THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

BUSINESS SCHOOL


# Case Study: SkinVision

## Saturday 4 February

Case prepared by Jessica Yao under the supervision of Emil Kiroff. This case has been prepared solely for the Champions Trophy Case Competition. All data in this case has been obtained from publically available sources and SkinVision. This case is not intended to serve as an endorsement, a source of primary data, or an illustration of effective or ineffective management.

From: Mike Atwill

Sent: 4 February 2017

To: SkinVision Project Team

CC: Elizabeth Vincent, Dick Uyttewaal

Subject: SkinVision Strategy Presentation

Good morning team,

Our client SkinVision provides an innovative solution to detect skin cancer through a consumer mobile application that can examine suspicious skin lesions. Its mission is to raise awareness of the importance of early detection in skin cancer. t does this by empowering individuals to take their skin health into their own hands.

In recent years, healthcare models have shifted from a treatment to a primary prevention focus. This has brought about higher survival rates and substantial cost benefits. Technology plays a key role in this shift and SkinVision's unique and scientifically proven algorithm is at the very forefront of skin cancer prevention solutions. In this evolving healthcare landscape, SkinVision has developed a scalable model that leverages and supports this change. The company wishes to integrate their technology into healthcare systems and position itself as a primary prevention tool. It has a particular focus on New Zealand, where it sees the greatest potential for healthcare development.

As a start-up, SkinVision is currently exploring new opportunities and business models within the health system. Primary sources of funding have been obtained through several rounds of venture capitalist investment. The company would like to achieve revenues of $100 million within the next five years in addition to a self-sustaining business model. Its challenge lies in procuring and engaging users as well as ensuring uptake in the medical industry. This is an industry known to be change resistant and conservative.

SkinVision is interested in your team's strategy for how it can advance, with particular interest in strategies targeted towards the New Zealand market. This strategy should support the company in its goals of reducing the impact of skin cancer on individuals and healthcare systems.

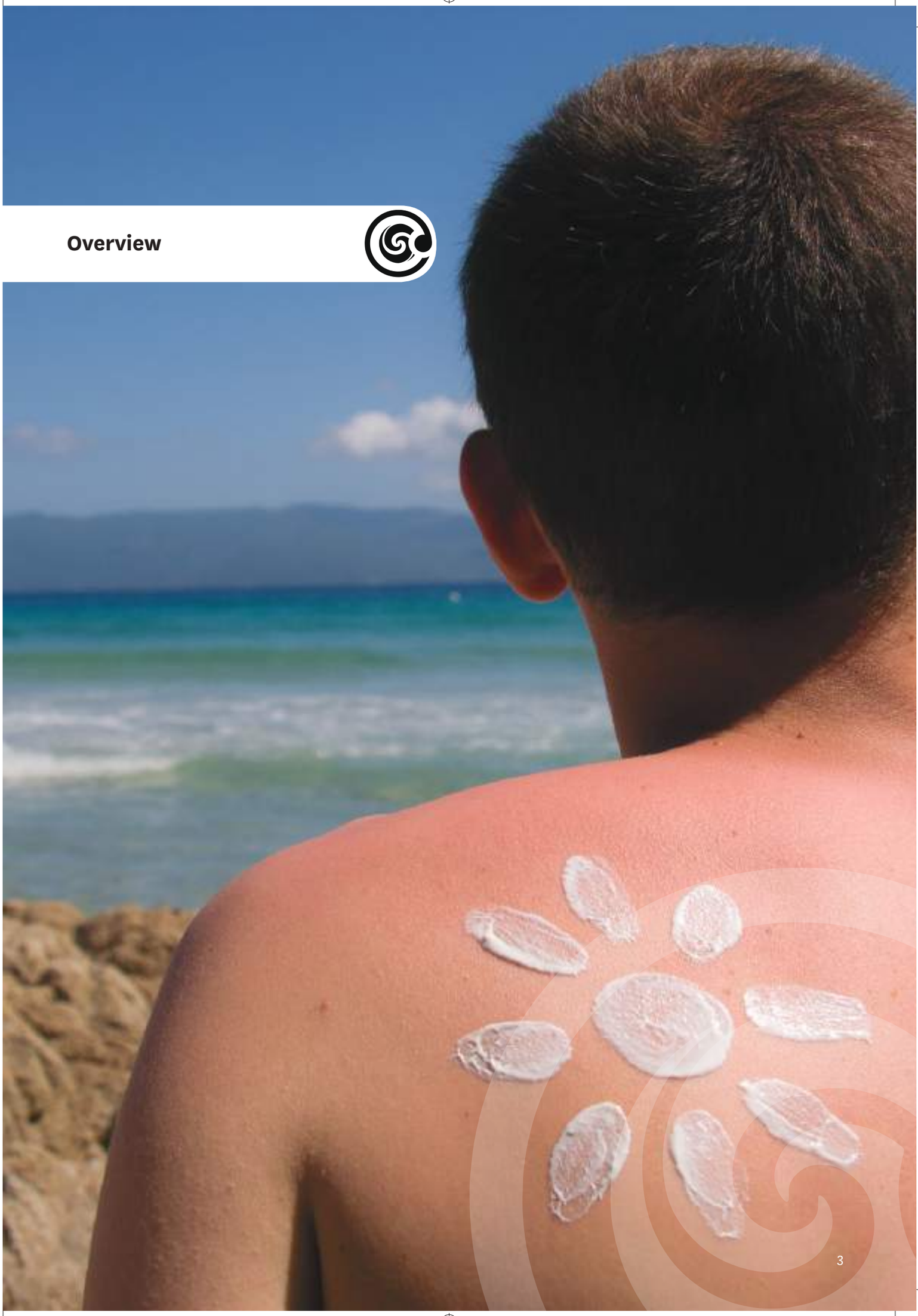
Kind regards,

Winona Washington

Partner

Verizon Consulting

## Overview



# The problem of skin cancer in New Zealand

New Zealand has the world's highest skin cancer rates, with an alarming two in three New Zealanders treated for some form of skin cancer in their lifetime. In addition to a breach in the ozone layer directly above New Zealand, risk factors such as an outdoor lifestyle and a large population of residents with high risk ancestry have led to skin cancer becoming a nationwide concern. Skin cancer is the fourth most common cancer in New Zealand and accounts for over 300 deaths every year.

Approximately half of all skin cancers are first discovered by the individual themselves. However, there is often a lack of motivation to take further action. This results in only 3.9% of the population annually examined by medical professionals for skin health. This can also be attributed to the fact that the New Zealand health system covers only the treatment of skin cancer, while preventative but expensive skin checks are funded either through private insurance or out of pocket payments. Further, only one in three New Zealanders have health insurance and often basic packages do not cover regular skin cancer checks.

Skin cancers can be divided into two categories: melanoma and non-melanoma skin cancer (NMSC); the former, more deadly form, is characterised by irregularly shaped skin lesions. Although there are higher incidence rates of NMSC, the mortality rate and treatment costs of melanoma are much greater. Melanoma accounts for less than one percent of skin cancer cases, but the vast majority of skin cancer deaths. The most common cause of skin cancer is exposure to ultraviolet (UV) radiation in sunlight. Sun exposure in childhood leads to a greater risk of skin cancer compared to sun exposure in later life. Skin cancers can be diagnosed in their early or advanced stages. The earlier a skin cancer is diagnosed the greater the chance of survival for the patient and the lower the cost of treatment.

***Figure 1: Key statistics for early and advanced staged melanoma diagnosis in New Zealand 2016***

| | Number of cases | 5 year Survival Rate* | Average Cost of Treatment** |
|---|---|---|---|
| Early Stage Melanoma | 2000 | 98% | $18,000 |
| Advanced Melanoma | 500 | 17% | $233,000 |
| All Melanoma | 2,500 | 81% | $61,000 |

*The five-year survival rate is the percentage of survivors five years after initial diagnosis
**Based on Australian and New Zealand figures

Melanoma rates are variable across demographics and factors such as gender, age and ethnicity will impact an individual's risk profile. Skin cancer is more prominent in males and mortality rates continue to be consistently higher in males than in females, as do registration rates. Male mortality rates in New Zealand have increased 13% in the last 15 years, while remaining stable in women. Additionally, 70% of melanoma cases occur in individuals aged 50 years or older, owing to greater risks of developing skin cancers later in life. A breakdown of melanoma incidences in New Zealand by demographic can be found in Appendix A.

## The New Zealand Government health strategy

In 2016, the Ministry of Health – the New Zealand Government's principal adviser on health and disability – released the ten-year national health strategy. It placed a strong emphasis on technological innovation and tele-health solutions. Tele-health is the provision of health advice where the medical professional and patient are not in the same room. This report demonstrated a commitment to increasing the effectiveness of the New Zealand health system with a goal to ensure that:

> "All New Zealanders live well, stay well, get well, in a system that is people-powered, provides services closer to home, is designed for value and high performance, and works as one team in a smart system"

The five strategic themes of the strategy:

- People powered: Promoting health literacy and empowering individuals to make their own informed healthcare choices, especially through the use of accessible technology such as mobile phones and the internet. This aims to involve consumers in all levels of the healthcare system, understanding the needs and goals of consumers at every level.
- Closer to home: Providing care closer to where people live, learn, work and play, especially for managing long-term conditions. This involves integrating health services and making better connections with wider public services, in addition to investing in health and wellbeing early in life and focusing on children, young people and families.
- Value and high performance: Delivering better outcomes relating to people's experience of care, health status and best-value use of resources. Success in this theme would involve a consistent, standardised and efficient delivery of healthcare to all New Zealanders.
- One team: Operating as a team in a high-trust system that works together with the people and their family at the center of care. A key component of this theme is true integration of services across the health sector and integration with other agencies to support improved health and wellbeing outcomes.
- Smart system: Taking advantage of opportunities offered by new and emerging technologies to improve both data and patient outcomes. New Zealanders will use patient portals regularly and effectively to access their health information and improve their interactions with their doctor and other health care providers.


