

# He Pikinga Waiora Kimi Ora lifestyle programme: case study of a successful community-based Indigenous diabetes intervention

Bridgette Masters-Awatere, Shemana Cassim, Jade Tamatea, Nina Scott, Chae Simpson, Cherie Paekau

## ABSTRACT

**AIM:** To co-design and implement a whānau-centred, community-based lifestyle programme (Kimi Ora) intended to ensure no worsening of HbA1c and to improve wellbeing for Māori whānau and communities with diabetes or pre-diabetes.

**METHODS:** Māori healthcare providers, community members, research advisors and wider stakeholders used a co-design process underpinned by He Pikinga Waiora to collaboratively develop and implement Kimi Ora Control group comparisons and participants were recruited from Te Kōhao Health. Multi-method monitoring and collection captured individual, whānau and community data.

**RESULTS:** Kimi Ora was run in two communities in Aotearoa New Zealand. In total, there were 35 participants who took part in an eight-week programme offered five times alongside a comparison group comprising 21 participants. Kimi Ora resulted in significant improvements on all biomedical measures compared to baseline, and participants had gains relative to the comparison group for variables including weight, BMI, blood pressure and waist measurement. Of particular note was the 100% retention rate and sustained community support for Kimi Ora.

**CONCLUSIONS:** Outcomes from Kimi Ora demonstrate this programme, which was actively tailored for and worked with Māori communities in a responsive and flexible manner, resulted in successful biomedical outcomes, high engagement and high retention.

Diabetes is being experienced at epidemic rates and is disproportionately affecting Indigenous peoples.<sup>1</sup> In Aotearoa New Zealand, diabetes age-standardised prevalence is 1.6–2.4-times higher for Māori compared to those of European ethnicity.<sup>2,3</sup> This is associated with significant complications from the burden of diabetes, with increased rates of cardiac complications, renal failure and amputation<sup>3</sup> and, most importantly, avoidable mortality for Māori.<sup>4</sup> Overall, Māori have a 1.8-times greater health burden than non-Māori and a nine-year lower average life expectancy.<sup>3</sup> Research into the different rates point towards

obligations under Te Tiriti o Waitangi as a fundamental driver of the unequal distribution of the determinants of health and inaction in the face of need.<sup>5,6</sup>

Treatment of type 2 diabetes mellitus (T2D) seeks to reduce blood glucose levels through diet, exercise, lifestyle changes and, where necessary, the use of medication. In New Zealand's current primary care environment, treatment is heavily focused on medicine. Diet, exercise and lifestyle prescriptions in primary care achieve mixed results, suggesting there may be an "unknown" factor. Although it is well established that glycaemic control is closely

linked to development of diabetes-related complications, elevated glycaemic control indicates a reduced adherence to treatment measures and/or the necessary lifestyle changes (eg, diet care, physical activity, use of medication, blood glucose monitoring).<sup>5</sup> Treatment inertia and undertreatment are also associated with individuals not reaching target levels.<sup>7</sup> Adequate T2D management among Indigenous populations in particular has been identified as a challenge that requires urgent attention.<sup>9–11</sup> Barriers experienced by Indigenous peoples with T2D relating to glycaemic control include an obesogenic environment, geographic isolation and fragmented services,<sup>12,13</sup> ongoing impacts of colonisation, political and social challenges<sup>14</sup> and cultural differences between health services, medical professionals and Indigenous communities.<sup>11,14</sup> These structural-level barriers have a cumulative effect on Indigenous peoples. Indigenous communities have had little ability to contribute to the nature and quality of services provided.

Interventions have been implemented to assist with and promote diabetes management for Indigenous communities internationally.<sup>8,13,15</sup> In New Zealand, despite the steep rise in obesity and diabetes rates for Māori,<sup>5,16</sup> there has been a limited array of interventions specifically designed for Māori communities with T2D. Examples of interventions offered include health navigators, health communication tools,<sup>17,18</sup> culturally tailored interventions<sup>19,20</sup> and, most recently, a multi-pronged programme.<sup>8</sup> A key feature within these interventions is the relevance of a Māori approach. Collectively they acknowledge a holistic view of health, comprise a co-design or community partnership aspect, Māori knowledge, language<sup>24</sup> and leadership and a multi-disciplinary approach to intervention development and delivery. Across the Māori interventions noted, socioeconomic costs (such as for households, transport and healthy food) were indicated but not investigated.

