz/act/public/2016/0035/latest/versions.aspx

Concern has been expressed in recent years that the widespread use of sunscreens may adversely affect vitamin D status. However, there is no evidence that regular use of sunscreen results in vitamin D insufficiency (Marks et al1995; Norval and Wulf 2009). For the general population with no specific medical issues or risk factors for vitamin D deficiency, supplementation is not necessary and is not recommended. General practitioners may consider prescribing a vitamin D capsule to those at high risk of vitamin D deficiency, as discussed in the *Consensus Statement*. The *Consensus Statement* also recommends that "people who live in the cooler, southern regions of New Zealand and spend little time outdoors in the middle of the day between May and August… may wish to consider vitamin D supplementation during these months".

## 3.2 EARLY DETECTION

According to *The New Zealand Cancer Control Strategy*, early detection means detecting cancer prior to the development of symptoms or as soon as practicable after the development of symptoms (Minister of Health 2003). For skin cancer, early detection means identifying lesions suspicious of malignancy at the earliest clinical stage possible. This may occur through self-screening (people who have no symptoms of skin cancer deliberately check their skin), screening (people who are unaware of any signs or symptoms of skin cancer undergo a total skin examination) or early clinical diagnosis (visual recognition of an early suspicious lesion by a health professional). Early identification of a lesion can lead to earlier and more effective treatment.

As a proportion of diagnoses, melanoma has a much higher death rate than NMSC. Because of this greater risk of death, research in relation to early detection has tended to focus on melanoma.

### *3.2.1 Melanoma Thickness a Predictor of Prognosis*

Worldwide, melanoma survival decreases with increasing melanoma thickness, from about 92% 10-year survival for melanomas <=1mm thickness to 50%10-year survival in patients with melanomas >4mm thick (Balch et al 2009). In general, the thinner the lesion the better the outcome, with an Australian study reporting a 20-year survival of 96% for those with thin invasive melanomas (Green et al 2012). For these reasons, Sneyd and Cox (2006) advise that early diagnosis, along with prevention of excessive sun exposure, is one of the best avenues for reducing the burden of melanoma in New Zealand.

According to an analysis of routinely collected data for melanoma from 1994 to 2004, the proportion with thick melanoma (>3.0mm) was greater for older compared with younger people (with the proportion of thick melanomas increasing with age), for males compared with females, for Māori compared with non-Māori (despite the substantially lower incidence in Māori), and for those diagnosed with nodular melanoma compared with other types of melanoma (Richardson et al 2008).

The same results are found for analyses of more recent melanomas registered between 1997 and 2012 (MJ Sneyd, personal communication, 21 September 2016). For invasive melanomas registered from 1997 to 2012, the proportion of very thick melanomas (>4mm) ranged from about 3% for patients aged under 50 years at diagnosis, to 20% in patients aged 80 years and over. Men had a greater percentage of thick (2mm to 4mm) and very thick (>4mm) melanomas and a

statistically significant higher median thickness: 0.8mm in men and 0.71mm in women (MJ Sneyd, personal communication, 21 September 2016).

### *3.2.2 Screening for Melanoma*

The screening test for the early detection of melanoma is a total body skin examination either by a health professional or by self-examination. The skin examination may be augmented by dermoscopy by trained health professionals. Melanoma can only be confirmed by biopsy, ideally excision biopsy, not punch biopsy, followed by histological examination.

#### *Population screening for melanoma*

Population screening for melanoma has not been shown to reduce mortality from melanoma so the *Clinical Practice Guidelines for the Management of Melanoma in Australia and New Zealand* (Australian Cancer Network Melanoma Guidelines Revision Working Group 2008), the Melanoma Standards (National Melanoma Tumour Standard Working Group 2013) and the US Preventive Services Task Force (US Preventive Services Task Force 2016) do not recommend routine screening for the general population.

#### *Screening and surveillance of people at high risk of melanoma*

Risk assessment and prognostication are regularly used in medicine to guide management decisions. It is generally believed that screening of high-risk people by total skin examination for early detection is more feasible, cheaper, has fewer false positive screens and lower patient anxiety (Williams et al 2011) compared to population screening. However, screening of high-risk people requires their accurate identification. The common practice of stratifying individual risk based on a single variable, such as age, does not give an accurate estimate of individual risk and, to date, few melanoma risk prediction models have been comprehensively developed and validated (Vuong et al 2014).