***Figure 2: Five strategic themes of the 2016 New Zealand national health strategy***

## New Zealand Government initiatives against skin cancer

In recent years, there has been a shift in the New Zealand healthcare system from a focus on treatment to primary prevention. Despite this, skin cancer has been largely overlooked and limited government initiatives have been put in place.

To date, the New Zealand strategy against skin cancer has been largely focused on the early education of primary school children through the SunSmart "Slip, Slop, Slap and Wrap" campaign. This marketing effort encouraged children to wear protective clothing and sunscreen. In Australia, a review of the comprehensive SunSmart programme concluded that it would return $2.32 for every $1 invested over 20 years. It would also reduce the number of melanoma cases by 20,000 over that period and deliver $90 million in productivity gains each year. This demonstrates the legitimacy of prevention methods in strategies against skin cancer. Aside from the SunSmart programme, surprisingly there is little preventative action taken, given that skin cancer is one of New Zealand's most prolific cancers.

Non-government organisations (NGOs) are non-profit organisations formed to address local or national social issues and form a key pillar in the New Zealand strategy against skin cancer. They provide community support, public information and academic research to educate and promote awareness of skin cancer throughout the country. The primary players in New Zealand are:

- The New Zealand Cancer Society: The leading organisation dedicated to reducing the incidence of all cancers and ensuring the best cancer care for everyone in New Zealand. It primarily provides health promotion initiatives, cancer community support, information and research. The New Zealand Cancer Society raised $10 million in funds in 2016, the majority of which was received from community donations.
- Melnet: A network of professionals committed to reducing the incidence and impact of melanoma in New Zealand. It is actively involved in skin cancer research and provide clinical guides and health strategies to members. Melnet receives financial support from the Health Promotion Agency (HPA) – a government agency that leads and delivers national health programmes.
- Melanoma New Zealand: A charitable organisation that aims to prevent avoidable deaths from melanoma and provide support for New Zealanders affected. It uses celebrity brand ambassadors to promote the importance of skin health. In 2016, Melanoma New Zealand raised $475,000 in funding primarily through community donations and grants.

NGOs are dependent on volunteers and donations to operate. They often face pressure on resources and are limited in extent of influence. NGOs generally receive little to no government funding but play a critical role in advocacy and support of skin cancer in New Zealand.

# SkinVision overview

SkinVision is an awareness and tracking solution designed to empower individuals in the early recognition of skin cancer. Founded on the back of a PhD study in 2011 in Romania, the for-profit company applies mathematical algorithms to medical imaging through its SkinVision mobile application. The application allows users to easily monitor potentially suspicious skin lesions in a personal gallery. This has reinvented the way individuals track and understand skin health.

Its mission statement is to:

> "Empower customers to act on their skin health for the early recognition of skin cancer to save lives and reduce health costs"

With over 800,000 downloads worldwide and a database of over 2.5 million images of suspicious skin lesions, SkinVision's goal is to raise awareness of the importance of the early detection of skin cancer. This involves ensuring more people see their health professionals about concerning skin lesions and educating the public through targeted channels. It is the world's first consumer-focused skin cancer app that detects both melanoma and NMSC.

## History

SkinVision was founded in 2011 in Bucharest, Romania, based on a PhD study to apply the mathematical theory 'fractal geometry' to medical imaging. Fractal geometry simulates the natural growth of tissue and is widely used and documented in biology, applied here to detect early and potential signs of chaotic growth (skin cancer). Recognising the need to increase the business expertise within the company, in 2012 the company moved to Amsterdam, the Netherlands, where it has been based since. A strong start-up and business-minded culture makes Amsterdam the perfect hub for innovation and the continued development of companies. SkinVision receives funding primarily through venture capital sources by demonstrating high growth potential and an innovative technology.

## The SkinVision team

A small team of 12 dedicated individuals drive the company's operations, in addition to a panel of expert dermatologists and a scientific board. The scientific board was established in March 2016 to advise on the research roadmap of SkinVision. They aim to further the engagement of users for regular skin monitoring and increase the adoption of new technologies, like SkinVision, by health professionals as trusted tools within their practice.

### Professor Thomas Ruzicka

Professor Ruzicka has been Head of the Clinic for Dermatology in the Ludwig Maximilian University in Munich since 2006. Before 2006 he was the Head of the Dermatology Clinic of the University of Düsseldorf for many years. His medical focus is on research of and treatment for neurodermatitis, psoriasis, lichen ruber and other inflammatory skin diseases, acne as well as autoimmune diseases of the skin. Professor Ruzicka has more than 800 publications in peer reviewed journals.

### Professor Dedee Murrell

Professor Murrell is Head of the Department of Dermatology at St Georges Hospital at the University of New South Wales, in Sydney, Australia. She specialises in novel therapeutics for skin disorders. Professor Murrell was Executive Vice President of the International Society of Dermatology (2011-13) and a Board member of the Women's Dermatologic Society (2012-16). Her research interests include skin cancer, psoriasis, eczema, acne, blistering disorders, pemphigus, pemphigoid and epidermolysis bullosa.

### Associate Professor Chris Baum

Associated Professor Baum is an Assistant Professor in the Department of Dermatology at the Mayo Clinic in Rochester, Minnesota. He graduated from medical school at the University of Iowa. Following his residency at the University of Iowa Hospitals and Clinics, he received fellowship training in Mohs Surgery and Cutaneous Oncology at the University of Iowa Hospitals and Clinics under the direction of Christopher Arpey. He currently enjoys a practice that focuses on cutaneous oncology, reconstruction, and resident and fellow education. His research interests include melanoma, spindlecell tumors, and squamous cell carcinoma.

## Product descriptions

SkinVision offers two products:

- SkinVision: A mobile application for patients to profile, assess and monitor their skin health
- SkinVision Pro: An online platform for doctors to communicate and consult with patients

*Figure 3: SkinVision and SkinVision Pro interaction diagram*

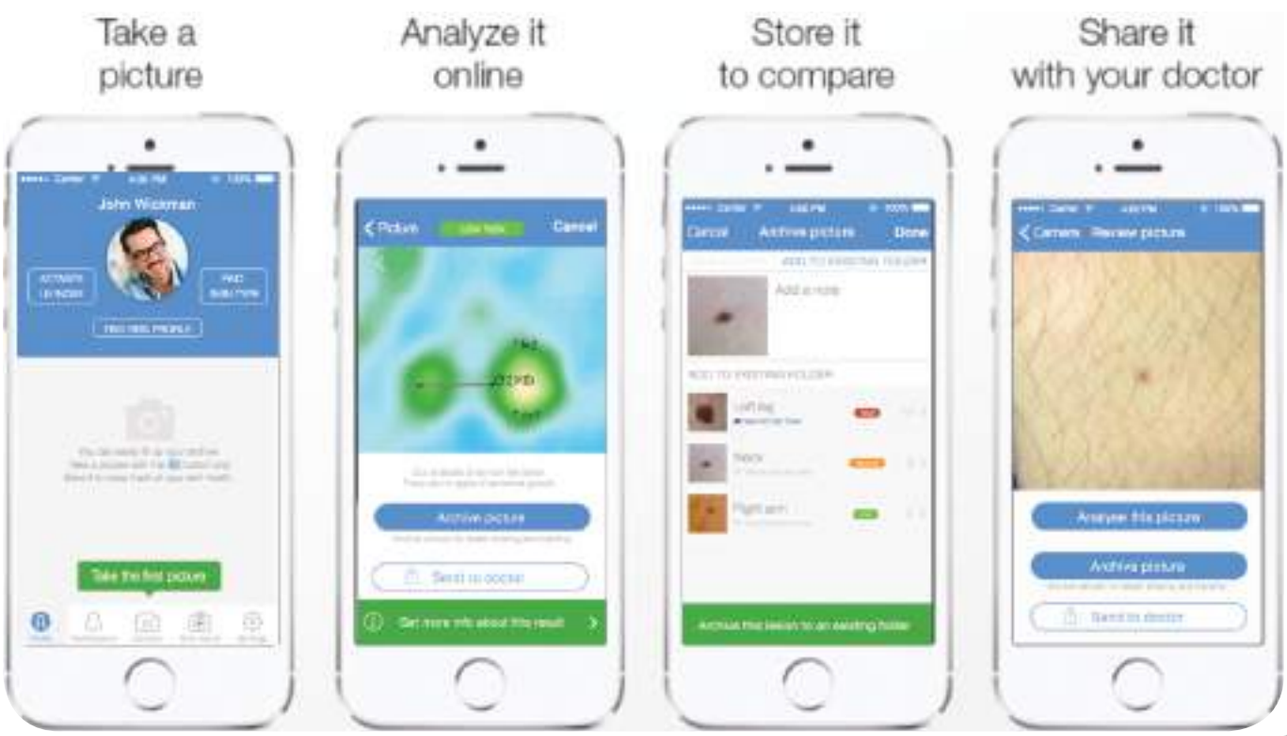

## SkinVision app

The SkinVision app is a free to download mobile application and is a certified medical device in New Zealand. It operates on a credit system and users can obtain credits through in-app purchases. These credits are exchanged for access to the many services provided by the application. One credit is equivalent to $2.50. Users are given a complimentary ten credits upon downloading the application.

The application has five main areas of functionality:

- Risk profiling: A user's risk of skin cancer is rated from low to high, based on factors such as geographic location, family history of skin cancer and skin colour. The user assesses their risk profile by completing a survey in the application.
- Online assessment tool: This employs the proprietary mathematical algorithm to assess the risk of specific skin lesions. It costs one credit to assess an image, or users can buy a subscription for unlimited usage of the assessment tool over a specific period of time.
- Image gallery: Users may upload images to a personal image gallery, allowing them to monitor suspicious skin lesions for changes over time.
- Expert review: Users can send images to be reviewed by SkinVision's team of skin cancer experts for $9.99 (or four credits). They will subsequently be sent their 'next steps', involving a recommendation to seek a doctor's opinion or to continue to track for changes.
- Find a doctor: Users can send images of concerning skin lesions to a doctor to seek professional advice for a fixed rate determined by the doctor who is connected through the SkinVision Pro platform. This typically costs a user $30-$70 depending on the service level guaranteed.