It is imperative that initiatives aim to observe no worsening of HbA1c are designed and implemented in a way that contributes to better health for Māori.<sup>21</sup>

This article describes a community-based participatory approach to improve outcomes

for whānau Māori with T2D by describing the co-design process employed by Kimi Ora and an overview of the health outcomes. Kimi Ora is part of the broader He Pikinga Waioira project.<sup>22</sup>

Kimi Ora is a whānau-centred lifestyle intervention based in the community focused principally on improving health outcomes for Māori with pre-diabetes or T2D. Kimi Ora was co-designed by several groups: a marae-based service provider (Te Kōhau Health Ltd), locals at participating sites (Melville and Raglan), researchers from the University of Waikato and wider stakeholders (community health and education providers such as school, district health board (DHB) and Ministry of Health staff). The initial design took 18 months to develop.<sup>21</sup> Iterative refinement meant that Kimi Ora was continually reshaped as issues were identified, new evidence came to light and participant feedback was evaluated.<sup>23,24</sup>

Implemented in two communities (a suburb of Hamilton and a rural Waikato township), Kimi Ora comprises 2–3 interactions per week over an eight-week period, with screening and evaluation activities during the weeks at either end. The screening and evaluation weeks are undertaken within a group context, with opportunities for one-on-one interaction between the participant and community facilitator. Regular interactions allow opportunities to form and reinforce culturally relational engagements,<sup>25</sup> as well as to monitor participant involvement, troubleshoot individual and whānau concerns, respond to queries and share successes. Examples of the many resources include week-to-week meal planning that reflect of whānau budgets to allow for incorporation of discount items at local grocery stores; trialling recipe variations for improved nutrition; guidance reading nutritional labels; and discussing alternatives to fast food. These resources ensure participants can integrate learnings into their home environment. Additionally, tailored physical activities were designed to enhance cultural knowledge and provide opportunities to improve their sense of community belonging and their health and wellbeing (eg, exercise sessions and guided walks to cultural sites were open to participants their whānau and the wider community).

## Methods

Participants of Kimi Ora were initially identified through the client database as service-users registered with Te Kōhao Health (TKH) who had either pre-diabetes or T2D. Invitations were sent to those who met the criteria (Māori adults with pre-diabetes or T2D). Given the focus on a whānau-centred approach and the poor uptake of interventions that focus on individuals while ignoring the family/household situation, Kimi Ora looked to impact people in the same household; as such, potential participants were also encouraged to include whānau (whether in the same household or not).

There were three cohorts from within TKH, and two cohorts were later recruited from a rural township located outside of Hamilton. A control group was recruited through the TKH database. This group received the standard diabetes care through their usual primary care team, with members followed-up at approximately eight weeks after their first assessment. At the end of each eight-week round of delivery, control group members (n=21) were invited to participate in the next Kimi Ora cohort.

Kimi Ora was co-designed with regards to its approach, design and measures. The team of service provider staff, clinicians, academics, researchers and whānau advisors settled on a non-randomised pre-intervention/post-intervention design and intervention/control with multi-method data collection. The four areas of focus were: clinical measures selected to capture individual biometric measures of glycaemic control, including glycated haemoglobin (HbA1c), blood pressure, weight, body mass index (BMI) and waist circumference; individual self-reporting, which captured physiological features with known links to weight problems (such as perceived energy levels, hours of sleep,<sup>26</sup> fruit/vegetable servings); whānau engagement, which enabled reflections on household/whānau activities; and community activities, which utilised participant-observation recording of wider community (multiple households) healthy lifestyle, health education activities.

Formal data collection began prior to the eight-week programme and then again

at completion. To assist organising data and assessments, the He Pikinga Waiora framework<sup>22</sup> was used by the research team. Ethical approval was received by the University of Waikato Management School Ethics Committee (15/202).