Although many risk factors for melanoma are well described, many of them are non-modifiable and their multiple interactions make risk prediction complex. However, estimation of an individual's probability of developing melanoma within a specified time, by consideration of their personal combination of risk factors, allows the doctor and patient to discuss an evidence-based management plan, including appropriate strategies for prevention, surveillance and early diagnosis. Dependent on level of risk, this may be just a heightened index of suspicion from both doctor and patient, or for example, include annual total body photography or referral for regular skin examinations by a physician trained and competent in skin surveillance. To calculate this probability, an updated risk predictor model (RPM) for melanoma has been developed, using data from a new large case-control study of New Zealand melanomas and based on the preliminary RPM (Sneyd et al 2014). The model has been available to health professionals with access to the BPAC (Best Practice Advocacy Centre) patient management system since 2016.

#### *Skin self-examination*

Although skin self-examination has been suggested as one way to detect melanoma, its efficacy is not well understood. Nevertheless, in a population-based study of melanoma patients diagnosed between 1 July 1992 and 30 June 1994 in New Zealand, 45% of melanomas were first recognised

as abnormal skin lesions by the patient, 31% by a family member or friend, and 20% by their GP (Sneyd 1999). In a more recent study of New Zealand patients diagnosed in 2012-2014, 64% of patients first noticed the abnormal lesion themselves, 16% by a family member, and only 14% were first noticed by a doctor (MJ Sneyd, personal communication, 21 September 2016).

### *Sensitivity and specificity of the skin examination by a health professional*

The evaluation of a screening examination is commonly described using a single measure of diagnostic accuracy. However, as overall accuracy is dependent on prevalence of the disease, it is less useful than sensitivity (probability that a person with the disease will test positive) and specificity (probability that a person without the disease will test negative) when evaluating a screening test (Alberg et al 2004).

Evidence for the accuracy of screening with total skin examinations by physicians or patients is limited and inconsistent (Wolff et al 2009). Most evaluations of skin examinations have assessed the test using pictures of lesions, or when conducted by specialist (primarily within screening programmes) so are not generalisable to screening in the whole population. One Australian study estimated the specificity of skin examinations for melanoma by GPs as 86.1% (Aitken et al 2009). Sensitivity could not be calculated in this study as people with negative screening tests were not followed up for verification. Furthermore, because of substantial verification bias preventing the estimation of sensitivity in studies to date, it is still unclear whether the routine use of dermoscopy in screening examinations will improve the sensitivity and diagnostic accuracy of skin cancers.

Although there is some evidence that a screening skin examination by a physician is associated with thinner melanomas being diagnosed (Aitken et al 2009; Koh et al 1996), three major biases (lead-time bias, length bias and over-diagnosis bias) can result in over-estimation of benefit.

## 3.3 DIAGNOSIS AND TREATMENT OF SKIN CANCER

As indicated previously, the pathway for diagnosis and treatment directly links to the *Standards of Service Provision for Patients with Melanoma in New Zealand – Provisional* (National Melanoma Tumour Standard Working Group 2013). The Standards promote nationally coordinated and consistent standards of service provision across New Zealand. They aim to ensure efficient and sustainable best-practice management of melanoma, with a focus on equity. Comparable standards for the diagnosis and treatment of NMSC in New Zealand, which have not yet been developed, also are needed.

## 3.4 RESEARCH, EVALUATION AND SURVEILLANCE

The knowledge required for effective cancer control originates from three broad types of knowledge-generating activities - fundamental research (causes and impacts), intervention research (efficacy and effectiveness of cancer control actions) and surveillance (collection, analysis and review of cancer-related data) (Minister of Health 2003).

Regarding primary prevention, the 2004 comprehensive systematic review carried out for the US Community Preventive Services Task Force identified a number of issues that may help to explain why there has been insufficient evidence regarding the effectiveness of interventions to prevent

skin cancer (Saraiya et al 2004). These issues (in the reviewed studies, which were published up to 2000) included a lack of rigour in research design (particularly the need for appropriate comparison groups), measurement issues, poor description of interventions, lack of insight into how environmental and policy interventions may work, and lack of studies among multi-ethnic populations. That review also noted that there was a paucity of research that measured key health outcomes, from objectively measured skin damage through to clinical evidence of skin cancer. However, the ongoing series of review updates relating to specific intervention contexts and types, which supplement earlier findings with research published since 2000, have tended to find a strengthening in evidence for the effectiveness of most primary prevention interventions. As outlined in Section 3.1.2 these include interventions in primary and middle school, outdoor occupational, child care, multi-component community-wide and recreational and tourism settings. However, there remains a need to implement and rigorously evaluate such interventions within the New Zealand context where skin cancer is a much more common health outcome than in any other country, except Australia.