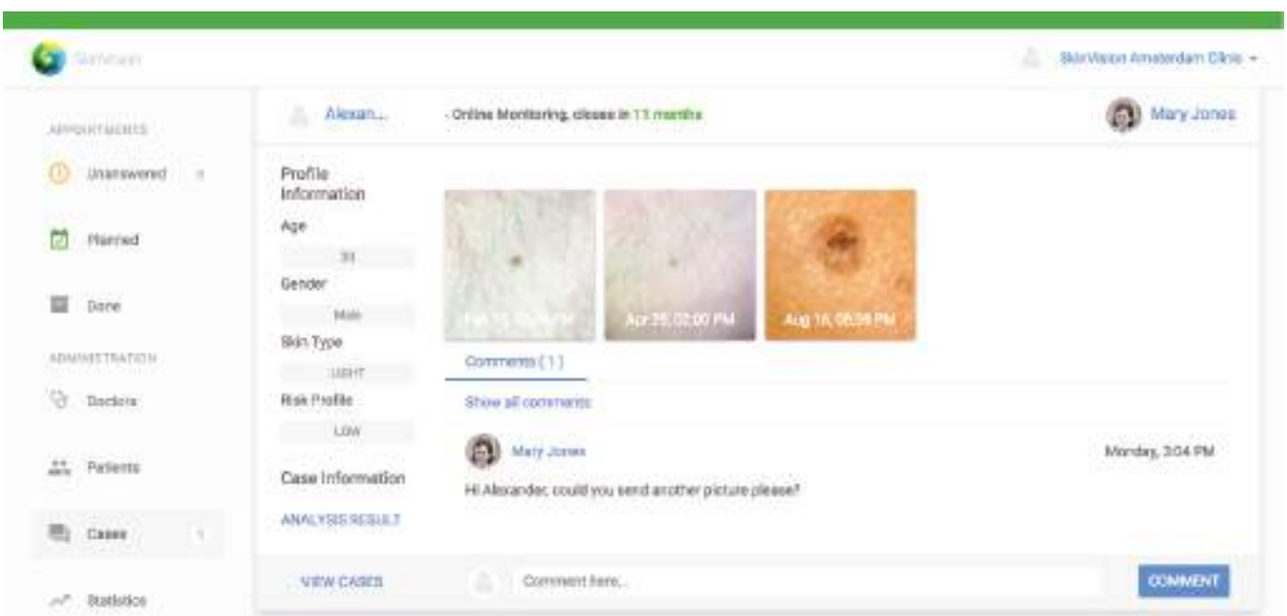
*Figure 4: SkinVision app user interface steps*



## SkinVision Pro

SkinVision Pro is an online platform that facilitates the connection and communication between skin specialists and their patients. Doctors can monitor the development of suspicious skin conditions by analysing pictures taken by patients with their smartphones through the SkinVision app. Additionally, doctors can communicate directly with their patient through the built-in messaging service that connects SkinVision to SkinVision Pro. The platform is currently only offered to skin specialists for an annual $150 subscription fee. These doctors set their own pricing for this online monitoring service to patients at a fixed rate.

***Figure 5: SkinVision Pro interface***



# Critical success factors

Essential to the success of both SkinVision and SkinVision Pro is the user's trust in the accuracy of the skin lesion imaging software. SkinVision relies on both scientific studies and user testimonials to facilitate this trust.

Scientific studies are a continuous commitment for SkinVision and the proprietary algorithm has been tested in two studies to date, with a third study commenced in November of 2016 due to be completed in early 2017. According to these, the current algorithm achieves an 88% accuracy rate in detecting skin cancer. This high level of accuracy can be attributed in part to the large database of suspicious skin lesion images for the algorithm to reference and learn from. This means that as SkinVision expands globally, the rate of accuracy of the self-learning algorithm continually increases. Of SkinVision's current database of over 2.5 million images, 60% were taken in 2016, 30% in 2015 and 10% in the years prior to 2015.

User testimonials are vital in communicating with the public and form a large part of the company's brand image. A user story can prompt a download or increase awareness of the prevalence and risks of skin cancer. SkinVision success stories show tangible benefits to using the application and follow typical user experiences. These typically involve promoting early detection and showcasing the significant health and cost benefits of using the application. Caroline's SkinVision story and other user and doctor testimonials can be found in Appendices B & C.

## Global strategy

SkinVision has placed a key strategic emphasis on growing and entrenching its technology within healthcare systems across the world. Although the application can be downloaded in 52 countries, the company is focusing resources on operations in New Zealand and the Netherlands. This is due to the relatively small populations that allow for ease of market penetration. These countries have effective healthcare systems, high GDP per capita, and are at-risk for skin cancers due to ancestral and environmental factors. A breakdown of the number of downloads of the SkinVision app by country and year can be found in Appendix D.

In 2017, SkinVision plans to enter the US market after success in New Zealand and the Netherlands. This move is governed by a high degree of strict Food and Drug Administration (FDA) regulation.

## New Zealand strategy

In March 2016, SkinVision entered the New Zealand market, following the example of companies such as Microsoft and Facebook. Historically, New Zealand has been a preferred choice for software firms, social networks and app developers to test products and services before further international expansion. Residents tend to be early adopters of technology and are open minded to international companies.

SkinVision's move was initially intended to leverage New Zealand's ideal testing environment to trial the viability of SkinVision as a healthcare technology. However, it has quickly become the company's largest source of revenue, earning 15% of all revenues. The mobile application has since been downloaded over 100,000 times by New Zealand users and 200,000 photos of suspicious skin lesions have been analysed by the software. Following this successful launch, SkinVision is now focusing on cementing its technology in the New Zealand healthcare system. It plans to achieve this through strategic insurance partnerships, the education and uptake of healthcare professionals, and raising awareness of skin cancer through press and media coverage.

# National partners

### Accuro Health Insurance

New Zealand spends approximately $59 million on the treatment costs of skin cancer annually which includes surgeries and hospitalisation. A further $74 million is spent on Keytruda - a drug used to treat advanced skin cancer. Through health insurance provider partnerships, SkinVision aims to aid the early detection and prevention of skin cancers. This will help lower the overall cost of skin cancer to the nation, in addition to reducing insurance pay outs.

A key partnership is with Accuro, a New Zealand health insurance not-for-profit for both corporate clients and individuals. It began in December 2016. This involved an integration of the SkinVision mobile application with the Accuro user wellness platform. The insurance company currently has 36,000 members and is highly responsive to changes in the New Zealand healthcare landscape.

SkinVision and Accuro's relationship operates under a reimbursement model. Accuro will compensate SkinVision for every cancerous lesion found. The relationship is built on confidence in the skin imaging algorithm's accuracy and a dedication to the early recognition of skin cancers. Accuro hopes to feature innovative new technology as part of its existing membership packages, providing the SkinVision app free to all members for one year.

### New Zealand Nurses Organisation (NZNO)

In New Zealand, nurses receive little to no skin cancer training. This results in nurses being hesitant to diagnose or recommend further skin cancer treatment. However, nurses have been identified as being well positioned to detect suspicious skin lesions, given their high levels of patient interaction. They are a major untapped touch point in the skin cancer patient journey. They are present in all stages of the New Zealand healthcare system, from primary care (the day to day healthcare that is often a patient's first point of contact with a healthcare system) to tertiary care (advanced healthcare involving surgeries and treatments provided by highly specialised medical practitioners).

The New Zealand Nurses Organisation (NZNO) is a nurse's union and represents over 46,000 nurses and health workers. SkinVision has aided in increasing New Zealand nurses' knowledge of skin cancer through SkinAcademy Pro – a free online web course series that NZNO members can sign up for. This course outlines basic information on the early detection of skin cancer, empowering nurses to help bring down the high rates of skin cancer in New Zealand. Additionally, for the summer of 2016/2017, NZNO nurses have been provided with free credits in the SkinVision app, to assist in detecting potentially cancerous skin lesions.

# The health and disability system in New Zealand

Healthcare is provided through a mix of public and private healthcare services. A relatively extensive and high-quality system of public hospitals and clinics provides publically funded medical care. It is managed and partially owned by district health boards (DHBs) – regional boards responsible for providing or funding the provision of health services in their district. DHBs are allocated funding from the New Zealand Government to be distributed within their district.

Treatments at public hospitals are fully covered by the New Zealand health and disability system. However, costly or difficult operations often involve long waiting lists unless the treatment is medically urgent. Due to this, a secondary market of private health insurance providers exists which fund operations and treatments for their members privately. Southern Cross Health Insurance, a not-for-profit provider, is the largest of these covering 80% of New Zealanders' health insurance. Private health insurance will typically cost an individual $300-$400 annually for basic cover and up to $2,000 for full coverage.

New Zealand healthcare is rarely litigious, due to an effective public healthcare system. Accidents are covered by the unique Accident Compensation Corporation (ACC), a government agency that provides comprehensive, no-fault personal injury cover to all New Zealand residents and visitors to New Zealand. ACC also raises revenue directly, through levies on employers which vary depending on the level of working environment risk.

Most tertiary level care is covered, at least partially, through government funding of health and disability services. Thus medical practitioners are more willing to trial new technologies and systems, without the risk of medical malpractice suits or lack of paying patients. Further information on the funding flows and service provision in New Zealand's health and disability system is provided in Appendix E.

In the last year, total expenditure in New Zealand on healthcare was $15.2 billion. The majority of healthcare is funded through general taxation via the Ministry of Health, followed by out of pocket payments and private health insurance claims. General taxation and employer levies are used to fund the HPA, ACC and DHBs, and subsequently fund much of the public system. Private insurance and out of pocket payments, in addition to private donations, fund the majority of private healthcare in New Zealand. See Appendix F & G for a breakdown of New Zealand's healthcare funding sources and expenditure.