Baseline measures, including HbA1c, blood pressure, health rate, weight, waist circumference and height, were collected prior to starting and at follow-up at the completion of the programme (post-intervention) for both the participants and the control group. Demographic details were analysed using frequencies or mean/standard deviations. Descriptive statistics of key clinical outcomes included frequencies and charts. All items used the original scale. Data analysis for the outcome measures pre-intervention to post-intervention utilised paired sample t-tests. Analysis for the comparison between intervention and comparison group used independent sample t-tests of the pre/post difference scores. All analyses were completed with SPSS 25.0 (released 2017, Armonk, NY: IBM Corp).

For the self-report and whānau engagement elements, participants completed an interviewer-assisted questionnaire with a community researcher at TKH. The questionnaire was administered to all enrolled participants, including the control group, and covered topics such as self-reported measures of overall feelings of health, food and nutrition, physical activity, lifestyle knowledge and demographic information.

In addition to the use of measures for statistical reporting, interviews with whānau and key stakeholders contributed understanding perceptions, attitudinal shifts and socioeconomic contexts. Lastly, observations at three key community events were held as part of assessing uptake of Kimi Ora.

## Results

There were 35 participants who started and completed an eight-week programme. One participant was excluded from some analyses measures due to pregnancy. Most participants were female (n=31, 89%). Participant ages ranged between 20 and 69 years old (two did not report age). All participants (Kimi Ora and the control group) were of Māori ethnicity. Post-intervention

gains are observed on most variables in the initial analysis of Kimi Ora outcomes (Table 1). Improvement on all clinical measures include median weight loss of 4.71 kg, BMI reduction of 1.80 kg/m<sup>2</sup> and HbA1c reduction (mmol/mol) by 8% of initial level. The latter reduced the sample median from pre-diabetic to normal (44 to 40mmol/mol). Further information, including a descriptive exploration of key outcome variables along with charts to illustrate the changes, is available in the supplementary material.

Food, activity and lifestyle questionnaires showed differences at both individual and whānau level. After the programme, there were minimal changes in hours of sleep, fried foods eaten and dollars spent per week on food. In all other variables, a significant difference was observed over the eight-week period of the programme.

Pre and post measures had to be available in order to be reported. Some results reported have less than 35 participants. The absent individual biomedical measure is the result of a pregnancy exclusion. Although everyone was encouraged to complete all areas of individual self-report, a large number of participants felt uncomfortable reporting their estimated total weekly minutes active (n=13). Missing data from whānau engagement reflect the exclusion of children (under 12 years of age) and missed appointments where measures were recorded for the study.

A second analysis compared the difference in pre-intervention and post-intervention scores between the Kimi Ora participants and the control group (Table 2). Members of the control group were less likely to have all measures done (eg, HbA1c), so the response rates within categories vary. Comparison results observe changes in Kimi Ora participants that are not seen in the control group. Differences in the measures for weight, waist, and BMI show significant improvement in Kimi Ora participants.

Kimi Ora retained 100% of participants. Significant results for median reductions of weight (4.7kg), waistline measures (9.1cm) and BMI (1.8 kg/m<sup>2</sup>) reflect strong impacts for individual Kimi Ora participants when compared to control group participants who observed a median increase in weight, waistline and BMI (-0.2kg, -0.4cms and -0.1 kg.m<sup>2</sup> respectively). Additional to individual

and whānau level engagement, community activities were created to encourage social interaction. Community events such as a community kai, local sports day and a tree planting event were organised as part of Kimi Ora and reflect stakeholder engagement:

The community kai was held at the local primary school. Community members were invited to have food, engage in activities and receive information from seven different sponsoring organisations. There were 200 meals served. The event was so well attended that the food ran out with 30 minutes remaining in the event.

The local sports day was open to the whole community to come and have an enjoyable day “giving it a go.” A free barbeque was available and a range of fun games was offered. The day included a range of stallholders and organisations to assist and guide youth and whānau into future career and lifestyle pathways.

With support and tree donations from the local city council, fruit trees and a vegetable garden were established in the community. The intention of the community garden was to provide low income whānau with free access to fruit and vegetables. This initiative involved engagement and education on planting, growing and maintaining the trees.

