

New Zealand has a serious and growing type 2 diabetes problem. It is predicted that within the next 20 years, the number of people with type 2 diabetes will increase by 70-90%. Of these people, Māori, Pacific and Asian will be worst affected. Allowing this to occur will have a hugely detrimental impact on the wellbeing of our people, but also on the sustainability of our health system and economy. There is an urgent need to recognise diabetes as a Government health priority and to invest in future prevention, treatment and care.

The Economic and Social Cost of Type 2 Diabetes



Tony and Heather Falkenstein
Sponsors



This study was conducted by PwC and funded by: Diabetes New Zealand; Edgar Diabetes and Obesity Research Centre (University of Otago); Healthier Lives – He Oranga Hauora National Science Challenge and Tony & Heather Falkenstein

Foreword

There have been many attempts to highlight the burden of disease and inequity of health outcomes associated with type 2 diabetes. In the late 1980s the New Zealand Medical Research Council identified diabetes as a condition warranting priority funding for research. In 2001, on behalf of Diabetes New Zealand, PwC New Zealand ('PwC') produced a report demonstrating the current and projected cost of diabetes. Then in 2008, an Expert Advisory Group appointed by the Ministry of Health at the request of the then Minister, developed a Quality Improvement Plan which recommended a series of measures considered necessary to stem the tide of the rapidly developing diabetes epidemic and its consequences.

Despite a range of Quality Standards for Diabetes Care and various well intended initiatives introduced by successive Governments, New Zealand still has no national strategy or plan for managing what is widely regarded as a disease which has reached pandemic proportions. It is largely up to District Health Boards (DHBs) to develop their own strategies. While it may be beneficial for services to be tailored to local needs, there are inevitably variations in the quality of service provision potentially leading to a worsening of the inequity of health outcomes. There is no national approach to diabetes prevention.

In collaboration with Diabetes New Zealand, Edgar Diabetes and Obesity Research Centre and the Healthier Lives – He Oranga Hauora National Science Challenge, PwC has produced this Report, which examines the current and projected economic and social costs of type 2 diabetes between 2020 and 2040. The findings, which in 2001 were considered worrying, might now more appropriately be described as alarming as rates of type 2 diabetes continue to escalate and inequities persist. However, the Report also provides some good news.

The researchers have examined the cost effectiveness of several strategies that have the potential to reduce the disease burden associated with type 2 diabetes. International research has convincingly shown that lifestyle changes (modifying diet and increasing physical activity) can appreciably reduce the risk of progression of pre-diabetes to type 2 diabetes. Similar measures, if adopted more intensively to the extent that appreciable weight loss is achieved, can result in the remission of type 2 diabetes even when the condition is well established and being treated by medication. These lifestyle related interventions are likely to change the lives of individuals; have considerable societal benefits; and likely achieve cost benefits in the longer term beyond the timeframe of the modelling undertaken in this project. The benefits of two relatively new medications and of providing adequate foot care services for all people with diabetes have also been shown in international trials and studies. The modelling studies presented in this Report show that the availability of these medications and ensuring access to podiatry throughout the country would result in substantial saving of Government expenditure as a result of reducing the long-term costs associated with the treatment of complications.

The Report has clearly not examined all the options relating to type 2 diabetes which should be included in a national strategy. In particular, it has not considered population-based approaches to primary prevention as this topic has been widely aired in New Zealand and internationally. It is generally accepted that legislative and other initiatives that enable healthy food and physical activity choices (e.g. a sugar levy) will reduce obesity rates and thus the risk of developing type 2 diabetes. At the other end of the spectrum of opportunities, there is a need to consider the role of bariatric surgery, currently available to a very limited extent in New Zealand, but which has the potential to produce remission of type 2 diabetes in association with appreciable weight loss. Further, while both conditions have common issues, this Report has not considered type 1 diabetes as there are a number of fundamental differences with regard to cause as well as the provision of services and treatments. The condition may be less frequent than type 2 diabetes, but type 1 diabetes is also increasing in frequency and the effects on individuals, their families and society require separate consideration.

It is hoped that Government will consider the full range of options in an urgently needed National Strategy for the prevention and management of this chronic disease pandemic. The disease burden of diabetes extends beyond the recognised complications and diabetes is now acknowledged as a major determinant of poor outcomes in people developing COVID-19 infections.

Sir Eion Edgar
Patron of Diabetes New Zealand
Chair of the Advisory Panel of the Edgar Diabetes
and Obesity Research Centre (University of Otago)

Sir Jerry Mateparae
Chair of the Governance Group Kahui Māori of the
Healthier Lives – He Oranga Hauora National
Science Challenge

Objectives and approach of this study

Through this study we aimed to achieve three primary objectives:

1. Reignite awareness amongst Government decision-makers and across the health sector of the realities of the economic and human cost of type 2 diabetes in New Zealand, including issues of inequity;
2. Provide a robust case for prioritisation of resources toward more equitable and effective type 2 diabetes prevention and management initiatives; and
3. Prompt the update and amendment of type 2 diabetes-related Government policy towards more effective and equitable diabetes prevention and management interventions.

To achieve this, we worked closely with our Expert Advisory Group (Table 2) to step through a series of key questions (which form the structure of this report). Our process is described below:

- **First**, we sought to understand type 2 diabetes as a condition, specifically the diabetes disease progression pathway, as this formed the basis of our analyses.
- **Second**, we developed 20-year population-based prevalence and cost projections as this allowed us to understand the size and cost of New Zealand's 'type 2 diabetes problem'.
- **Third**, we sought to understand the current national approach to diabetes prevention, treatment and care as well as key trends within the wider health and disability system as this provided important context.
- **Fourth**, we worked through a process to identify four of the opportunities associated New Zealand's current approach to diabetes prevention, treatment and care.
- **Fifth**, we designed a package of four individual diabetes interventions intended to address the identified challenges/opportunities.
- **Sixth**, we completed cost-benefit analysis on each intervention to understand the potential impact on New Zealand's economy and society if the Government were to invest in any one of these interventions.
- **Finally**, we used insight gathered throughout the study to develop a set of overarching conclusions and recommendations.