Regarding early detection, the Early Detection Sub-Committee of the Skin Cancer Steering Committee (2010) highlighted the need for research to better target early detection strategies to reduce mortality from both melanoma and NMSC. While the current New Zealand Skin Cancer Primary Prevention and Early Detection Steering Committee recognises that international research has focused on melanoma due to its greater risk of death, the committee also concurs with Brougham et al (2010) that New Zealand needs a critical analysis of our significant burden of NMSC, including an understanding of the extent to which delays in detection and diagnosis may contribute to deaths from NMSC. Of particular importance are data on cutaneous SCC, as it is more likely to result in death than BCC.

Regarding early detection of melanoma, the report of the Early Detection Advisory Group (EDAG 2006) identified the need for research in New Zealand into:

- who is most likely to develop which type of melanoma
- who is most likely to develop thick melanoma
- who is most likely to die of melanoma
- the extent to which delay in recognition, presentation, diagnosis occurs and the reasons for this.

The Early Detection Sub-Committee of the Skin Cancer Steering Committee (2010) also highlighted the need for research to better target early detection strategies to reduce mortality from skin cancer, particularly melanoma, in New Zealand.

# 4. NEW ZEALAND SKIN CANCER PRIMARY PREVENTION AND EARLY DETECTION STRATEGY 2017 TO 2022

## 4.1 KEY PRINCIPLES

**Alignment with the New Zealand Health Strategy.** As noted in Section 1.2 Strategy Overview, the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022* has been developed by a committee established to facilitate improved coordination and collaboration among organisations involved in skin cancer prevention and early detection. As such, it reflects the *New Zealand Health Strategy* guiding principle of collaborative health promotion, rehabilitation, and disease and injury prevention by all sectors (Minister of Health 2016). The *New Zealand Health Strategy* also acknowledges the importance of collaboration across government agencies. In this regard, the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022* is designed as a basis for fostering broader and greater engagement in skin cancer prevention by agencies that include the Ministry of Education and WorkSafe NZ as well as local government and sporting and recreational bodies.

**Reducing inequalities.** Reducing inequalities is a guiding principle of the *New Zealand Primary Prevention and Early Detection Strategy 2017 to 2022* as reflected in the identified purposes of the Outcomes Framework. The New Zealand Primary Prevention and Early Detection Steering Committee recognises the need to reduce the incidence and impact of skin cancer *and* reduce inequalities with respect to skin cancer. *A Health Equity Assessment Tool* (Equity Lens) for tackling inequalities in health (Signal et al 2008) should be applied in the development of skin cancer policy, identification of interventions and commitment of resources. Inequalities relating to gender, age and ethnicity require particular attention.

**Evidence-based.** A guiding principle of the *New Zealand Primary Prevention and Early Detection Strategy 2017 to 2022* is that all activities should be evidence-based. This is consistent with *The New Zealand Cancer Control Strategy* (Minister of Health 2003). A strong evidence base provides confidence that the intervention approaches, goals and objectives identified are likely to be effective and that efforts and resources are directed at the population groups most affected by skin cancer and its risk factors. The importance of ensuring the *New Zealand Primary Prevention and Early Detection Strategy 2017 to 2022* is evidence-based is reflected in the inclusion of a research, evaluation and surveillance intervention pathway in the Outcomes Framework (Figure 1).

**The Strategy as a guide for action.** As in previous strategies, the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022* is intended to inform action rather than be a blue print. Organisations are encouraged to assess areas of expertise and capacity in relation to the Outcomes Framework (Figure 1) and, in developing programmes, specifically identify how the programmes contribute to these outcomes. It is expected that each organisation involved in skin cancer control will interpret and use the Strategy from their organisational perspective.