## Skin cancer healthcare landscape in New Zealand


***Figure 6:***
***Breakdown of the skin cancer healthcare landscape in New Zealand***

### General practitioners

A general practitioner (GP) is often the first touch point for skin cancer concerns, with families staying loyal to the same clinic for years. A GP sees many patients a day in short 15-minute appointments. This short time frame means suspicious skin lesions are often overlooked and can lead to skin cancer diagnosis occurring at more advanced stages. Because they are less specialised and typically receive less funding, GPs have a slower uptake of new technologies and are more resistant to industry change.

A typical patient visit is funded both publically by the New Zealand Government and privately by the patient. GPs will usually refer their patients to the nearest dermatologist following the identification of a suspicious skin lesion. However, due to the shortage of dermatologists available through the public systems, GPs often remove lesions for biopsy before accelerating treatment. These surgeries typically cost a patient $100 and are covered by most private insurance schemes.

### General practitioners with a special interest

A general practitioner with a special interest (GPSI) in skin cancer is a more specialised GP with additional training in identifying and treating skin cancer. These doctors tend to be more willing to trial and use new technologies, with greater concern for the skin health of their patients. GPSIs provide primary level care and compared to GPs, their patients are typically wealthier and have a greater awareness for skin health. Depending on demand in the region, they either start their own practice, work between multiple clinics as an independent or work for a single clinic. GPSIs are interested in increasing awareness of skin cancer and encourage regular skin checks for New Zealanders. As a result of their additional training, they have higher accuracy rates of skin cancer detection than GPs do.

### Dermatologists

A dermatologist is a medical expert in the diseases of the skin, hair and nails. They undergo a further four years of intensive study to gain their title. Due to the high rates of the disease, most dermatologists in New Zealand deal mainly with skin cancer. These doctors tend to be older, aged 51 on average in New Zealand, and tend to have conservative stances on innovation. Consultations are not covered by the public health system and thus private insurance and out-of-pocket payments are their main sources of revenue.

***Figure 7: Key differences in skin cancer medical practitioners***

| | GP | GPSI | Dermatologists |
|---|---|---|---|
| Number of Doctors | 4000 | N/A** | 61 |
| Cost of Visit* | $35-55 | $150 | $250-300 |
| Technology Adoption Rate | Low | High | Medium |
| Accuracy of melanoma detection | 50-70% | Between accuracy of GPs and Dermatologists** | 68-92% |

* A 15 minute appointment that does not involve treatment or surgery
** GPSIs are not registered and any GP can claim to be a GPSI, resulting in missing data surrounding GPSIs

# Problems New Zealand faces in treating and preventing skin cancer

## Unsustainable health expenditure

New Zealand is experiencing a period of population ageing. This has led to the median age of a New Zealander rising to 38 years in 2013, compared with 35.9 years in 2006. This has caused a significant increase in health expenditure owing to greater demand for aged care services and growing pressure on public healthcare. New Zealand's publicly funded spending on healthcare had more than doubled as a share of GDP over the past 60 years.

If no reform is made, healthcare expenditure is expected to rise from 9.74% of GDP in 2013 to 11% in 2060. This trend of increasing healthcare expenditure has prompted the New Zealand Government to seek alternatives and efficiencies in the system, currently focusing on technology solutions to reduce costs.

## Rural healthcare access in New Zealand

In rural regions, more primary healthcare is provided through mobile services and skin cancer risk rates can be higher due to a predominately outdoor lifestyle. Currently 14% of the New Zealand population live in rural areas, characterised as such by their limited access to on-demand healthcare. Rural New Zealanders can live hours away from the nearest doctor and as a result tend to visit a health practitioner less frequently and at greater cost than their urban counterparts. This discourages regular preventative skin checks, especially given the rural Kiwi "she'll be right" attitude.

Rural medical facilities are often understaffed and overworked, providing an incentive to reduce the number of patients. These factors have seen the rise of tele-dermatology. This is where skin lesion consultations occur through digital means and patients benefit through greater accessibility to primary care and reduced costs. This generally means that the patient or professional takes images which are then electronically sent to a specialist for later review. Tele-dermatology has the potential to provide rural patients with faster access to dermatologists with earlier diagnosis and treatment. For more information, see Appendices H, I and J.

## The inaccuracy of general practitioners

GPs will often diagnose suspicious skin lesions inaccurately due to inadequate training and little ongoing skin cancer educational support. In medical school, GPs will receive approximately two hours of skin cancer training with little emphasis on the subject in their continued education. However, given their awareness of the high rates of skin cancer in New Zealand, and to err on the side of caution, they will often remove lesions that may not require action. Studies have shown this lack of training and cautious attitude often results in more surgeries than necessary.

Although GPs have a low skin cancer detection accuracy, they provide over 85% of dermatological consultations. This is due to both a shortage in dermatologists and the fact that secondary and tertiary care in the public skin cancer system requires a referral by a GP or an equivalent medical practitioner.

## The shortage of dermatologists

There exists a very significant undersupply of dermatologists in New Zealand. There are only 16 full-time equivalent (FTE) dermatologists working in the public system, mainly in regional public hospitals. In both public and private healthcare, dermatologists are overworked and unable to meet the demand for skin cancer consultation and treatment. New Zealand has 61 registered dermatologists in total with a dermatologist to patient ratio of 1FTE:74,000, while the ideal ratio is 1FTE:50,000. Thus an access gap exists in which patients with skin cancer often do not have timely access to an appropriate specialist.

# Competitors

## MoleMap

MoleMap is an online platform that connects patients to skin cancer imaging experts. A patient goes for a consultation and a nurse takes full body images. These images are sent to a dermatologist to review remotely. There is no app or algorithm involved. The service costs $130 for analysis of three lesions of concern by a dermatologist remotely, or $379 for a full body check.

MoleMap is a popular option in New Zealand, providing monitoring of suspicious skin lesions and additional skin care education services. Given the cost, this service generally targets the "worried well" – more affluent individuals who can afford the significant cost at annual intervals. Since 1997, MoleMap has seen over 250,000 patients and has assessed over 5 million skin lesions through 50 clinics across New Zealand, Australia and United States.

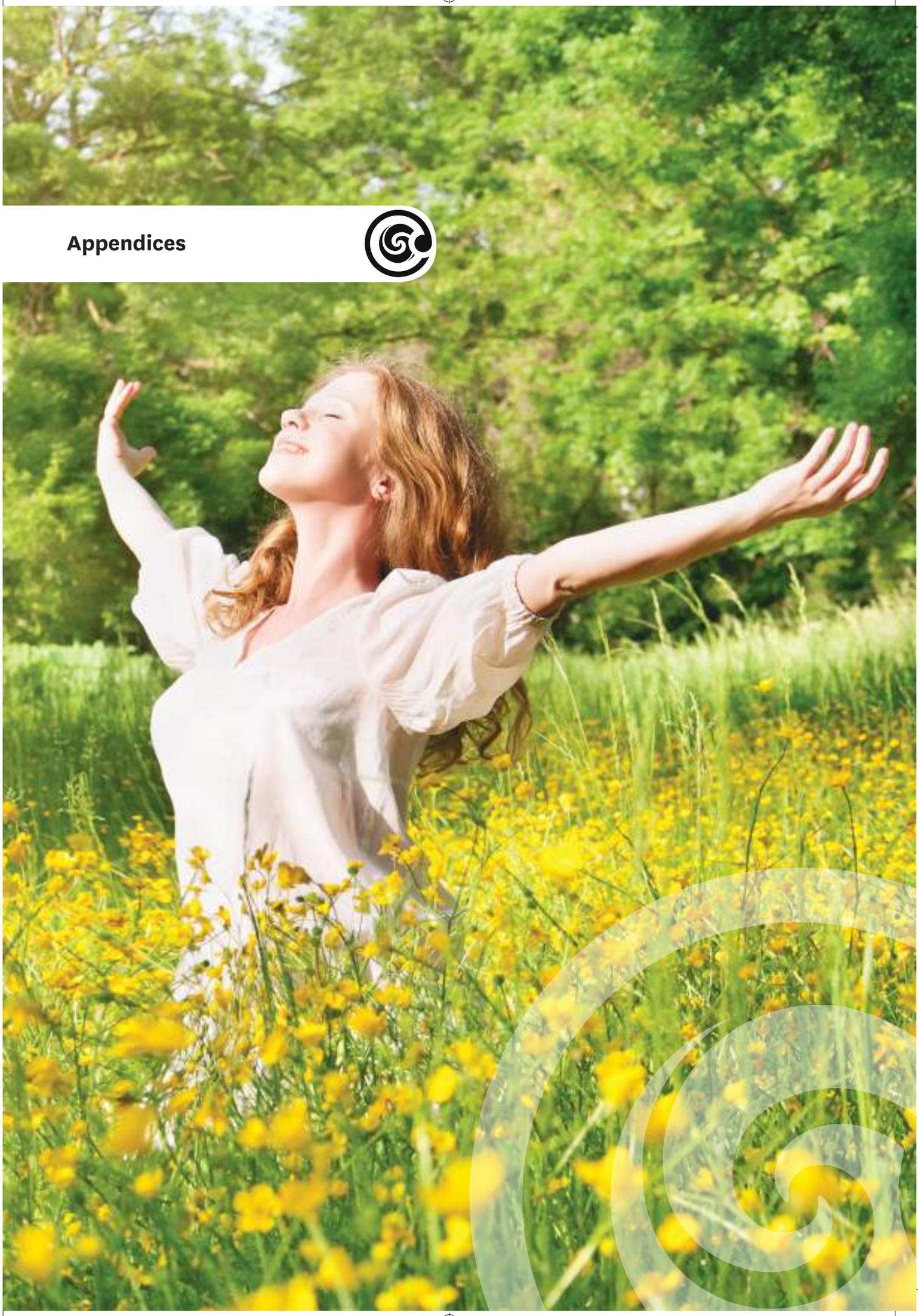
## FirstCheck

Tele-dermatology is a growing initiative among skin cancer specialists, recognising the need for efficient and easily accessible healthcare services. Tele-dermatology services act to provide medical examinations remotely to a wider population. FirstCheck provides online dermatological consultations for $19.95 through a free to download mobile application. Users can send images of suspicious skin lesions to specialists, replacing a trip to the doctor. FirstCheck differs from SkinVision in that there is no initial profiling of skin lesions using medical imaging algorithms, nor are there in-built risk awareness tools.