Executive summary



New Zealand has a serious type 2 diabetes problem that is on a trajectory to reach epidemic proportions within the next 20 years. The health, social and economic consequences of this problem are severe. However, as type 2 diabetes is considered to be a largely preventable condition that can be effectively managed, and in some cases reversed, there is an opportunity to significantly reduce the trajectory and size of this problem with appropriate intervention.

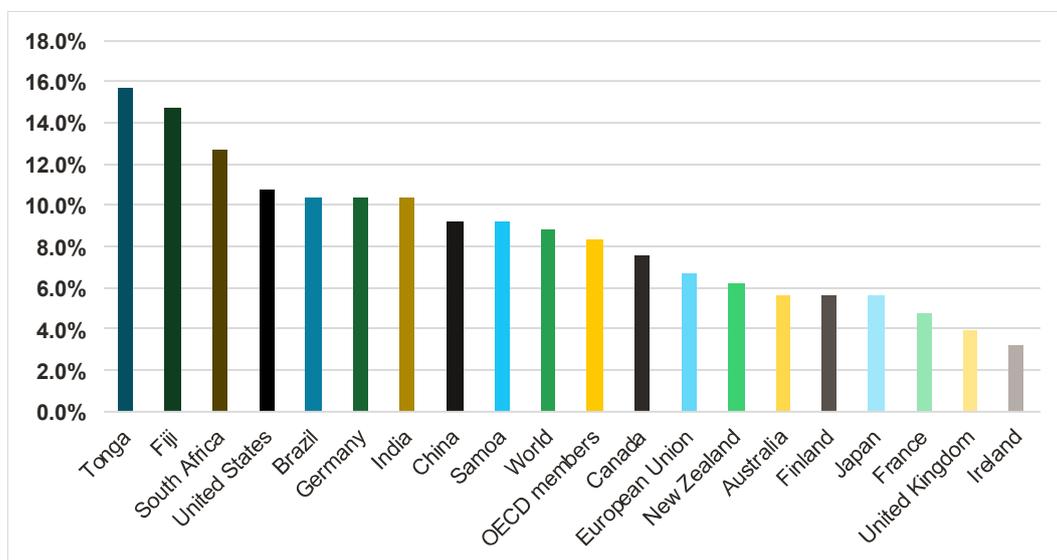
This will require a collective, holistic and system-wide response from Government, society and individuals. At a system-level, there is a need to reduce prevalence and cost, and improve equity and health outcomes, by changing the diabetes model of care and developing a national diabetes (and other associated long-term conditions) strategy. At a population level, it is essential to create an environment which is conducive to healthy food and activity choices in order to reduce the high rates of obesity, the major preventative risk factor for type 2 diabetes. At a community level, there is a need to support our whānau and communities to make positive change. And at an individual level, we need to seek help and invest time and effort into improving our own health, which becomes feasible when the environment around us makes healthy choices the easy choice.

Size of the problem

With just under half a billion people living with diabetes worldwide (90% of whom have type 2 diabetes) and the number projected to increase by 25% in 2030 and 51% in 2045¹, **type 2 diabetes is likely to be the biggest global epidemic in human history**². As seen in Figure 1, epidemic proportions of the condition are apparent in many individual countries, including; Tonga, Fiji, South Africa, United States of America, Brazil, Germany and India– all of which report prevalence of diabetes greater than 10% of the population³.

While New Zealand does not yet rank amongst the worst affected nations, **our type 2 diabetes prevalence rates exceed both those of our closest comparators, Australia and the United Kingdom**³. Further, historical trends and future projections suggest that **New Zealand is on a trajectory to reach epidemic proportions of type 2 diabetes within the next 20 years.**

Figure 1: Diabetes prevalence in selected countries (type 1 and 2 combined) - ages 20 to 79



The Economic and Social Cost of Type 2 Diabetes

Today, there are ~228,000 New Zealanders suffering from type 2 diabetes (4.7% of the population). Within the next 20 years this number is **projected to increase by 70-90%** to ~390,000 to ~430,000 people (6.6%-7.4% of the population) as the population ages and becomes more ethnically diverse. Table 1 below provides a snapshot of actual and projected prevalence of diagnosed type 2 diabetes in New Zealand – the trajectory of increase paints a clear and concerning trend.

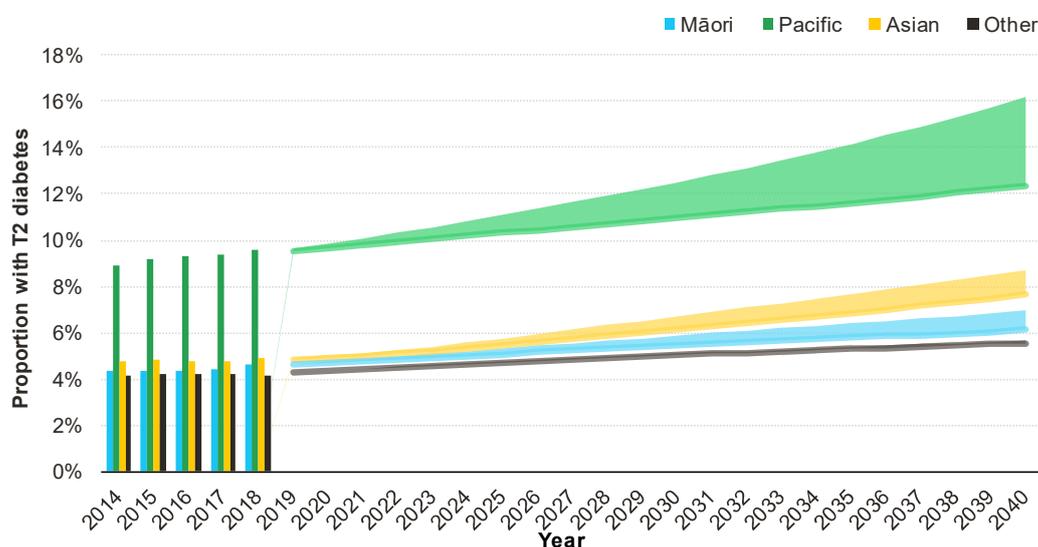
Table 1: Change in prevalence of type 2 diabetes in New Zealand – by ethnicity (2018-2040)