**Alignment with The New Zealand Cancer Control Strategy.** As noted in Section 2, the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022* aligns with *The New Zealand Cancer Control Strategy* (Minister of Health 2003). In particular, the Outcomes Framework purposes and intervention pathways (Figure 1, page 22) are consistent with the purposes and with goals 1 (primary prevention) and 2 (early detection) of that Strategy.

## 4.2 THE OUTCOMES FRAMEWORK

As Figure 1 (p 22) shows, the overarching purposes of the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022* are to contribute to reducing the incidence and impact of skin cancer and reducing inequalities with respect to skin cancer. Skin cancer is understood to include both melanoma and NMSC. Impact includes mortality and morbidity (i.e., stage at detection) as well as quality of life considerations (beyond the scope of this document). Consistent with the *Standards of Service Provision for Melanoma Patients in New Zealand - Provisional* (National Melanoma Tumour Standard Working Group 2013), priorities for early detection include increasing health professional best practice relating to detection, with a particular focus on recognition by primary care clinicians of skin lesions suspected of being melanoma. As highlighted in the principles of the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022*, research, evaluation and surveillance should provide a critical underpinning to all skin cancer control activities.

Figure 1 identifies priorities for the primary prevention intervention pathway. The focus of primary prevention activities is on reducing exposure to UVR that causes harm, the overarching risk factor for melanoma and NMSC. Exposure to UVR that causes harm incorporates sunburn, intermittent and chronic sun exposure and sunbed use. Key medium-term outcomes are increases in individual behaviours that protect people from UVR exposure that causes harm and increases in the number of sun protective environments and settings. Changes that may be expected to contribute to achievement of these outcomes include:

- increased knowledge of the risks (and benefits) from UVR among the public, policy makers and health professionals
- universal recognition that skin cancer is a serious public health issue
- increased policy support for protective environments.

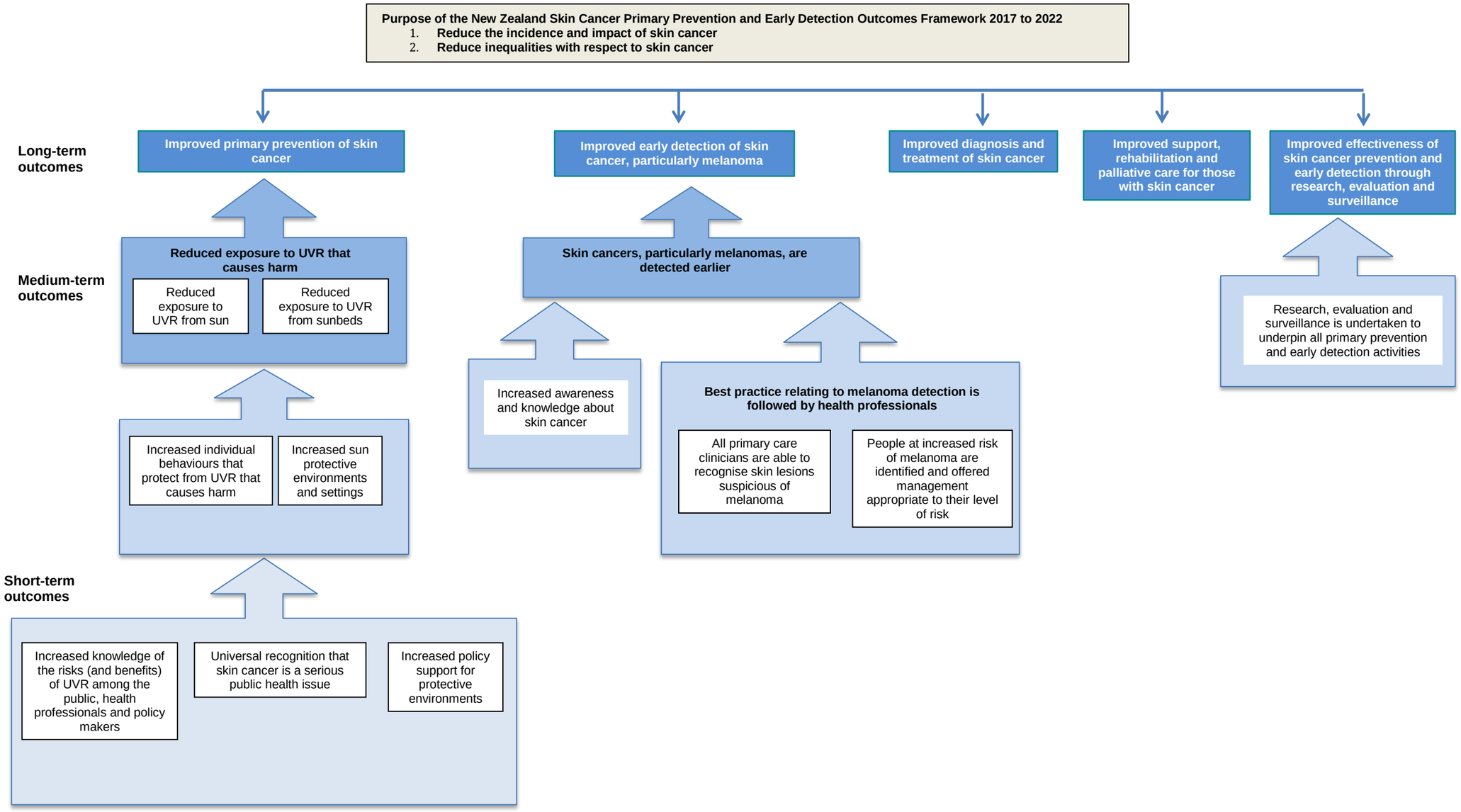
It is anticipated that these changes will be the focus of a mix of strategies to include settings-based interventions, advocacy, and marketing and communications.