## IBM Watson

IBM Watson is a big data player, catering to the data analytics needs of all healthcare professionals, researchers and corporates. Its technology provides knowledge to help clinicians take better care of their patients, government programme leaders care for their clients, and consumers take better care of themselves by extracting information from data. With services across a range of sectors including supply chain, education and healthcare, IBM Watson is one of the largest players in the big data industry, with revenues of $4.7 billion in the second quarter of 2016.

# Appendices



# Appendix A: Melanoma incidences in New Zealand by demographic

**Number of melanoma registrations for males by year of registration, ethnic group and age group at registration**

| | | Age group (years) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Ethnic group | 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | 50–54 | 55–59 | 60–64 | 65–69 | 70–74 | 75–79 | 80–84 | 85+ | Total |
| 2013 | | | | | | | | | | | | | | | | | | | | |
| | All | 0 | 0 | 0 | 3 | 5 | 9 | 17 | 26 | 32 | 73 | 106 | 107 | 161 | 155 | 176 | 124 | 120 | 112 | 1226 |
| | Māori | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 | 1 | 2 | 1 | 0 | 2 | 0 | 16 |
| | Non-Māori | 0 | 0 | 0 | 2 | 5 | 9 | 17 | 26 | 32 | 73 | 101 | 103 | 160 | 153 | 175 | 124 | 118 | 112 | 1210 |
| 2014 | | | | | | | | | | | | | | | | | | | | |
| | All | 0 | 0 | 2 | 2 | 8 | 7 | 10 | 31 | 31 | 66 | 97 | 117 | 162 | 191 | 175 | 143 | 118 | 93 | 1253 |
| | Māori | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 2 | 2 | 1 | 0 | 1 | 12 |
| | Non-Māori | 0 | 0 | 2 | 2 | 8 | 7 | 9 | 30 | 30 | 65 | 96 | 116 | 162 | 189 | 173 | 142 | 118 | 92 | 1241 |
| 2015 | | | | | | | | | | | | | | | | | | | | |
| | All | 0 | 0 | 1 | 2 | 9 | 11 | 10 | 20 | 44 | 60 | 99 | 120 | 146 | 192 | 203 | 154 | 160 | 122 | 1353 |
| | Māori | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 4 | 0 | 1 | 4 | 1 | 3 | 0 | 16 |
| | Non-Māori | 0 | 0 | 1 | 2 | 9 | 11 | 9 | 20 | 44 | 59 | 98 | 116 | 146 | 191 | 199 | 153 | 157 | 122 | 1337 |

**Number of melanoma registrations for females by year of registration, ethnic group and age group at registration**

| | | Age group (years) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Ethnic group | 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | 50–54 | 55–59 | 60–64 | 65–69 | 70–74 | 75–79 | 80–84 | 85+ | Total |
| 2013 | | | | | | | | | | | | | | | | | | | | |
| | All | 0 | 0 | 0 | 4 | 9 | 21 | 32 | 64 | 82 | 71 | 123 | 96 | 140 | 113 | 113 | 101 | 86 | 85 | 1140 |
| | Māori | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 4 | 2 | 1 | 3 | 6 | 0 | 3 | 0 | 0 | 0 | 26 |
| | Non-Māori | 0 | 0 | 0 | 4 | 9 | 21 | 29 | 60 | 78 | 69 | 122 | 93 | 134 | 113 | 110 | 101 | 86 | 85 | 1114 |
| 2014 | | | | | | | | | | | | | | | | | | | | |
| | All | 0 | 1 | 0 | 0 | 9 | 13 | 31 | 27 | 71 | 74 | 91 | 119 | 126 | 119 | 116 | 84 | 70 | 89 | 1040 |
| | Māori | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 0 | 1 | 16 |
| | Non-Māori | 0 | 1 | 0 | 0 | 8 | 13 | 30 | 27 | 69 | 72 | 90 | 117 | 125 | 117 | 115 | 82 | 70 | 88 | 1024 |
| 2015 | | | | | | | | | | | | | | | | | | | | |
| | All | 0 | 0 | 0 | 2 | 4 | 15 | 23 | 35 | 53 | 79 | 95 | 142 | 96 | 133 | 128 | 98 | 75 | 84 | 1062 |
| | Māori | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 1 | 2 | 4 | 2 | 1 | 2 | 2 | 1 | 1 | 0 | 20 |
| | Non-Māori | 0 | 0 | 0 | 0 | 4 | 15 | 22 | 34 | 52 | 77 | 91 | 140 | 95 | 131 | 126 | 97 | 74 | 84 | 1042 |

Source: Ministry of Health. 2016. Selected Cancers 2013, 2014 & 2015 (Provisional). Wellington: Ministry of Health.

# Appendix B: Caroline's story

Caroline Salmon says the SkinVision app saved her life. The Cambridgeshire 49-year-old, who is mum to Beatrice, 18, and William, 16, says:

"I have always had fair skin but love being in the outdoors. Then in 2015, I noticed that what seemed to be an innocent freckle on my right leg, had begun to subtly change size and shape. Having worked as a health care professional for most of my life, I had seen many pictures of what to look out for with regard to melanomas.

"Then I came across the SkinVision app on Facebook. After taking a photograph and analysing the freckle I saw the reply was "High risk". As soon as possible, I made an appointment to see my GP who told me that I was the third person to use the app.

"Pretty quickly, I was sent off to the hospital at Addenbrookes Cambridge Hospital, to have the freckle removed. After 2 weeks of recovery I was desperate to know if the freckle was a melanoma. Four weeks later I received my results over the phone - I did have a melanoma.

"My leg is healing nicely now, but if it hadn't been for SkinVision then I would never have thought twice about that freckle. I'm grateful the app gave me the push I needed to see my GP."

Source: First certified app to tackle skin cancer in the UK. (2016, August 22). Dakota Digital.

# Appendix C: User and doctor testimonials

"I had a mole removed last week and got the results today. It was a melanoma and some skin was removed so no further action required. Thank you for making available this amazingly accurate app."

Theresa, Queensland

"I had a suspect spot removed ten days ago thanks to your app and it came back as a basal cell carcinoma which would have gone undetected if it had not been for your app, so thank you again."

Donna, Emmaville

"The doctor looked at the lesion and took a biopsy which he thought was a haemangioma. But your app was pretty accurate, it turned out to be a basal cell skin cancer and I have to get it cut out."

Heather, Sydney

"I have patients communicating with me through email, WhatsApp and SMS - with the risk of missing messages. SkinVision Pro is a solid platform for simple and secure communication with my patients through medical grade photos. It's easier and safer for both me and my patients. I work with it every day."

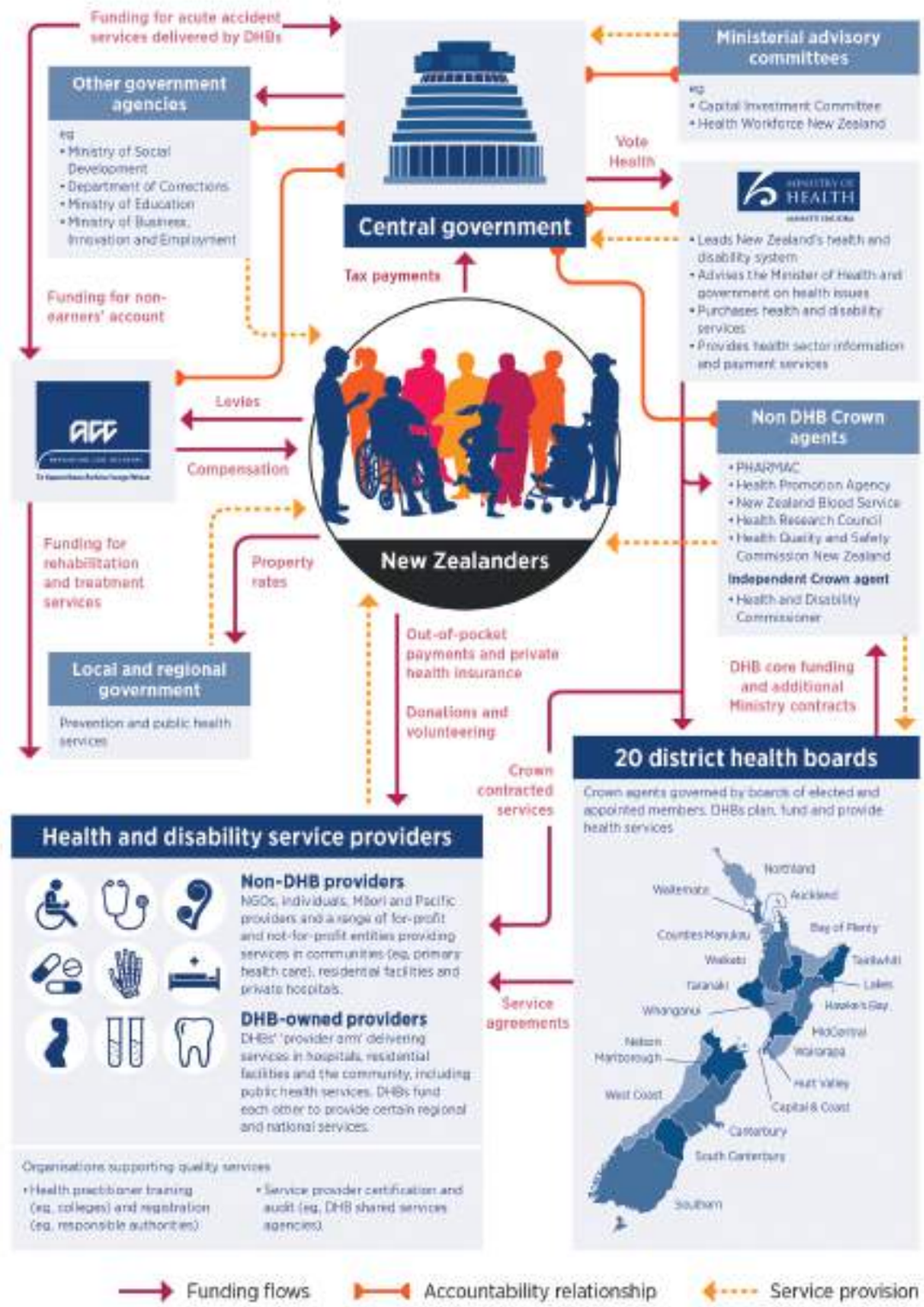
Kostas Koutsioukis
Dermashape, Member of the American Academy of Dermatology (AAD)