	Other	Māori	Pacific Island	Asian	Total population
2018 (actual)	4.2%	4.6%	9.6%	4.9%	4.7%
2040 (projected)	5.5%-5.7%	6.1%-7.0%	12.4%-16.2%	7.6%-8.7%	6.6%-7.4%
Change	+1.4%-1.5%	+1.5%-2.3%	+2.8%-6.6%	+2.7%-3.8%	+1.9-2.7%

In addition to these diagnosed type 2 diabetes prevalence projections, we also know there is a **high prevalence of people with pre-diabetes in New Zealand**, where the *2008/2009 Adult Nutrition Survey* found that the prevalence of pre-diabetes was 18.6% of the population (which equates to approximately 930,000 people todayⁱ). Pre-diabetes is a major issue as many people in this category will go on to develop type 2 diabetes.

With respect to ethnicity, **Pacific, Asian and Māori are disproportionately represented amongst New Zealand's type 2 diabetes population**. Table 1 above and Figure 2 below show current and projected prevalence of type 2 diabetes amongst these ethnic groups. The analysis shows that Pacific peoples have a current type 2 diabetes prevalence rate of 9.6% (2018), which is projected to increase to 12.4%-16.2% over the next 20 years. Asian people have current prevalence of 4.9% (2018) and projected to increase to 7.6%-8.7% in 20 years – and the current prevalence rate for Māori people is 4.6% (2018) and projected to increase to 6.1%-7.0% in 20 years.

Figure 2: Estimated prevalence of type 2 diabetes by ethnicity (2018-2040)



With respect to these results, it is important to note that age distribution within an ethnicity can distort prevalence. This is because prevalence is generally higher as age increases. This is a relevant consideration as Māori and Pacific populations are younger on average, which means the non-age standardised prevalence rates presented in Figure 2 are likely to understate the ‘true’ like-for-like prevalence. To address this, Figure 3 presents an alternative age-standardised version of the analysis, which has the effect of inflating prevalence rates for most of the ethnic groups – but **particularly for Pacific peoples**.

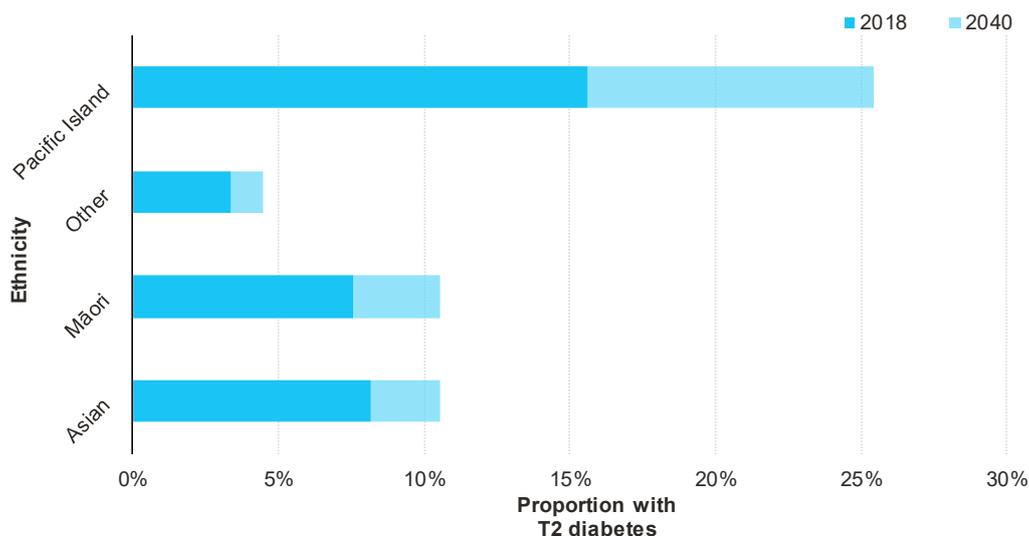
ⁱ Assuming a population of 5 million people

The Economic and Social Cost of Type 2 Diabetes

This analysis shows that the current and projected prevalence of type 2 diabetes is still highest for Pacific peoples, where current prevalence of 15.1% (2018) is projected to increase to a staggering 18.4%-25.4% over the next 20 years – meaning that a **quarter of all New Zealand’s Pacific peoples could be diagnosed with type 2 diabetes in 20 years’ time**. This concerning trend is similar for **Asian** people, where current prevalence of 8.2% (2018) is projected to increase to 9.3%-10.5% by 2040 – and for **Māori** people, where current prevalence of 7.5% (2018) is projected to increase to 9.5%-10.5% by 2040.

These projections clearly demonstrate that if no further action is taken to address New Zealand’s type 2 diabetes problem, **inequities and health outcomes will worsen for Pacific, Asian and Māori populations**.

Figure 3: Estimated prevalence of type 2 diabetes by ethnicity (2018 and 2040) – Age standardised



With respect to prevalence trends by gender, our analysis shows that **current and projected prevalence is higher for males than females**, where males are projected to move from a prevalence of 5.0% (2018) to 7.0%-7.8% over the next 20 years (to 2040) and females from a prevalence of 4.4% (2018) to 6.3%-7.1% (to 2040).

And with respect to age, our analysis shows that the **current prevalence of type 2 diabetes is highest for people aged 80+ years** (at 15.4% of the population), but the **most significant area of growth over the next 20 years is for those aged 60-79 years**, where prevalence is projected to increase from 12.9% (2018) to 15.6%-16.4% by 2040. As New Zealand has an ageing population, there will be a greater proportion of people in the older age bands in 2040 than there are in 2018. Due to high prevalence of type 2 diabetes for older people, age is one of the key drivers of the projected overall increase in prevalence for the New Zealand population as a whole over the next 20 years.