The New Zealand Skin Cancer Primary Prevention and Early Detection Steering Committee agreed that prevention activities need to target all age groups. Based on the McNoe et al (2016) update of the United States Community Preventive Services Task Force review, the Steering Committee recommended primary/middle schools, outdoor occupational and outdoor recreational and tourism as priority settings for prevention activities. Workplaces and primary health care were also identified as important channels for sun safety activities, with a focus on men and older adults. Based on the McNoe et al (2016) update of the task force review, the Steering Committee also

recommended the following settings - childcare centres (for use of sunscreen[6], clothing, shade and combinations of protective practices), multi-component community-wide skin cancer prevention interventions and individually directed interventions (e.g., electronic media such as text messaging or Smartphone apps). This will include a focus on working with community influencers, e.g., local and regional councils and recreational organisations, to increase sun safety policy and practice.

[6] The Steering Committee noted that within an early childcare centre setting, some children may have skin sensitivity to sunscreen

**Figure 1: New Zealand Skin Cancer Primary Prevention and Early Detection Outcomes Framework 2017 to 2022**



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# APPENDIX A CORE MESSAGES FOR CONSUMERS

**Background**

In developing the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017-2022*, members of the 2016 New Zealand Skin Cancer Primary Prevention and Early Detection Steering Committee were involved in a consensus process to establish core messages for primary prevention and early detection. The purpose of the core messages is to facilitate consistency in consumer communication.

The expectation behind the recommended core content is that organisations will modify the order in which the content appears as well as add further evidence-based detail for particular media and target audiences. The bracketed words provide options for communicating some messages.

**Skin Cancer Facts**

Skin cancers are by far the most common cancers in New Zealand.

Most skin cancers are caused by too much UV radiation (UVR), either from the sun or artificial sources, e.g., sunbeds.

The majority of skin cancers are preventable.

Exposure to the sun that causes harm at any age increases the risk of skin cancer.

The chances of developing skin cancer, including melanoma, increase with age.

Most skin cancers, including melanoma, are found in people aged 50 years or older.

Melanoma is reasonably common in younger age groups (especially people aged between 25 and 39 years).

Skin cancer, including melanoma, is rare in children.

Non-melanoma skin cancers are by far the most common form of skin cancer.

Melanomas are less common than non-melanoma skin cancers but are responsible for the most deaths from skin cancer.

New Zealand and Australia have the highest rates of melanoma in the world.

**Skin Cancer Protection**

Protect your skin [*or*, Be SunSmart]:

- when the ultraviolet index (UVI) is 3 or above
- from September to April, especially between 10am and 4pm

- at the beach, as reflections from water and sand can increase UVR
- at high altitudes, especially near snow, which strongly reflects UVR.

There are three ways to know when UVI levels are 3 or above:

- Sun Protection Alert (www.sunsmart.org.nz).
- uv2Day free smartphone app (www.niwa.co.nz/node/111461).
- NIWA website UVI forecast for specific sites (http://www.niwa.co.nz/UV-forecasts).