# Appendix D: Number of SkinVision app downloads by country and year

| Downloads | 2011-2015 | 2015 | 2016 |
|---|---|---|---|
| NZ | 0 | 0 | 100,000+ |
| Australia | 0 | 10,000+ | 90,000+ |
| Netherlands | 10,000+ | 30,000+ | 60,000+ |
| UK | 5000+ | 25,000+ | 45,000+ |
| Other | <65,000 | <175,000 | <185,000 |
| Total | 80,000 | 240,000 | 480,000 |

# Appendix E: Funding flows and services in the New Zealand health and disability system

**Overview of the New Zealand health and disability system**



# Appendix F: New Zealand healthcare expenditure funding 1999/00–2009/10

| Sources of funds | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ($000) % of total | ($000) % of total | ($000) % of total | ($000) % of total | ($000) % of total | ($000) % of total | ($000) % of total | ($000) % of total | ($000) % of total | ($000) % of total | ($000) % of total |
| Ministry of Health | 6,543,778 69.5% | 6,952,914 66.9% | 7,418,078 66.3% | 7,773,876 66.3% | 8,507,429 69.7% | 9,361,675 69.4% | 10,302,689 69.3% | 10,958,724 70.5% | 12,123,747 70.6% | 13,275,453 70.9% | 14,403,918 2.5% |
| Deficit financing | 6,413 0.1% | 76,837 0.7% | 244,125 2.2% | 216,337 1.8% | - - | - - | - - | - - | - - | - - | - - |
| ACC – social security | 581,078 6.2% | 709,561 6.8% | 801,330 7.2% | 924,253 7.9% | 945,608 7.7% | 1,095,557 8.1% | 1,260,278 8.5% | 1,436,042 9.2% | 1,634,796 9.5% | 1,820,216 9.7% | 1,669,838 8.4% |
| Other government agencies | 250,230 2.7% | 282,226 2.7% | 302,011 2.7% | 313,386 2.7% | 208,084 1.7% | 221,730 1.6% | 251,667 1.7% | 309,954 2.0% | 379,049 2.2% | 398,489 2.1% | 395,346 2.0% |
| Local authorities | 60,374 0.6% | 64,243 0.6% | 68,381 0.6% | 73,792 0.6% | 63,242 0.5% | 61,882 0.5% | 82,371 0.6% | 106,072 0.7% | 92,672 0.5% | 55,923 0.3% | 67,238 0.3% |
| Public total | 7,441,873 79.1% | 8,085,781 77.9% | 8,833,925 78.9% | 9,301,644 79.4% | 9,724,363 79.6% | 10,740,844 79.7% | 11,897,005 80.1% | 12,810,792 82.4% | 14,230,264 82.8% | 15,550,082 83.0% | 16,536,341 83.2% |
| Out-of-pocket | 1,375,165 14.6% | 1,656,853 16.0% | 1,714,843 15.3% | 1,740,565 14.9% | 1,722,649 14.1% | 1,896,704 14.1% | 2,056,173 13.8% | 1,780,830 11.5% | 1,930,708 11.2% | 1,990,059 10.6% | 2,086,476 10.5% |
| Health insurance | 560,857 6.0% | 610,198 5.9% | 612,315 5.5% | 640,632 5.5% | 671,638 5.5% | 695,686 5.2% | 762,074 5.1% | 793,949 5.1% | 863,063 5.0% | 929,720 5.0% | 974,938 4.9% |
| Not-for-profit organisations | 31,952 0.3% | 32,943 0.3% | 33,355 0.3% | 36,591 0.3% | 92,911 0.8% | 147,111 1.1% | 143,169 1.0% | 162,506 1.0% | 153,263 0.9% | 259,629 1.4% | 272,642 1.4% |
| Private total | 1,967,974 20.9% | 2,299,994 22.1% | 2,360,513 21.1% | 2,417,788 20.6% | 2,487,198 20.4% | 2,739,501 20.3% | 2,961,416 19.9% | 2,737,285 17.6% | 2,947,034 17.2% | 3,179,408 17.0% | 3,334,056 16.8% |
| Total from all sources | 9,409,847 100.0% | 10,385,775 100.0% | 11,194,438 100.0% | 11,719,432 100.0% | 12,211,561 100.0% | 13,480,346 100.0% | 14,858,422 100.0% | 15,548,077 100.0% | 17,177,299 100.0% | 18,729,490 100.0% | 19,870,398 100.0% |
| % of GDP | 8.1% | 8.3% | 8.6% | 8.4% | 8.1% | 8.6% | 9.0% | 8.8% | 9.4% | 10.1% | 10.5% |

Source: Ministry of Health. 2012. Health Expenditure Trends in New Zealand 2000–2010. Wellington: Ministry of Health.
Values are represented in nominal dollars (actual dollars spent) and are GST inclusive. Totals may be affected by rounding.

# Appendix G: Healthcare expenditure breakdown in New Zealand 2009/10

| | Funding source | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Function | Total public (breakdown to the right) | Ministry of Health | Other central government | Regional and local government | Social security funds | Total private (breakdown to the right) | Private insurance | Private household out-of-pocket payments | Non-profit institutions (other than social insurance) | Totals |
| Health care services and goods by function | | | | | | | | | | |
| Services of curative and rehabilitative care | 9,460,137 | 8,342,089 | 73,529 | – | 1,044,519 | 2,102,414 | 774,108 | 1,292,300 | 36,006 | 11,562,551 |
| Services of long-term nursing care | 2,670,273 | 2,649,229 | 21,044 | – | – | 222,279 | 35,535 | 109,476 | 77,268 | 2,892,552 |
| Ancillary services to health care | 844,166 | 617,655 | 4,433 | – | 222,078 | 186,130 | 64,052 | 43,900 | 78,178 | 1,030,296 |
| Medical goods dispensed to outpatients | 1,511,904 | 1,376,390 | 18,910 | – | 116,604 | 697,002 | 51,308 | 640,800 | 4,894 | 2,208,906 |
| Pharmaceuticals and other medical non-durables | 1,236,884 | 1,229,983 | 2,224 | – | 4,677 | 639,733 | 40,803 | 598,930 | – | 1,876,617 |
| Therapeutic appliances and other medical durables | 275,021 | 146,407 | 16,686 | – | 111,928 | 57,268 | 10,504 | 41,870 | 4,894 | 332,289 |
| Personal medical services and goods | 14,486,480 | 12,985,363 | 117,916 | – | 1,383,201 | 3,207,825 | 925,003 | 2,086,476 | 196,346 | 17,694,305 |
| Prevention and public health services | 1,324,921 | 934,905 | 266,764 | 67,238 | 56,014 | 62,982 | – | – | 62,982 | 1,387,903 |
| Health administration and health insurance | 724,941 | 483,651 | 10,667 | – | 230,623 | 63,250 | 49,935 | – | 13,315 | 788,191 |
| Total current expenditure on health | 16,536,342 | 14,403,919 | 395,347 | 67,238 | 1,669,838 | 3,334,057 | 974,938 | 2,086,476 | 272,643 | 19,870,399 |
| Gross capital formation | – | – | – | – | – | – | – | – | – | – |
| Total expenditure on health | 16,536,342 | 14,403,919 | 395,347 | 67,238 | 1,669,838 | 3,334,057 | 974,938 | 2,086,476 | 272,643 | 19,870,399 |
| Memorandum items: further health-related functions | | | | | | | | | | – |
| Education and training of health personnel | 456,365 | 166,202 | 290,163 | – | – | 291,202 | – | 290,162 | 1,040 | 747,567 |
| Research and development in health | 225,321 | 124 | 225,197 | – | – | 30,154 | – | – | 30,154 | 255,475 |
| Food, hygiene and drinking water control | 368,171 | – | 100,333 | 267,838 | – | – | – | – | – | 368,171 |
| Environmental health | 1,444,295 | – | 20,819 | 1,423,476 | – | – | – | – | – | 1,444,295 |
| Administration and provision of social services in kind to assist living with disease and impairment | 119,148 | – | 27,739 | – | 91,409 | 61,905 | – | – | 61,905 | 181,053 |
| Administration and provision of health-related cash benefits | – | – | – | – | – | – | – | – | – | – |
| Total health-related expenditure | 2,613,300 | 166,326 | 664,251 | 1,691,314 | 91,409 | 383,261 | – | 290,162 | 93,099 | 2,996,561 |
| Total health and health-related expenditure | 19,149,642 | 14,570,245 | 1,059,598 | 1,758,552 | 1,761,247 | 3,717,318 | 974,938 | 2,376,638 | 365,742 | 22,866,960 |

Source: Ministry of Health. 2012. Health Expenditure Trends in New Zealand 2000–2010. Wellington: Ministry of Health.
Values are represented in nominal dollars (actual dollars spent) and are GST inclusive. Totals may be affected by rounding.

# Appendix H: Rural and urban population distribution in New Zealand changes

| Usual Resident Population and Population Change, Urban/rural areas, 1996 and 2006 Censuses | | | | |
|---|---|---|---|---|
| Area* | Population at census year | | Population change 5 yearly | |
| | 1996 | 2006 | 1991-1996 | 2001-2006 |
| Main urban | 2,540,661 | 2,892,810 | 191,238 | 237,750 |
| Satellite urban | 112,845 | 128,094 | 6,744 | 10,485 |
| Independent urban | 438,147 | 442,257 | 9,006 | 10,644 |
| Rural with high urban influence | 98,760 | 124,251 | 15,423 | 15,297 |
| Rural with moderate urban influence | 139,314 | 154,965 | 11,361 | 11,469 |
| Rural with low urban influence | 217,011 | 220,470 | 8,301 | 6,258 |
| Highly rural/remote | 69,786 | 64,179 | 1,263 | -948 |
| Area outside urban/rural | 1,779 | 915 | 1,035 | -288 |
| New Zealand Total | 3,618,303 | 4,027,947 | 244,377 | 290,670 |

Source: Statistics New Zealand (nd). Population. In Population mobility of urban/rural profile areas. Retrieved from www.stats.govt.nz.