Cost to New Zealand

With greater prevalence comes greater cost. As shown in Figure 4 below, the **total current annual cost of type 2 diabetes in New Zealand is estimated to be \$2.1 billion**, which represents a staggering 0.67% of New Zealand’s total Gross Domestic Product (GDP).

And over the **next 20 years, the annual cost is projected to increase by 63% to \$3.5 billionⁱⁱ** in current dollars.

Of the different health and economic components of this cost, **publicly funded health costs** borne by the Government, currently estimated to be ~\$1.0 billion (4.9% of Vote Health 2021/22 of \$20.3 billion), are

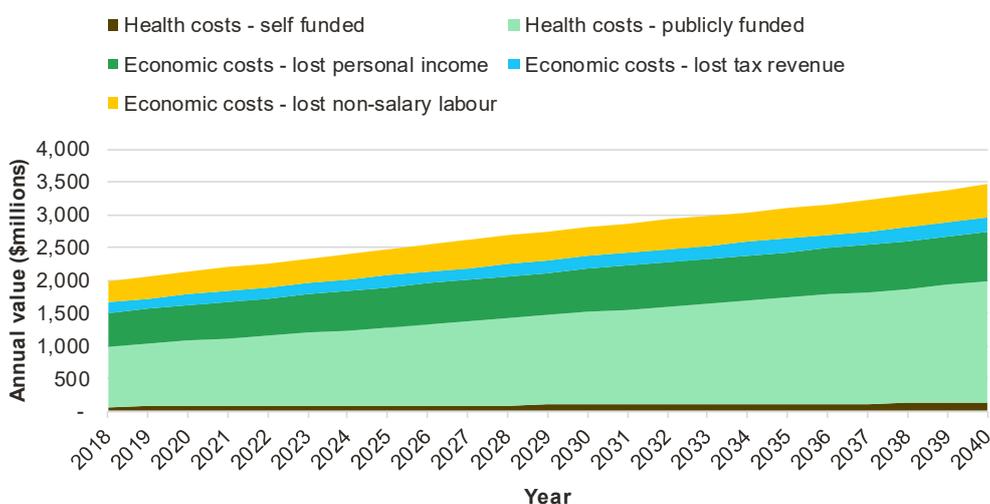
ⁱⁱ If we add superimposed inflation, the 20-year projected annual cost of type 2 diabetes is estimated at \$5.1 billion. This analysis can be found in the sensitivity testing in section of the full report.

The Economic and Social Cost of Type 2 Diabetes

projected to increase most, increasing by approximately \$857m or 86% over the next 20 years (increasing to 9.1% of Vote Health 2021/22). Key drivers of the increasing cost of type 2 diabetes in New Zealand are:

- Increasing prevalence (as per the discussion above);
- Population growth;
- An ageing population;
- A steady shift towards younger cohorts of people developing type 2 diabetes; and
- More expensive treatment (as greater proportions of people require treatment for diabetes-related complications).

Figure 4: Total annual cost of type 2 diabetes in New Zealand



Our analysis also shows that the personal and economic impact of the disease is **most detrimental when a person is diagnosed early in life**. When comparing the lifetime cost of someone diagnosed with type 2 diabetes at age 25 years (\$565k) to the lifetime cost of someone diagnosed at age 75 years (\$44k), the cost differential is \$521k or a factor of 13. This is significant given the shift towards younger cohorts of New Zealanders developing type 2 diabetes.

This trend alone provides a compelling case **for the Government to make a greater investment in the prevention of type 2 diabetes, both through interventions such as presented here, but also in terms of widespread environmental changes, such as reducing television and other advertising to children, or introducing a sugar levy.**

Figure 5: Representative lifetime cost of type 2 diabetes beginning at age 25 (\$565k)

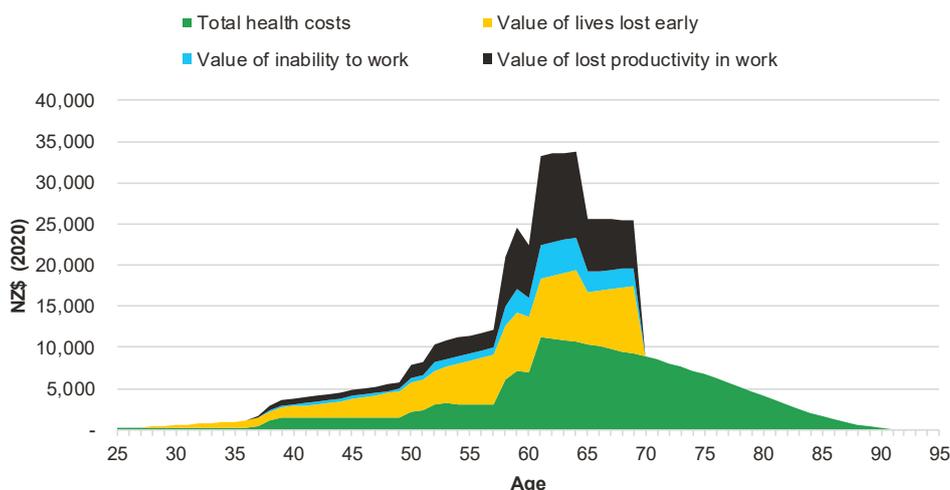
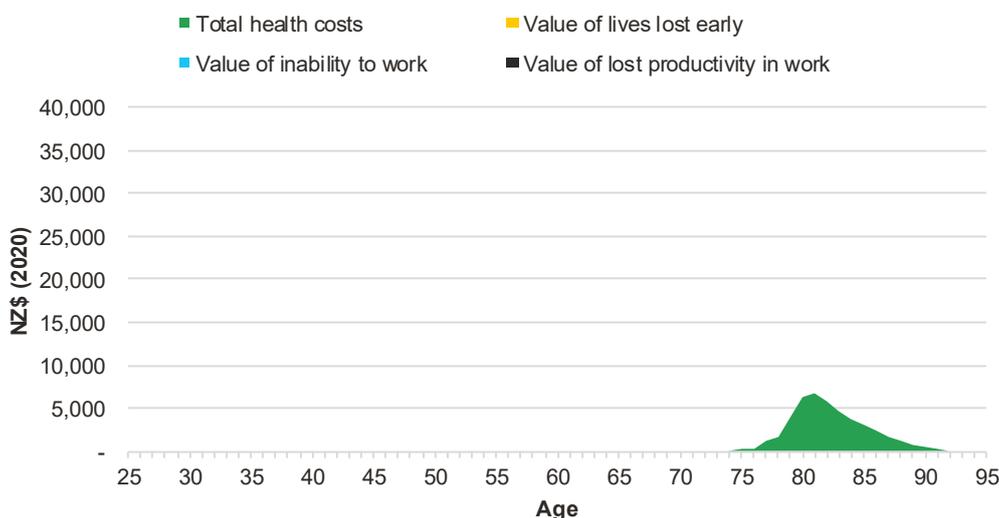