## Discussion

This article discusses the design, implementation and outcome evaluation of the Kimi Ora community-based lifestyle intervention for Māori with T2D. The overall aim of Kimi Ora was to improve HbA1c levels for Māori with pre-diabetes and T2D while making lifestyle changes. Results indicate that participants did improve their HbA1c levels. Two variables that could be interpreted as negative results were that fruit servings went down (from 1.56 to 0.91, albeit with an associated increase in servings of vegetables) and processed meat went up (from 2.68 to 3.16). These changes were expected because of the low carbohydrate diets of the participants. Although the increased processed meat intake is not recommended long term, the biomedical measures indicate positive gains in overall health for the short term while participants were monitored by medical support staff from TKH.

**Table 1:** Pre-intervention/post-intervention outcomes for Kimi Ora (N=35).

Outcome	N	Pre		Post	
		M	SD	M	SD
<b>Individual biomedical measures</b>					
Weight (kg)	34	109.2	22.4	***104.4	21.8
Waist (cm)	34	124.7	19.3	***115.6	18.2
BMI (kg/m <sup>2</sup> )	34	40.1	7.2	***38.3	7.1
BP systolic (mmHg)	35	131.9	12.0	**128.3	9.3
BP diastolic (mmHg)	35	84.3	6.7	***81.1	6.0
Resting heart rate (beats per minute)	30	78.0	8.8	*75.8	7.5
HbA1c (mmol/mol)	33	43.9	10.4	***40.3	8.9
<b>Individual self-report</b>					
Physical health (1 = highest level)	34	2.6	1.2	**1.9	0.9
Energy (1 = highest level)	34	3.4	0.7	***2.1	0.5
Emotional problems (1 = highest level)	33	2.3	1.3	**1.6	0.7
Hours of sleep	32	7.8	1.3	7.9	1.3
Fruit servings (5 = highest level)	32	1.6	1.1	**0.9	0.5
Vegetable servings (5 = highest level)	32	1.9	0.9	***3.1	0.9
Water intake (5 = highest level)	32	2.6	1.5	**3.4	1.2
Check nutritional labels (5 = highest level)	32	0.8	1.3	***4.3	1.0
Total weekly minutes active	21	71.2	101.6	**146.9	121.5
<b>Whānau engagement</b>					
Knowledge of physical activity benefits (3 = highest level)	26	1.9	0.7	**2.5	0.5
Knowledge of healthy eating benefits (3 = highest level)	26	1.9	1.0	***2.9	0.4
Knowledge of types of activities (3 = highest level)	24	1.9	0.9	***2.7	0.5
Processed meat (0 = highest level)	25	2.7	0.7	*3.2	1.0
Fast food (0 = highest level)	25	2.3	0.9	**1.6	0.6
Fruit juices (0 = highest level)	25	1.6	1.2	**0.6	0.7
Fried foods (0 = highest level)	26	1.8	0.6	1.5	0.7
Soft drinks (0 = highest level)	25	2.2	1.5	***0.6	0.8
Sweets (0 = highest level)	25	2.2	1.0	***0.8	0.6
Average weekly food spend (\$)	20	210.0	91.9	227.0	84.7
Knowledge of community activism (4 = highest level)	20	1.3	1.0	***2.3	0.6

\*\*\*p&lt;.001; \*\*p&lt;.01, \*p&lt;.05



Table 2: Intervention vs control group.

Outcome	Kimi Ora			Control		
	n	M change	SD	n	M change	SD
<b>Individual biomedical measures</b>						
Weight (kg)	34	***4.7	3.2	21	-0.2	1.0
Waist (cm)	34	***9.1	6.2	16	-0.4	18.2
BMI (kg/m <sup>2</sup> )	34	***1.8	1.4	21	-0.1	.3
BP systolic (mmHg)	35	**3.6	6.1	6	-0.8	2.0
BP diastolic (mmHg)	35	3.2	3.8	6	-4.3	15.6
Heart rate (beats per minute)	30	2.2	4.7	7	0.4	3.8
<b>Individual self-report</b>						
Physical health	34	***0.6	1.0	9	-0.2	0.8
Energy	34	**1.2	0.8	9	0.0	0.9
Emotional problems	33	0.7	1.0	9	-0.2	1.9
Fruit servings	32	-0.7	1.2	8	0.0	0.8
Vegetable servings	32	***1.2	1.1	8	0.0	0.5
Water intake	31	**0.8	1.3	9	-1.1	1.5
Check nutritional labels	32	***3.4	1.5	9	0.1	0.3
<b>Whānau engagement</b>						
Knowledge of physical activity benefits	26	0.6	0.8	6	0.0	0.6
Knowledge of healthy eating benefits	26	*1.0	0.9	6	0.2	0.4
Knowledge of types of activities	24	0.8	0.9	6	0.2	0.8
Processed meat	25	*-0.5	0.9	6	0.3	0.5
Fast food	25	**0.6	1.0	6	0.0	0.0
Fruit juices	25	*1.0	1.5	6	0.2	0.4
Soft drinks	25	1.6	1.6	6	0.7	1.2
Sweets	25	*1.4	1.2	6	0.2	1.5
Knowledge of community activism	20	1.0	1.0	4	0.5	0.6