*Definitions provided below:

**Main urban area**

Main urban areas are very large and centred on a city or main urban centre. They have a minimum population of 30,000. This is the same as the standard 2001 pattern for main urban centres and includes: Whangarei, Auckland, Hamilton, Tauranga, Rotorua, Gisborne, Napier-Hastings, New Plymouth, Wanganui, Palmerston North, Kapiti, Wellington, Nelson, Christchurch, Dunedin and Invercargill.

**Satellite urban community**

This category identifies towns and settlements with strong links to main urban centres. This connection is through employment location. Satellite urban communities are defined as urban areas (other than main urban areas) where 20 percent or more of the usually resident employed population's workplace address is in a main urban area.

**Independent urban community**

This category identifies towns and settlements without significant dependence on main urban centres. Again, employment location is the defining variable. Independent urban communities are urban areas (other than main urban areas) where less than 20 percent of the usually resident employed population's workplace address is in a main urban area.

**Rural area with high urban influence**

This category identifies rural areas that form a transition between the main urban areas and rural areas, although meshblocks are not necessarily contiguous with main urban centres. The index allows for a meshblock to be included in this category only if a significant proportion of the resident employed population work in a main urban area.

**Rural area with moderate urban influence**

This category identifies rural areas with a significant, but not exclusively, main urban area influence. A meshblock can be included in this category: (1) if a large percentage of the resident employed population works in a minor or secondary urban area, or (2) if a significant percentage work in a main urban area. However, if the percentage working in a main urban area is too substantial, the meshblock will be included in the high urban influence category.

**Rural area with low urban influence**

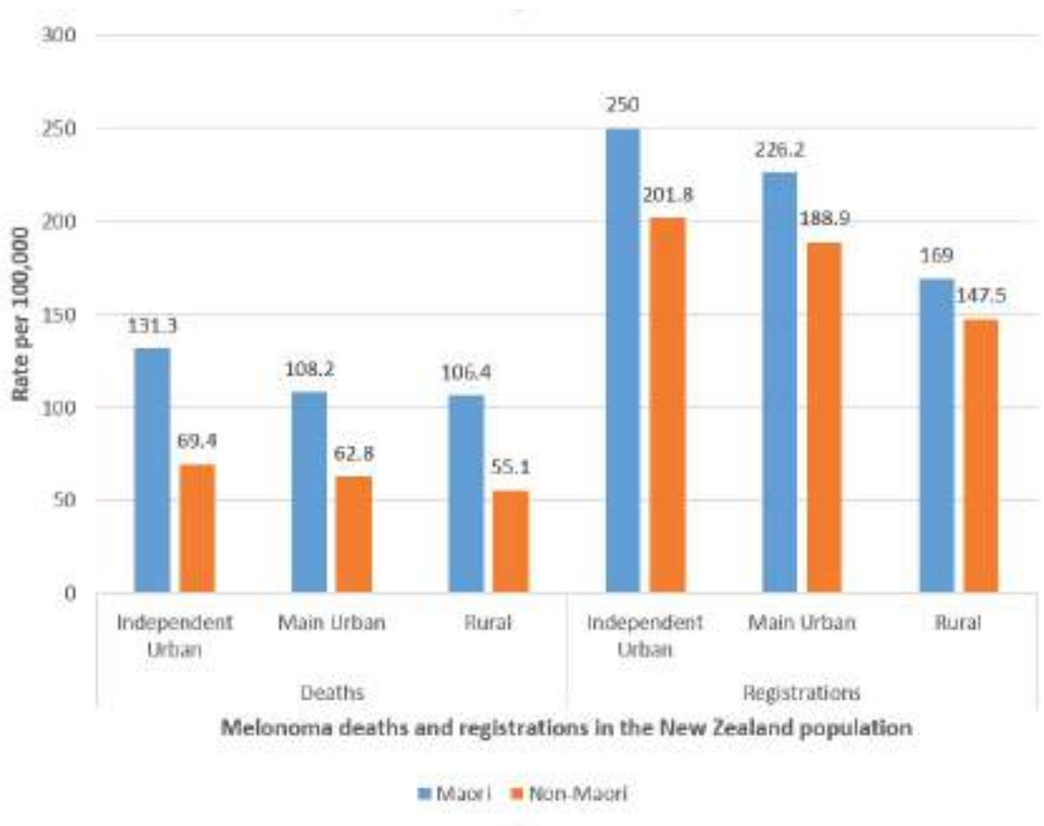
This category identifies rural areas with a strong rural focus. The majority of the population in these areas works in a rural area. Due to the impact of the weighting system, it is unlikely meshblocks in this category will have many people employed in a main urban area, although a number may work in a minor urban area.

**Highly rural/remote area**

These are rural areas where there is minimal dependence on urban areas in terms of employment, or where there is a very small employed population.

# Appendix I: Cancer (all types) registrations and deaths by rural–urban status, 2002–2006*

Source: Robson B, Purdie G, Cormack, D. 2010. Unequal Impact II: Māori and Non-Māori Cancer Statistics by Deprivation and Rural–Urban Status, 2002–2006. Wellington: Ministry of Health.

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**Independent urban community**

This category identifies towns and settlements without significant dependence on main urban centres. Employment location is the defining variable. Independent urban communities are urban areas (other than main urban areas) where less than 20 percent of the usually resident employed population's workplace address is in a main urban area.

**Rural includes the following categories:**

**Rural area with high urban influence**

This category identifies rural areas that form a transition between the main urban areas and rural areas, although meshblocks are not necessarily contiguous with main urban centres. The index allows for a meshblock to be included in this category only if a significant proportion of the resident employed population work in a main urban area.

**Rural area with moderate urban influence**

This category identifies rural areas with a significant, but not exclusively, main urban area influence. A meshblock can be included in this category: (1) if a large percentage of the resident employed population works in a minor or secondary urban area, or (2) if a significant percentage work in a main urban area. However, if the percentage working in a main urban area is too substantial, the meshblock will be included in the high urban influence category.

**Rural area with low urban influence**

This category identifies rural areas with a strong rural focus. The majority of the population in these areas works in a rural area. Due to the impact of the weighting system, it is unlikely meshblocks in this category will have many people employed in a main urban area, although a number may work in a minor urban area.

**Highly rural/remote area**

These are rural areas where there is minimal dependence on urban areas in terms of employment, or where there is a very small employed population.

# Appendix J: Technology uptake numbers in rural and urban households in New Zealand 2006

| Urban/rural profile area** | Telecommunication systems in Households in New Zealand | | | | | |
|---|---|---|---|---|---|---|
| | No access to telecommunication systems | Cellphone/mobile | Access to a telephone | Access to a fax machine | Access to the internet | Total houses surveyed* |
| Main urban area | 17,781 | 741,567 | 911,799 | 236,343 | 617,004 | 986,130 |
| Satellite urban area | 1,137 | 33,342 | 41,388 | 10,560 | 24,594 | 46,212 |
| Independent urban area | 4,623 | 117,789 | 147,381 | 36,201 | 83,001 | 166,749 |
| Rural area with high urban influence | 621 | 32,457 | 39,069 | 16,833 | 29,085 | 41,805 |
| Rural area with moderate urban influence | 1,092 | 40,662 | 48,954 | 20,835 | 33,393 | 53,385 |
| Rural area with low urban influence | 2,232 | 54,675 | 68,826 | 31,503 | 44,511 | 76,887 |
| Highly rural/remote area | 906 | 13,776 | 19,842 | 9,732 | 12,045 | 22,248 |
| Area outside urban/rural profile | 15 | 264 | 66 | 30 | 102 | 291 |
| Total New Zealand | 28,407 | 1,034,529 | 1,277,325 | 362,040 | 843,735 | 1,393,707 |

Source: Statistics New Zealand (2006). New Zealand: An Urban/Rural Profile Update: Social Conditions [Data file].

* Households reporting more than one means of access to telecommunication devices have been counted in each stated category. Therefore, the total number of responses in the table will be greater than the total number of households.

**Definitions provided below:

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Main urban areas are very large and centred on a city or main urban centre. They have a minimum population of 30,000. This is the same as the standard 2001 pattern for main urban centres and includes: Whangarei, Auckland, Hamilton, Tauranga, Rotorua, Gisborne, Napier-Hastings, New Plymouth, Wanganui, Palmerston North, Kapiti, Wellington, Nelson, Christchurch, Dunedin and Invercargill.

**Satellite urban community**

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**Independent urban community**

This category identifies towns and settlements without significant dependence on main urban centres. Again, employment location is the defining variable. Independent urban communities are urban areas (other than main urban areas) where less than 20 percent of the usually resident employed population's workplace address is in a main urban area.

**Rural area with high urban influence**

This category identifies rural areas that form a transition between the main urban areas and rural areas, although meshblocks are not necessarily contiguous with main urban centres. The index allows for a meshblock to be included in this category only if a significant proportion of the resident employed population work in a main urban area.

**Rural area with moderate urban influence**

This category identifies rural areas with a significant, but not exclusively, main urban area influence. A meshblock can be included in this category: (1) if a large percentage of the resident employed population works in a minor or secondary urban area, or (2) if a significant percentage work in a main urban area. However, if the percentage working in a main urban area is too substantial, the meshblock will be included in the high urban influence category.

**Rural area with low urban influence**

This category identifies rural areas with a strong rural focus. The majority of the population in these areas works in a rural area. Due to the impact of the weighting system, it is unlikely meshblocks in this category will have many people employed in a main urban area, although a number may work in a minor urban area.

**Highly rural/remote area**

These are rural areas where there is minimal dependence on urban areas in terms of employment, or where there is a very small employed population.