Figure 6: Representative lifetime cost of type 2 diabetes beginning at age 75 (\$44k)



To provide a general basis of comparison to other chronic long-term conditions, New Zealand’s rate of age adjusted new **cancer cases** for 2016 was 543 per 100,000 people in 2016 (calculating to a prevalence rate of 0.54%). Globally, this was second only to Australia (at 744 per 100,000 people or a prevalence rate of 0.74%)⁴. With respect to cost, a 2010 and 2011 study showed that the total public health system cost of treating cancer was \$880 million annually⁵. Further, the prevalence of **ischaemic heart disease** in New Zealand adults was 5.5%⁶ of the population (in 2011-2012) and **cardiovascular disease** accounted for \$501 million worth of New Zealand public hospital casemix discharges during the same period⁶.

These comparators show that the projected prevalence and cost of type 2 diabetes in New Zealand is significant – where **both 20-year prevalence and cost projections exceed the stated prevalence and cost of cancer and cardiovascular disease**ⁱⁱⁱ.

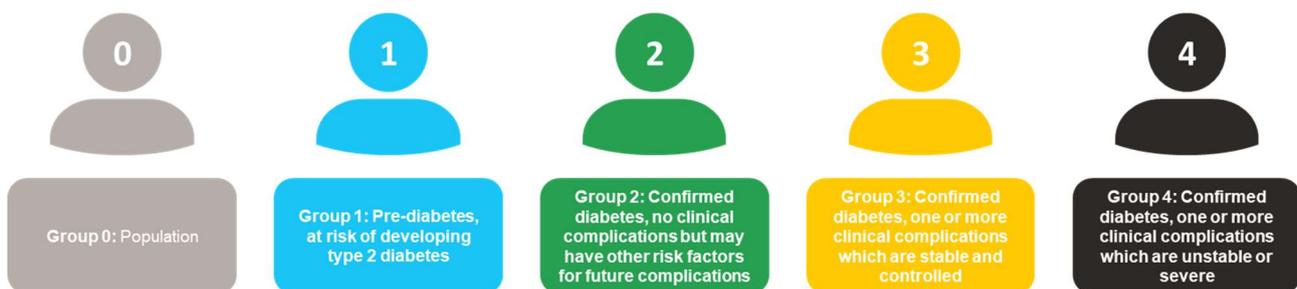
ⁱⁱⁱ Based on reported prevalence and cost per the studies above, where these studies may have had a different scope to this study.

Holistic and system-wide response to the epidemic

A holistic and system-wide response from Government, society and individuals is needed to change the trajectory of projected type 2 diabetes prevalence, costs and health outcomes in New Zealand.

At a **system-level**, there is a need to change the **New Zealand's diabetes^{iv} model of care**. This would require identification of diabetes^v as a Government health priority; identification of a national set of health and social outcome targets; and development of a national strategy to enable achievement of those outcomes. The strategy would need to adopt and **invest in a broad national package of interventions that target all stages of the type 2 diabetes disease progression pathway** (see Figure 7 below for an illustration of the pathway).

Figure 7: Type 2 diabetes disease progression pathway



Specifically, the **package of interventions** would need to incorporate:

- Population-based interventions aimed at reducing obesity and thus diabetes risk e.g. national policy change, legislative change etc. (i.e. targeting Group 0 on the disease progression pathway)
- Individualised lifestyle interventions to reduce risk of progression from pre-diabetes to type 2 diabetes e.g. lifestyle programmes that aim to achieve sustained change in diet and movement habits (i.e. targeting Groups 1 and 2 on the disease progression pathway)
- Treatment options for those with type 2 diabetes e.g. medication, bariatric surgery etc. (i.e. targeting Groups 2, 3 and 4 on the disease progression pathway)
- More appropriate delivery of on-going care to reduce the risk and impact of diabetes-related complications e.g. foot screening/care, retinal screening/care (i.e. targeting Groups 3 and 4 on the disease progression pathway).

Focus areas for this report

By considering the landscape of existing diabetes work and research in New Zealand, we decided to explore the impact (through a cost-benefit analysis lens) of four possible interventions through this report. This package of interventions is not intended to be 'complete', rather, it is intended to provide a range of type 2 diabetes specific interventions that aim to address health behaviours. To achieve the kind of system-level change described above, **this package of interventions would need to be combined with a set of wider 'system focused' and population-based interventions** that address both health behaviours and healthcare factors.

^{iv} While this report is focused on type 2 diabetes, changing the national model of care would likely apply to all forms of diabetes.

^v Due to the nature of the condition (which often involves comorbidities and complications), it is likely that in practice, a national strategy for diabetes prevention, treatment and care would need to link closely to the prevention/treatment/care strategy for other long-term conditions such as cardiovascular disease and cancer. However, as other long-term conditions are outside the scope of this report, our commentary relates to type 2 diabetes only.