\*\*\*p<.001; \*\*p<.01, \*p<.05

Kimi Ora participants report improvements in their feelings of physical health, energy levels and their intake of vegetables and water. Nutritional education was a key component of the weekly cooking sessions where participants were able to discuss menus, taste-test a variety of unfamiliar foods and learn new skills, such as interpreting nutritional labels. A difference with regards to checking nutritional labels suggests key learning was transferred to participants through these sessions. Another area of suggested correlation is observed with the doubling of weekly activity minutes (71.2 minutes to 146.9 minutes) and an increase in observed average weekly spend on food (+\$17 per week).

The strong stakeholder relationships that support co-designed programmes such as Kimi Ora are difficult to establish within the usual funding timeframes (of 36 months): project planning and formal relationship building took six months, co-designing Kimi Ora took 18 months of relational engagements and recruitment of the first cohort took three months: that's a total of 27 months. In the remaining project time (five months), delivery of four more cohorts took place alongside the development of systems to support adequate reporting.

Despite approaching clients within a marae-based service provider, it was initially difficult to recruit participants for an unknown and unproven programme through usual channels (primary care doctors, hospital, other providers). Slow initial recruitment engagement indicates that distrust of research among Māori still remains. A strategy to mitigate recruitment reluctance is to foster research relationships with whānau recruits. Their involvement, in addition to highly engaged stakeholder groups across multiple interests, will impact the pace of the programme. Decision-making processes and access to resources were difficult conversations to navigate at times. Future programmes similar to Kimi Ora will need to factor such delays into project planning or risk non-delivery. By the time systems were agreed upon and organised to record changes, the first cohort had nearly finished the eight-week programme. Observed gains quickly spread by word of mouth among other TKH clients. Subsequent recruitment became easier. The high

demand for in-person interactions and the provision of support needed to undertake research components (obtain biomedical measures, survey assistance and project evaluation) meant participant cohort numbers were intentionally kept small.

Initiatives aiming to improve health outcomes for Māori need to be co-designed and co-produced with communities and key stakeholders in a manner that reflects the realities of the intended communities.<sup>29</sup> Kimi Ora was implemented in communities with many low-income households. The high cost of healthy food<sup>19, 30</sup> is a known barrier to maintaining a healthy diet for Indigenous peoples. Thus, the meal planning component of Kimi Ora was tailored to be flexible and responsive to participants' incomes and what was on special at the supermarket on a week-to-week basis. The reflexive process within Kimi Ora helped to ensure the programme was relevant and remained engaging for participants. When barriers or challenges emerged, adjustments became necessary to ensure Kimi Ora remained fit for purpose. Incorporating community voices during and after design and delivery contributed to feelings of control. For instance, pre-pilot interviews with service users highlighted key issues for whānau. Strategies to navigate key issues were then integrated into the programme design.<sup>24,25</sup>

Health service providers and governments tend to adopt a top-down, dictatorial approach to healthcare interventions, essentially inviting Māori along on a journey designed by, for and with another group, rather than creating a space for partnership. Key points of note from this study are the positive outcomes for participants involved in the intervention compared to the comparison group. Although the improvement in biomedical measures assessed cannot be overlooked, particularly when considering the impact of diabetes and its complications, the retention rate of Kimi Ora signals added contributing factors to the success. The outcomes of Kimi Ora highlight how actively tailoring programmes for and working with participants can function to increase engagement and retention of the intervention while achieving health gains. As this and similar projects demonstrate,<sup>9,20,29</sup> community-based, community-owned health initiatives that are responsive and flexible

to the needs of the people involved can improve the health of participants, enable greater rates of engagement and retention, allow for a sense of ownership, cultivate participants supporting and championing the programme and have broader benefit to the community beyond the participants alone.