How to protect your skin [*or*, How to be SunSmart]

- Slip on a shirt/top with long sleeves and a collar
- Slip into the shade
- Slop on sunscreen that is at least SPF 30, broad-spectrum and water resistant. Apply 20 minutes before going outside and reapply every 2 hours
- Slap on a broad-brimmed hat that shades your face, head, neck and ears
- Wrap on close fitting sunglasses
- Don't use sunbeds.

**Sun Protection and Vitamin D**

For the general population, some sun exposure is recommended for vitamin D.

Vitamin D levels are increased by regular small sun exposures - greater exposures result in only small additional increases.

From September to April, a daily walk or some other outdoor physical activity in the early morning or late afternoon is recommended.

From May to August, a daily walk or another form of outdoor physical activity in the hours around noon, with face, arms and hands exposed, is recommended.

**Skin Cancer Risk Factors**

Anyone in New Zealand can develop skin cancer.

Factors that may contribute to skin cancer, including melanoma, include:

- family or personal history of skin cancer
- fair skin
- red, blond or fair hair
- skin type that burns easily
- skin damage due to sunburn
- sunbed use
- many moles and larger moles.

Māori and Pacific people have a much lower chance of developing melanoma, but often have thicker (more serious) melanomas.

It is not possible for individuals to identify their personal risk of melanoma by going through a checklist of risk factors.

If you want to identify your risk, ask your primary care practitioner to use the melanoma risk predictor tool available to primary care practices in New Zealand.

**Skin Cancer Early Detection**

Early detection of skin cancer can lead to earlier and more effective treatment.

If left untreated, melanoma can spread rapidly to other parts of the body.

Check your skin regularly so you will be aware of any changes.

Check your entire body, including skin not normally exposed to the sun, along with the soles of your feet and under your toe nails.

Ask someone else to check difficult-to-see areas (back, neck and scalp).

Look for a spot, freckle or mole that is new or existing and:

- has changed in colour, shape or size and differs from others (an ‘ugly duckling’)
- may sometimes be itchy or bleeds
- becomes raised quickly.

If you have such a spot, freckle or mole, you should consult any of the following:

- a GP or a GP trained in the early detection and diagnosis of melanoma, including the use of a dermatoscope (a skin surface microscope)
- a specialist (dermatologist, surgeon or plastic surgeon).

# APPENDIX B NEW ZEALAND SKIN CANCER PRIMARY PREVENTION AND EARLY DETECTION STEERING COMMITTEE

## A HISTORY OF THE COMMITTEE

### 2001

The first meeting of the New Zealand Skin Cancer Prevention and Early Detection Steering Committee (formerly the New Zealand Skin Cancer Steering Committee) took place in August 2001. The meeting, which was convened by the Health Sponsorship Council (HSC) and the Cancer Society of New Zealand (CSNZ), brought together representatives of the HSC, CSNZ, the National Institute of Water and Atmospheric Research (NIWA), the Social and Behavioural Research in Cancer Group of the University of Otago (SBRU), as well as a GP and a dermatologist. Meeting discussions were underpinned by a discussion document prepared by Dr Tony Reeder (2001). The *Skin Cancer Prevention and Early Detection Action Plan 2001-2004* that resulted from the meeting set out five key objectives for skin cancer control work in New Zealand. On the basis of the Action Plan, HSC and CSNZ National Office developed a SunSmart programme that focused on primary prevention of skin cancer, with children 12 years and under and their caregivers as its priority audiences.

### 2004

The second meeting of the Committee took place in August 2004, with a view to reflecting on the previous three years and developing and identifying strategic direction for the next three years. Again the meeting was underpinned by a report prepared by Dr Reeder (2004). In addition to the organisations represented at the previous Committee meeting, a GP and representatives of the Ministry of Health, Victoria University School of Architecture and Design and Waikato District Health Board also participated. On the basis of discussions at the 2004 Committee meeting a *Skin Cancer Control Strategic Framework for 2005 to 2008* was developed. Early detection of skin cancers and effectiveness of skin cancer treatment were identified as core components of the 2005 to 2008 Framework, providing the impetus for establishment of the Early Detection Advisory Group (EDAG). Vitamin D deficiency was also acknowledged as an important issue for skin cancer control at this meeting.