The Economic and Social Cost of Type 2 Diabetes

- The **Healthy People, Healthy Lives** intervention aims to prevent New Zealanders from developing type 2 diabetes by providing subsidised whānau/community-centred lifestyle change programmes (i.e. targeting Group 1 on the disease progression pathway).
- The **Owning our Futures** intervention aims to enable New Zealanders to reverse their type 2 diabetes and simultaneously reduce other obesity-related conditions by providing subsidised intensive whānau/community-centred lifestyle change programmes (i.e. targeting Group 2 on the disease progression pathway).
- The **Better Diabetes Medications** intervention aims to enable people to better manage their type 2 diabetes by providing access to ‘gold standard’ subsidised medication (SGLT2 inhibitors and GLP-1 receptor agonists) (i.e. targeting Groups 2, 3 and 4 on the disease progression pathway).
- The **Foot Screening and Protection** intervention aims to prevent people with type 2 diabetes from developing serious foot related complications such as amputation, by providing people access to optimal foot care services (i.e. targeting Groups 3 and 4 on the disease progression pathway).



Impact of investment in four specific areas

Cost-benefit analysis on each of the four diabetes-specific interventions show how **Government investment** in the prevention, treatment and care of type 2 diabetes could have a **significantly positive impact on New Zealand’s economy and society**. The benefits vary by intervention but are driven primarily by reducing health costs^{vi} and increasing economic value through increasing life expectancy and productivity. In addition to economic benefits, significant societal benefit can be achieved by improving peoples’ quality of life and their ability to participate in society.

Key results from our cost-benefit analysis are as follows:

- Investing in the **Healthy People, Healthy Lives** intervention is estimated to achieve a total Government benefit of \$42 million and a societal benefit of \$88 million, which equates to a Government Return on Investment (ROI) of 0.95 and a societal ROI of 2.95^{vii}.
- Investing in the **Owning our Futures** intervention is estimated to achieve a total Government benefit of \$23 million and a societal benefit of \$63 million, which equates to a Government ROI of 0.97 and a societal ROI of 2.69^{vii}.
- Investing in the **Better Diabetes Medication** intervention will achieve different benefits for each drug class. For SGLT2 inhibitors, investment is estimated to achieve a total Government benefit of \$510 million and a societal benefit of \$201 million, which equates to a Government ROI of 3.0 and a societal ROI of 4.2. For GLP-1 receptor agonists, investment is estimated to achieve a total Government benefit of \$595 million and a societal benefit of \$148m, which equates to a Government ROI of 1.2 and a societal ROI of 1.5^{vii}.
- The **Foot Screening and Protection** intervention is estimated to achieve net present value cost saving benefits of approximately \$40,000 (major amputation) and \$36,000 (minor amputation) for each

^{vi} Where health costs include medications, laboratory costs, secondary care costs, publicly funded primary care costs and self-funded primary care costs.

^{vii} Where a ROI result of 1.0 means that every \$1 invested, a corresponding \$1 dollar of benefit will be realised over the 50-year period.

diabetes-related lower limb amputation avoided. And if the intervention is implemented as intended, 390 major and 211 minor amputations would be avoided each year (based on 2020 data).

What do these results actually mean?

Individualised lifestyle interventions

Healthy People, Healthy Lives and **Owning our Futures** both have a Government ROI of approximately 1.0, which means every dollar spent by the Government results in a dollar saved. While this does not make a particularly compelling case for investment, the case is compelling when one considers that **most of the benefits generated by these interventions are societal benefits**, with total ROI's just under 3.0. These results are not surprising given **both interventions are designed to focus on, and change the lives of, individuals**, which mean they are typically more expensive than broader population-based interventions; require upfront investment; and require commitment and hard work of the individual to be successful. Viewed another way, one could argue that a Government ROI of 1.0 is cost neutral, so is simply a matter of shifting Government investment from one part of the health system to another. Rather than funding the treatment of diabetes related complications, funding could instead be used to give people the opportunity to transform their lives and avoid diabetes-related complications (for the exact same cost). This is a perfect example of moving from an **'ambulance at the bottom of the cliff to a fence at the top'**.

Our modelling for both these interventions relies heavily on the clinical results of existing comparable interventions to estimate benefits. Hence, the available results only capture the impact of each intervention up to the date of publication, not the entire lifetime of its participants. As such, we have only been able to model known results and have excluded 'potential' (but unproven) future benefits. This conservative approach particularly affects the Owning our Futures intervention, which builds upon the work of the DiRECT study in the United Kingdom. In the cost-benefit analysis for this intervention, we have only modelled the benefits/impacts five years into the future (as the study has not yet presented results beyond this timeframe). In reality, we expect that **many participants are likely to experience benefit from lifestyle change that extends many years beyond the timeframe that we have modelled**.

Treatment and care interventions

Foot Screening and Protection and especially **Better Diabetes Medications** present opposite cost-benefit analysis results to the lifestyle interventions described above as **most of the benefits are Government benefits** (particularly reduced spending on secondary health care), while societal benefits make up a much smaller proportion of the total. We have taken the same approach in our cost-benefit analysis modelling in that we have also modelled the benefit/impact of the medication over the period of time an individual continues taking the medication. What this means is that both spending on medications and savings to other areas of health spending add up slowly over many years, unlike the lifestyle interventions discussed above. Interventions of this type, while still improving the lives of many individuals, are better characterised as **'spending a cent today to save a dollar tomorrow'**.

How this might fit with the proposals from the New Zealand Health and Disability System Review

The recent *New Zealand Health and Disability System Review*⁷ identified a range of 'system deficiencies' that have had a detrimental impact on New Zealanders' health outcomes. For the purpose of this report, we have **focused on deficiencies related to the structure of the system and funding arrangements** within the system.

With respect to **structure**, the system is complex and fragmented. This is particularly problematic for people with type 2 diabetes who can have comorbidities and complications that necessitate them to be actively involved in treatment and to interact with multiple parts of the system (i.e. both primary and secondary). The complexity and fragmentation of the system means **people don't always access the services they need** and don't always receive high quality care, which results in a **high proportion of unmet need and sub-optimal health outcomes**. This is especially the case for Pacific, Asian and Māori people who have greater levels of unmet need and experience higher rates of type 2 diabetes and disparate health outcomes than other ethnicities.