This research highlights that a community-based, participatory and co-design process that truly involves the community is vital to ensure greater uptake of the resulting intervention. Health research consultation includes a snapshot of people's experiences regarding a particular issue to design a service or intervention that is then

implemented in that community. However, a consultation approach does not reflect genuine and effective engagement with communities.<sup>21</sup> Rather, a community-based, participatory and co-design approach involves a relationship of partnership and reciprocity between researchers and the community throughout the research.<sup>23,28</sup> Such an approach to research can ensure effective implementation, dissemination, uptake and sustainability.<sup>27</sup> These two key features speak to the overall positive outcomes and, as such, are vital to consider when designing and implementing health interventions, particularly with Indigenous communities.



**Competing interests:**

Nil.

**Acknowledgements:**

We would like to thank the following people assisted our team: whānau participants, clinical personnel, wider health provider support staff and other knowledgeable experts who worked with us. Acknowledgement also goes to: Lady Tureiti Moxon and Denise Kingi (of Te Kōhao Health), who were our collaboration partner; Professor John Oetzel and Associate Professor Maui Hudson, who were involved in the broader project funding acquisition and implementation; and Moana Rarere, Rewa Gilbert and Charis Brown, who provided project administration support and assistance. This research was funded by the Healthier Lives National Science Challenge HL-T1CR-D 13058/1 SUB1320.

**Author information:**

Bridgette Masters-Awatere: Associate Professor, School of Psychology, University of Waikato, Hamilton.

Shemana Cassim: Research Fellow, National Institute of Demographic and Economic Analysis, University of Waikato, Hamilton.

Jade Tamatea: Endocrinologist & Senior Lecturer, Waikato District Health Board, Hamilton & Te Kupenga Hauora Māori, University of Auckland.

Nina Scott: Clinical Director Māori Public Health, Waikato District Health Board, Hamilton.

Chae Simpson: Community Researcher, Te Kōhao Health Ltd, Hamilton.

Cherie Paekau: Clinical Exercise Physiologist, Te Kōhao Health Ltd, Hamilton.

**Corresponding author:**

Bridgette Masters-Awatere, Associate Professor, School of Psychology, University of Waikato, Hamilton, 07 837 9228 (DDI)

bridgette.masters-awatere@waikato.ac.nz

**URL:**

[www.nzma.org.nz/journal-articles/he-pikinga-waiora-kimi-ora-lifestyle-programme-case-study-of-a-successful-community-based-indigenous-diabetes-intervention](http://www.nzma.org.nz/journal-articles/he-pikinga-waiora-kimi-ora-lifestyle-programme-case-study-of-a-successful-community-based-indigenous-diabetes-intervention)