### 2007

The third meeting of the Committee took place in April 2007. Once again, the purpose of the meeting was to reflect on the previous three years and develop the strategic direction and priorities for the next three years. Organisations represented at the meeting were the HSC, the CSNZ, the SBRU, the Hugh Adam Cancer Epidemiology Unit, the Wellington School of Medicine, NIWA, the Ministry of Health, Te Ohu Rata o Aotearoa, the University of Auckland School of Population Health, the New Zealand Dermatological Society, the Royal College of General Practitioners and

the Cancer Control Council. On the basis of discussions at the 2007 Committee meeting a *Skin Cancer Control Strategic Framework for 2008 to 2011* was developed.

### 2010

The fourth meeting of the Steering Committee, hosted by MelNet and funded by the HSC, took place in August 2010. As with previous meetings, its purpose was to reflect on the previous three years and develop the strategic direction and priorities for the next three years. Organisations represented at the meeting were the HSC, MelNet, CSNZ, the Melanoma Foundation, SBRU, the Hugh Adam Cancer Epidemiology Unit, the Wellington School of Medicine, NIWA, the Ministry of Health, Te Ohu Rata o Aotearoa, the University of Auckland School of Population Health, the New Zealand Dermatological Society, the Royal College of General Practitioners, Daffodil Enterprises, the New Zealand Guidelines Group, Procare Health and Cancer Control New Zealand. On the basis of discussions a *Skin Cancer Control Strategic Framework for 2011 to 2014* was developed.

### 2013

The fifth meeting of the Committee, hosted by MelNet and funded by the Health Promotion Agency (HPA), took place in September 2013. As with previous meetings, its purpose was to reflect on the previous three years and develop the strategic direction and priorities for the next three years. Organisations represented at the meeting were HPA, MelNet, CSNZ, SBRU, the Institute of Environmental Sciences and Research, the Melanoma Foundation, the Ministry of Health, NIWA, the New Zealand Dermatological Society, the Royal NZ College of General Practitioners, Te Ohu Rata o Aotearoa and Cancer Control New Zealand. On the basis of discussions the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2014 to 2017* was developed.

## NEW ZEALAND SKIN CANCER PRIMARY PREVENTION AND EARLY DETECTION STEERING COMMITTEE MEETING 2016

The sixth meeting of the New Zealand Skin Cancer Primary Prevention and Early Detection Steering Committee, hosted by MelNet and funded by the Health Promotion Agency, took place on 21 September 2016. Meeting participants were as follows:

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| Cancer Society of New Zealand | Shayne Nahu<br>Vikki Ambrose |
| Cancer Society Social and Behavioural Research Unit, University of Otago | Bronwen McNoe |
| HPA | Dr Rebecca Bell<br>Barbara Hegan<br>Heather Knewstubb<br>Laurianne Reinsborough<br>Johnny Akatapuria |
| HPA/MelNet Executive Committee member | Megan Chapman |
| MelNet | Betsy Marshall |
| Hugh Adam Cancer Epidemiology Unit, University of Otago | Dr Mary Jane Sneyd |

| | |
|---|---|
| Melanoma New Zealand | Linda Flay |
| Ministry of Health | Jane Lyon |

The Committee meeting, which comprised a core group of agency representatives and those with specialised expertise, was facilitated by Megan Chapman of the Health Promotion Agency. Prior to the meeting specialised expertise had been contracted by HPA to revise and update sections of the 2014 to 2017 strategy, for example, on skin cancer incidence and mortality, as well as evidence-based interventions to reduce skin cancer incidence and promote early detection.

The purposes of the 2016 meeting were to:

- Review briefly the implementation of the *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2014 to 2017*
- Discuss the draft revised strategy, including research that informed the revision
- Discuss and revise the outcomes framework
- Discuss proposed core consumer messages for prevention, risk factors and early detection
- Identify sector groups among whom the strategy should be promulgated.

A revised draft document reflecting decisions at the meeting was circulated to committee members and their organisations for feedback before finalisation. Associate Professor Tony Reeder of the Cancer Society Social and Behavioural Research Unit, University of Otago, contributed to the initial document content and also provided feedback on the revised draft. Emeritus Researcher Dr Richard McKenzie and Ben Liley from the National Institute of Water and Atmospheric Research (NIWA) also provided advice and assistance.