# Press coverage

The New Zealand Herald

## Phone app diagnoses Marton woman with melanoma

By Liz Wylie - Wanganui Chronicle

4:27 PM Sunday Nov 20, 2016

Marton woman Marie Stantiall was surprised to learn that the skin discolouration on her leg was a melanoma in need of urgent attention.

Mrs Stantiall is one of 100,000 New Zealanders to download the SkinVision app which is used to photograph spots on the skin and analyse them within 20 seconds.

The app uses algorithm technology which has been tested in cooperation with dermatologists and checks for irregularities in colour, texture, and shape of marks on the skin.

Users will receive a message that tells them whether they are at low, medium or high risk of developing skin cancer.

Mrs Stantiall said she put her phone down when the red "high risk" alert first appeared.

"I had that instant reaction of denial but I kept going back to look at it until I knew I couldn't ignore it.

"When I went to my doctor, she removed it straight away and she noticed another lesion near my collarbone and removed that too."

The app, is the work of Netherlands-based company SkinVision and was launched in New Zealand in March this year.

Company representative Dick Uyttewaal was in New Zealand last week to announce a new partnership with Kiwi-owned Accuro Health Insurance to tie in with Melanoma Awareness Week 14 - 21 November.

"New Zealand has a growing number of melanoma cases and although there are doctors and specialists who are very good at diagnosing and treating it, people often don't visit their doctors when they should," said Mr Uyttewaal.

"The app is a very useful tool to give people an indication that they need to seek treatment or if they have marks or moles they need to keep an eye on."

The Accuro partnership will provide members with free access to the app with a payment structure where Accuro will reimburse SkinVision on the basis of each melanoma detected.

Anyone can download the app for a free one month trial and Mrs Stantiall said the cost is $7.95 per month thereafter.

"You save pictures in a gallery and then you can take new pictures as often as recommended to keep an eye on any changes.

"I think anyone who has concerns about marks on their skin should use it.

"Especially those of us who spent a lot of our childhoods out in the sun without protection."

Mrs Stantiall said her farmer husband has also been using the app and farmers are a target group for SkinVision.

"We are working on a contract with Federated Farmers," said Mr Uyttewaal.

"People who work outdoors are susceptible to melanoma but really anyone can benefit from using the app because it is a very effective way to track any changes on your skin."

Background and download information can be found at https://skinvision.com/

# New Zealand overtakes Australia for highest rates of skin cancer, says study

BEN HEATHER

Last updated 20:18, March 30 2016

"New Zealanders just don't get it," Kathryn Williams, of Upper Hutt, said. "We are living in this environment where the UV is killing us, and on top of that we don't have medicine to fix it."

New Zealanders now have the highest melanoma rates in the world, overtaking Australia, a new study has found.

And one melanoma patient has accused Kiwis of having a dangerously oblivious attitude to life in the glare of the world's harshest UV levels.

"New Zealanders just don't get it," Kathryn Williams, of Upper Hutt, said. "We are living in this environment where the UV is killing us, and on top of that we don't have medicine to fix it."

Australian research, published in the Journal of Investigative Dermatology, has found Australian melanoma rates are on the decline, but the opposite is true in New Zealand.

The QIMR Berghofer Medical Research Institute, funded by the Australian National Health and Medical Research Council, measured melanoma rates in six countries in the 30 years to 2011, including the United Kingdom, Sweden, New Zealand and Australia.

It found that, in New Zealand, melanoma rates have nearly doubled in the past 30 years, with about 50 cases per 100,000 people in 2011.

That puts our rate well in excess of Australia's, which peaked at 49 per 100,000 in 2005, and has since declined.

While rates in New Zealand were expected to drop to about 46 per 100,000 by 2031, starting from next year, this would still makes us the most melanoma-ridden country in the world.

And while the rate would decrease slightly, population growth meant the actual number of Kiwis getting melanoma would rise.

University of Otago associate professor Tony Reeder, who was not involved in the study, said New Zealand and Australia had a uniquely unfortunate combination of high UV levels and a large European population poorly adapted to handle the exposure.

"We have a summer when the Earth is closest to the sun ... it means you can be quite heavily exposed even when the weather is quite cool," he said.

Australia's rates were dropping because of a big focus on prevention and education, particularly in schools. "It seems that Australia has been much more committed to investment in sun protection and mass media campaigns."

However, Professor David Whiteman, who led the study, said the expected drop in New Zealand, and Australia, reflected a growing "sun smart" culture in both countries.

Health Minister Jonathan Coleman said on Wednesday that a lot was already being down to prevent melanoma, including efforts around education.

"Most schools that you go to in New Zealand, if not all schools, will require children to wear hats when they are playing outside."

Overtaking Australia did not change the Government's position on prevention, but he agreed the melanoma rate needed to fall. "We've got to continue to push those messages."

**'WE JUST DON'T GET IT'**

Kathryn Williams is incredulous at the attitudes of most New Zealanders to the sun.

Rather than treating the outdoors as a "breeding ground for melanoma", Kiwis often slapped on a bit sunscreen and forgot about it.

"If you just put some sunscreen on in the morning and go to the beach, then you are in big trouble. You're giving yourself the ingredients for cancer."

The Upper Hutt mother was diagnosed with incurable stage IV metastatic melanoma in 2008, aged 39, and given about a year to live.

Treatment has involved removal her ovaries, part of her right kidney, and a section of her right collarbone. While not cured, she is now in remission.

She said she had always been careful to cover up while growing up, but even that had not been enough.

"I used to fight with my son over putting sunscreen on."

For her, the "horse has bolted" on prevention, and the fight is now for access to the new-generation drugs that could save her life.

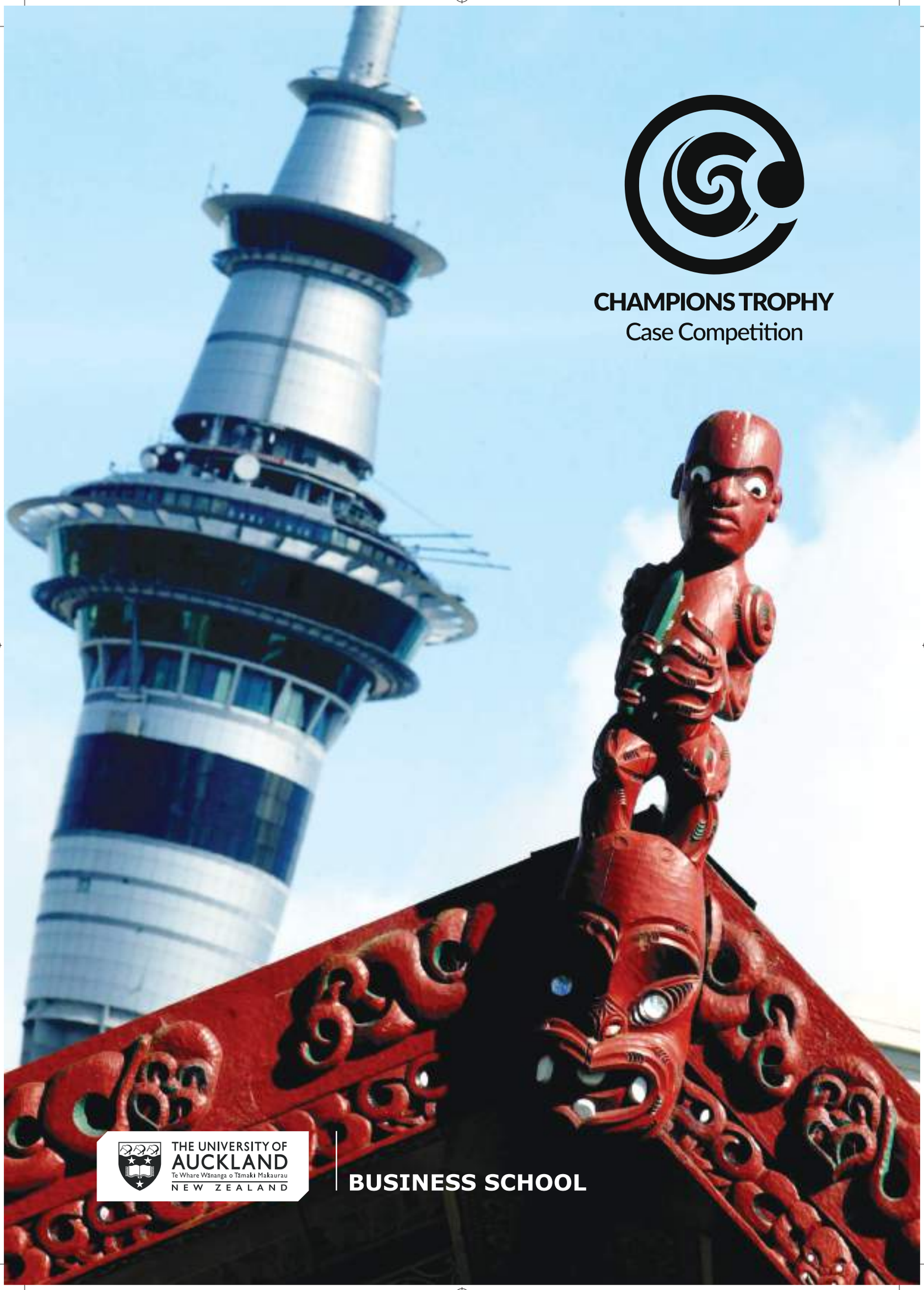
But for today's children and teenagers, the pattern is repeating itself.

"We've got 20-year-olds dying from melanoma already ... and we are going to see a lot of people in their 20s now starting to present in clinics in the next 10 years."

**MELANOMA: A KIWI PROBLEM**

- It is the fourth most common cancer, after prostate, breast and colorectal, with 2324 reported cases in 2012.
- 354 people died of melanoma in that same year
- Accounts for one in 10 cancer cases
- The New Zealand rate nearly doubled between 1982 and 2011
- With cases currently running at about 51 per 100,000 people, New Zealanders are more than twice as likely to get melanoma as the British.

- Stuff



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