**REFERENCES**

- Rice K, Te Hiwi B, Zwarenstein M, Lavallee B, Barre DE, Harris SB; FORGE AHEAD program team. Best Practices for the Prevention and Management of Diabetes and Obesity-Related Chronic Disease among Indigenous Peoples in Canada: A Review. *Can J Diabetes*. 2016 Jun;40(3):216-25. doi: 10.1016/j.cjcd.2015.10.007. Epub 2016 Apr 7. PMID: 27066857.
- Ministry of Health (published online 30 September 2020) Virtual Diabetes Register [Internet]. Available from: <https://www.health.govt.nz/our-work/diseases-and-conditions/diabetes/about-diabetes/virtual-diabetes-register-vdr>
- Ministry of Health. 2013/2014 New Zealand Health Survey 2014 2 Dec 2020 [Internet]. Available from: <https://www.health.govt.nz/our-work/populations/maori-health/tatau-kahukura-maori-health-statistics/nga-mana-hauora-tutohu-health-status-indicators/diabetes>
- Walsh M, Grey C. The contribution of avoidable mortality to the life expectancy gap in Māori and Pacific populations in New Zealand—a decomposition analysis. *N Z Med J*. 2019 Mar 29;132(1492):46-60. PMID: 30921311
- Coppell K, Mann J, Williams SM, Jo E, Drury PL, Miller J, Parnell W. Prevalence of diagnosed and pre-diabetes in New Zealand: findings from the 2008/09 Adult Nutrition Survey. *NZ Med J* 2013;126(1370):23-42.
- Waitangi Tribunal. Hauora: Report on Stage One of the Health Services and Outcomes Kaupapa Inquiry (Report no. WAI 2575). Wellington, New Zealand: Waitangi Tribunal; 2019. Available from: <https://www.waitangitribunal.govt.nz/news/report-on-stage-one-of-health-services-and-outcomes-released/>
- Giugliano D, Maiorino MI, Bellastella G, Esposito K. Clinical inertia, reverse clinical inertia, and medication non-adherence in type 2 diabetes. *J Endocrinol Invest*. 2019 May;42(5):495-503. doi: 10.1007/s40618-018-0951-8. Epub 2018 Oct 6. PMID: 30291589.
- Harwood M, Tane T,

- Broome L, Carswell P, Selak V, Reid J, et al. Mana Tū: a whānau ora approach to type 2 diabetes. *N Z Med J*. 2018;131(1485):76-83.
9. Herman WH, Zimmet P. Type 2 diabetes: an epidemic requiring global attention and urgent action. *Diabetes Care*. 2012 May;35(5):943-4. doi: 10.2337/dc12-0298. PMID: 22517937; PMCID: PMC3329834.
  10. Howard H. Politics of Culture in Urban Indigenous Community-Based Diabetes Programs. *American Indian Culture and Research Journal*. 2014;38(1):49-72.
  11. Jacklin KM, Henderson RI, Green ME, Walker LM, Calam B, Crowshoe LJ. Health care experiences of Indigenous people living with type 2 diabetes in Canada. *Canadian Medical Association Journal*. 2017;189(3):E106.
  12. Yashadhana A, Fields T, Blitner G, Stanley R, Zwi AB. Trust, culture and communication: determinants of eye health and care among Indigenous people with diabetes in Australia. *BMJ Glob Health*. 2020 Jan 9;5(1):e001999. doi: 10.1136/bmjgh-2019-001999. PMID: 32133172; PMCID: PMC7042588.
  13. St Clair M, Murtagh D, Kelly J, Ford PL, Wallace R. Telehealth: A Game Changer - Closing the Gap in Remote Indigenous Health in Three Remote Homeland Communities in the Laynhapuy Homelands, East Arnhem, Northern Australia. *Stud Health Technol Inform*. 2018;252:132-8. PMID: 30040695.
  14. Janssen J, Nelson K. Meeting the needs of Māori with diabetes: Evaluation of a nurse-led service. *Nurs Praxis NZ*. 2014;30(3):6-18.
  15. Tag H, Kalita P, Dwivedi P, Das AK, Namsa ND. Herbal medicines used in the treatment of diabetes mellitus in Arunachal Himalaya, northeast, India. *J Ethnopharmacol*. 2012 Jun 14;141(3):786-95. doi: 10.1016/j.jep.2012.03.007. Epub 2012 Mar 13. PMID: 22433536.
  16. Sellman D, Schroder R, Deering D, Elmslie J, Foulds J, & Frampton C. Psychosocial enhancement of the Green Prescription for obesity recovery: a randomised control trial. *NZ Med J*. 2017;130(1450). Available from: <https://www.nzma.org.nz/journal-articles/psychosocial-enhancement-of-the-green-prescription-for-obesity-recovery-a-randomised-controlled-trial>
  17. Farmer A, Edgar T, Gage J, Kirk R. "I Want to Walk with My Moko." The Application of Social Cognitive Theory in the Creation of a Diabetes Prevention Documentary with New Zealand Māori. *J Health Commun*. 2018;23(3):306-12. doi: 10.1080/10810730.2018.1442531. Epub 2018 Feb 22. PMID: 29469669.
  18. Farmer A, Gage J, Kirk R, Edgar T. Applying Community-Based Participatory Research to Create a Diabetes Prevention Documentary with New Zealand Māori. *Progress in community health partnerships: research, education, and action*. 2016;10(3):383-90.
  19. Murphy E, McAuley KA, Bell D, McLay RT, Chisholm A, Hurley R, et al. A new approach to design and implement a lifestyle intervention programme to prevent type 2 diabetes in New Zealand Maori. *Asia Pac J Clin Nutr*. 2003;12(4):419-22. PMID: 14672865.
  20. Coppel KJ, Tipene-Leach DC, Pahau HL, Williams SM, Abel S, Iles M, et al. Two-year results from a community-wide diabetes prevention intervention in a high risk indigenous community: the Ngati and Healthy project. *Diabetes Res Clin Pract*. 2009 Aug;85(2):220-7. doi: 10.1016/j.diabres.2009.05.009. Epub 2009 Jun 13. PMID: 19525026.
  21. Harding T, Oetzel J. Implementation effectiveness of health interventions for indigenous communities: a systematic review. *Implement Sci* 2019 Aug 5;14(1):76. doi: 10.1186/s13012-019-0920-4. PMID: 31382994; PMCID: PMC6683565.
  22. Oetzel J, Scott N, Hudson M, Masters-Awatere B, Rarere M, Foote J, Beaton A, Ehau T. Implementation framework for chronic disease intervention effectiveness in Māori and other indigenous communities. *Global Health*. 2017 Sep 5;13(1):69. doi: 10.1186/s12992-017-0295-8. PMID: 28870225; PMCID: PMC5584010.
  23. Rarere M, Oetzel J, Masters-Awatere B, Scott N, Wihapi R, Manuel C, Gilbert R. Critical reflection for researcher-community partnership effectiveness: the He Pikinga Waiora process evaluation tool guiding the implementation of chronic condition interventions in Indigenous communities. *Aust J Prim Health*. 2019 Nov;25(5):478-485. doi: 10.1071/PY19022. PMID: 31506161.
  24. Oetzel J, Rarere M, Wihapi R, Manuel C, Tapsell J. A case study of using the He Pikinga Waiora Implementation Framework: challenges and successes