The Economic and Social Cost of Type 2 Diabetes

With respect to funding arrangements, **funding has not kept pace with increasing costs** and the DHBs are financially unsustainable⁷. Further, as funding for diabetes prevention, treatment and care is distributed to the DHBs as part of an annual population-based allocation or as part of a long-term conditions package, it can be **diluted resulting in a lack of specific investment in diabetes**. Finally, the complexity and lack of understanding as to the DHB funding model has raised concern that funds are **not being spent equitably**.

Through this report we have built a compelling case for changing the New Zealand diabetes (and associated long-term conditions) model of care. To ensure relevance of the **future model**, we recommend it is **developed in a way that aligns to the ambitions of the *New Zealand Health and Disability System Review***⁷. As discussed previously, this will require identification of diabetes and associated long-term conditions as a specific Government health priority; identification of a national set of health and social population-based outcome targets; and development of a national 'diabetes and associated long-term conditions strategy' to enable achievement of those outcomes. To align with the *New Zealand Health and Disability System Review*⁷, this strategy should adopt and invest in a broad national package of interventions, which target both diabetes and associated long-term conditions; adopt a consumer, whānau and community-based delivery approach; incorporate Te Tiriti o Waitangi-based partnerships; address all stages of disease progression (with a strong focus on prevention); and address both health behaviours and health care factors.

To ensure **effective delivery of a new model of care and national diabetes (and associated long-term conditions) strategy**, it will also be necessary to review and refresh the Government funding approach to diabetes and associated long-term conditions; introduce appropriate accountability mechanisms for DHBs and providers (on both the use of funding and achievement of targeted health outcomes); and update and maintain the Quality Standards for Diabetes Care. The future national **approach to funding** diabetes prevention, treatment and care should be considered in conjunction with the core funding model changes of the *New Zealand Health and Disability System Review*⁷. Where the Review recommends legislation of DHB funding requirements (guaranteed yearly increases based on demographics, cost of services and changes to wages); ring-fenced funding for Tier 1 services; and development of a new Tier 1 service funding formula to adjust for communities with higher health needs⁷.

Acknowledgements

This study was conducted by PwC and funded/supported by Diabetes New Zealand; Edgar Diabetes and Obesity Research Centre (University of Otago); Healthier Lives – He Oranga Hauora National Science Challenge ; and Tony and Heather Falkenstein.

Figure 8: Funders and supporters of this study



We would like to acknowledge and thank all those who have freely given of their time and knowledge to be part of our Expert Advisory Group.

Table 2: Expert Advisory Group

Name	Role	Organisation
Heather Verry	Chief Executive Officer	Diabetes New Zealand
Professor Jim Mann	Director	Healthier Lives National Science Challenge
Professor Rachael Taylor	Director	Edgar Diabetes and Obesity Research Centre

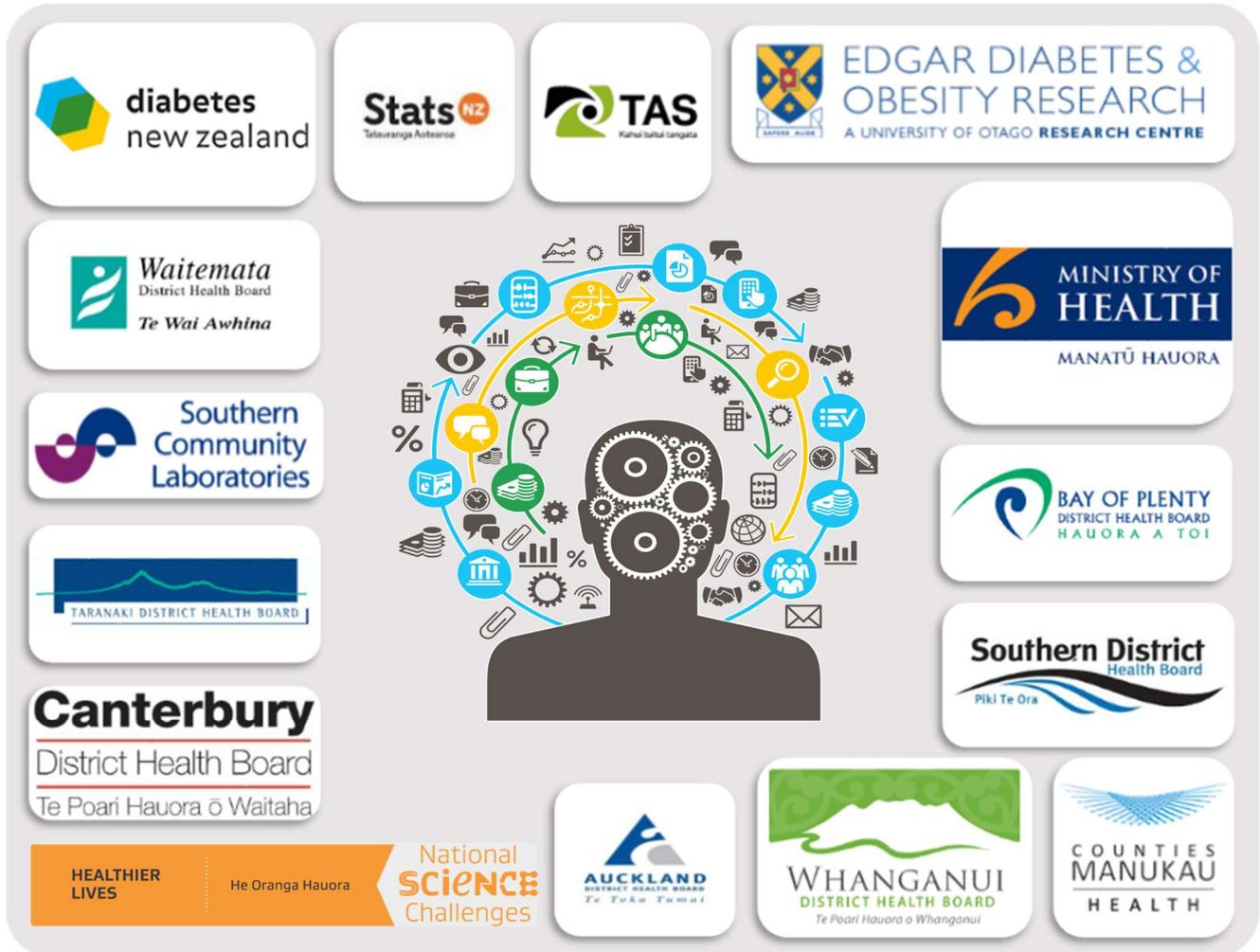
Expert advice was also provided by a range of national and international experts.

