# Preventing diabetes: What does the latest modelling evidence tell us about health gains and cost savings?

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**Approximately 5.5% of NZ adults have been diagnosed with diabetes. In this blog we summarise our recent modelling work that suggests that further investment in interventions of proven effectiveness to prevent type 2 diabetes could substantially benefit health, reduce health inequalities, and save billions in health sector costs for NZ.**

In 2013-2014, it was estimated that around 5.5% of NZ adults (those aged 15 years and over) had diagnosed diabetes [1]. However, men are more likely than women to have diabetes, Māori and Asian New Zealanders are twice as likely as non-Māori or non-Asian New Zealanders (respectively) to be diagnosed with diabetes, and Pasifika in NZ are almost three times as likely as other New Zealanders to have been diagnosed with diabetes [1]. Furthermore, people living in poorer neighbourhoods are almost twice as likely to be

diagnosed with diabetes as those living in wealthier neighbourhoods [1].

Several risk factors for type 2 diabetes (hereafter just “diabetes”) have been identified, including: obesity, poor diet, physical inactivity, advancing age, family history of diabetes, ethnicity, and high blood glucose during pregnancy affecting the fetus [2]. People with diabetes have a substantially increased death rates and high morbidity (ie, 3% of all illness, disability and premature mortality in 2006 [3]). Indeed, diabetes is one of the main causes of blindness, kidney failure and lower limb/toe amputations, all of which involve major suffering and have substantial healthcare costs [4]. Additionally, it has been estimated that healthcare expenditure for people with diabetes in NZ was NZ$526 million in 2006 [5].

Research has shown that it is possible to reduce type 2 diabetes incidence rates through health sector interventions such as the “diabetes prevention program” (DPP). The DPP was a randomised controlled trial that tested intensive lifestyle intervention and drug treatment to prevent or delay the development of diabetes in high risk adults [6]. The DPP showed a 34% reduction in type 2 diabetes incidence in the lifestyle intervention group and 18% reduction in the group using a drug treatment (metformin) compared to the placebo group, 10 years after randomisation [6]. Large health gains and health system cost savings are likely with this kind of reduction in population incidence rates. Our new research has outlined these potential impacts for a range of theoretical reductions in diabetes incidence in the NZ population alive in 2011 [7].

## What does the new NZ modelling show?

The modelling work indicated that health-adjusted life years (HALYs) gained, health system cost-savings and average life expectancy all increase linearly with increasing reductions in type 2 diabetes incidence [7]. The majority of this modelled gain comes from the impacts of reducing diabetes directly, but as diabetes also increases risk of coronary heart disease and stroke, a proportion also comes from reductions in these related diseases.

Very large health gain and health system cost savings are possible. If new cases of diabetes were completely eliminated from NZ in 2011 (eg, via a hypothetical intervention such as a very effective new treatment or a vaccine), there would be 1.8 million HALYs gained, and over NZ$38 billion saved in health system costs over the lifetime of the New Zealand adult population alive in 2011.

For a more realistic reduction of incidence by 10%, which is quite plausible to achieve with known interventions such as the DPP, it was estimated that there would be 150,000 HALYs gained, and over NZ$3 billion saved in health system costs. Additionally, per capita health gains were estimated to be 1.7 times higher in Māori than non-Māori or 2.2 times higher when an equity analysis was applied, suggesting these reductions in diabetes incidence may reduce health inequities. These are relatively large health gains compared to many other interventions, as indicated by data from our BODE$^3$ online interactive league table (https://league-table.shinyapps.io/bode3/). However, even larger health gains could be achieved through certain food taxes [8].

## Potential implications for research and NZ health agencies

These modelling results reiterate the multiple health and economic benefits of reducing diabetes incidence. This modelling work provides additional justification to establish

effective programmes for reducing type 2 diabetes and shows the maximum cost the programme can be for overall cost savings to remain. For example, if the evidence of a particular intervention shows that it will reduce the incidence of type 2 diabetes by 10% and will cost NZ$100 million to implement, the NZ Government could be confident that overall long-term cost savings would occur as a reduction of this size is estimated to save over NZ$3 billion in health system costs (albeit spread out over the life-time of the cohort and without discounting).

There are also other diabetes prevention interventions that would cost relatively little to implement (eg, the few million dollars to pass a law in NZ [9], such as a sugary drinks tax or a junk food tax [8]). Similarly, other changes to the obesogenic food environment, such as controlling the marketing of junk food and having healthy food policies in schools and early childcare centres (see the recommendations from the Health Coalition Aotearoa' s "Prevention Brief 2020" [10]), would cost little to implement.

Image by Mabel Amber from Pixabay

Increasing physical activity levels will also assist with preventing diabetes and there is evidence for activity levels being modifiable according to a systematic review (eg, "improving neighbourhood walkability, quality of parks and playgrounds, and providing adequate active transport infrastructure is likely to generate positive impacts on activity in children and adults" [11]). These broader interventions around the obesogenic environment are also likely to reduce the incidence of other chronic diseases (eg, various cancers and cardiovascular disease through other mechanisms), thereby further reducing health loss and health system costs [8].

**In summary,** recent modelling provides additional justification from a health gain, health

inequities, and health cost savings perspectives, for the NZ Government to further invest in effective interventions to prevent diabetes in this country. Fortunately, a range of proven interventions exist from targeted interventions such as the Diabetes Prevention Program to those which change the obesogenic environment, such as sugary drink taxes and improvements to walking/cycling infrastructure.

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