- in implementing a twelve-week lifestyle intervention to reduce weight in Māori men at risk of diabetes, cardiovascular disease and obesity. *Int J Equity Health*. 2020;19(1):103.
25. Masters-Awatere B, Rarere M, Gilbert R, Manuel C, Scott N. He aha te mea nui o te ao? He tāngata! (What is the most important thing in the world? It is people!). *Aust J Prim Health*. 2019 Nov;25(5):435-42. doi: 10.1071/PY19027. PMID: 32171366.
  26. Patel, S., & Hu, F. (2008) Short sleep duration and weight gain: A systematic review. *Obesity (Silver Spring)*. 2008 Mar;16(3):643-53. doi: 10.1038/oby.2007.118. Epub 2008 Jan 17. PMID: 18239586; PMCID: PMC2723045.
  27. Teng A, Blakely T, Scott N, Jansen R, Masters-Awatere B, Krebs J, Oetzel, J. What protects against pre-diabetes progressing to diabetes? Observational study of integrated health and social data. *Diabetes Res Clin Pract*. 2019 Feb;148:119-29. doi: 10.1016/j.diabres.2018.12.003. Epub 2019 Jan 8. PMID: 30633935.
  28. Smith, LT. *Decolonizing methodologies: Research and indigenous peoples*. 2021. Zed Books Ltd.
  29. Tipene-Leach DC, Coppell KJ, Abel S, Pahau HL, Ehau T, Mann JI. Ngati and healthy: Translating diabetes prevention evidence into community action. *Ethn Health*. 2013;18:402-14. doi: 10.1080/13557858.2012.754406. Epub 2013 Jan 29. PMID: 23360172.
  30. Moeke-Pickering T, Heitia M, Heitia S, Karapu R, Cote-Meek S. Understanding Māori food security and food sovereignty issues in Whakatāne. *MAI Journal [Internet]*. 2015; 4(1). Available from : <http://www.journal.mai.ac.nz/content/understanding-m%C4%81ori-food-security-and-food-sovereignty-issues-whakat%C4%81ne>.