Name	Role	Organisation
Belinda Ihaka	Lecturer	Auckland University of Technology
Dr Bryan Betty	College Medical Director	The Royal New Zealand College of General Practitioners
Dr Cristina Cleghorn	Senior Research Fellow	University of Otago
Graeme Jarvis	Chief Executive Officer	Medicines New Zealand
Helen Gibbs	Nutrition Development Advisor and Project Manager	WellSouth Primary Health Network
Dr Jade Tamatea	Senior Lecturer	The University of Auckland
Karen Reed	District Manager	Diabetes New Zealand
Liz Dutton	Service Development Manager	Diabetes New Zealand
Michele Garrett	Podiatry Professional Clinical Leader	Auckland DHB, Waitematā DHB
Dr Rosemary Hall	Executive Member / Senior Lecturer	New Zealand Society for the Study of Diabetes / University of Otago
Dr Ryan Paul	Senior Lecturer	University of Waikato
Professor Mike Lean	Clinical Senior Research Fellow and Honorary Consultant	University of Glasgow
Professor Ursula Schwab	Vice Head, Institute of Public Health and Clinical Nutrition	University of Eastern Finland
Emeritus Professor Matti Uusitupa	Institute of Public Health and Clinical Nutrition	University of Eastern Finland

The Economic and Social Cost of Type 2 Diabetes

We would also like to acknowledge all those people and organisations who provided us information, advice and direction.

Figure 9: Organisations that have provided information, advice and direction



For further information, please contact PwC New Zealand, <https://www.pwc.co.nz/services/consulting/health-and-wellbeing.html>

Tamati Shepherd-Wipiiti
Partner, National Health Practice
Leader
Wellington, PwC New Zealand
+ 64 22 012 0844
tamati.r.shepherd-wipiiti@pwc.com



Lorna Brennan
Director
Wellington, PwC New Zealand
+ 64 21 0237 5906
lorna.c.brennan@pwc.com



PwC disclosure for use of this report

This report, developed in conjunction with PwC, has been prepared solely for the purposes of the **20-Year Projection and Cost-Benefit Analysis of Diabetes in New Zealand ('2020 Diabetes Study')** and should not be relied upon for any other purpose. To the fullest extent permitted by law, PwC accepts no duty of care to any third party in connection with the provision of this presentation and/or any related information or explanation (together, the "Information"). Accordingly, regardless of the form of action, whether in contract, tort (including without limitation, negligence) or otherwise, and to the extent permitted by applicable law, PwC accepts no liability of any kind to any third party and disclaims all responsibility for the consequences of any third party acting or refraining to act in reliance on the Information.

PwC have not independently verified the accuracy of information provided to them in the development of this report. Accordingly, PwC express no opinion on the reliability, accuracy, or completeness of the information provided to them and upon which they have relied. The statements and opinions expressed herein have been made in good faith, and on the basis that all information relied upon is true and accurate in all material respects, and not misleading by reason of omission or otherwise.

Any statements and opinions expressed in this report are based on information available as at the date of the report. PwC reserve the right, but will be under no obligation, to review or amend this report, if any additional information, which was in existence on the date of this presentation was not brought to our attention, or subsequently comes to light. This report is issued pursuant to the terms and conditions set out in the contract with PwC, dated **28 February 2020**.

References

- ¹ Saeedi, P., Petersohn, I., Salpea, P., Malanda, B., Karuranga, S., Unwin, N., Colagiuri, S., Guariguata, L., Motala, A. A., Ogurtsova, K., Shaw, J. E., Bright, D., Williams, R. (2019). Global and regional diabetes prevalence estimates for 2019 projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. *Diabetes Research and Clinical Practice*, 157. [https://www.diabetesresearchclinicalpractice.com/article/S0168-8227\(19\)31230-6/fulltext](https://www.diabetesresearchclinicalpractice.com/article/S0168-8227(19)31230-6/fulltext)
- ² Zimmet, P. Z. (2017). Diabetes and its drivers: the largest epidemic in human history? *Clinical Diabetes and Endocrinology*. 3(1). <https://doi.org/10.1186/s40842-016-0039-3>
- ³ The World Bank. (n.d.). Diabetes prevalence (% of population ages 20 to 79) – International Diabetes Federation, Diabetes Atlas. <https://data.worldbank.org/indicator/SH.STA.DIAB.ZS/>
- ⁴ Global Burden of Disease Cancer Collaboration. (2019). Global, Regional, and National Cancer Incidence, Mortality, Years of Life Lost, Years Lived with Disability, and Disability-Adjusted Life-Years for 29 Cancer Groups, 1990 to 2017: A Systematic Analysis for the Global Burden of Disease Study. *JAMA Oncol*, 5(12):1749–1768. doi:10.1001/jamaoncol.2019.2996
- ⁵ Blakely, T., Atkinson, J., Kvizhinadze, G., Wilson, N., Davies, A., & Clarke, P. (2015). Patterns of cancer care costs in a country with detailed individual data. *Medical care*, 53(4), 302–309. <https://doi.org/10.1097/MLR.0000000000000330>
- ⁶ National Health Committee. (2013). Strategic Overview: Cardiovascular Disease in New Zealand (Working Draft). Wellington: National Health Committee.
- ⁷ Health and Disability System Review. (2020). Health and Disability System Review: Final Report Pūrongo Whakamutunga. New Zealand Health and Disability System Review – Hauora Manaaki ki Aotearoa Whānui. Wellington: HDSR.