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KA ORA, KA AKO | NEW ZEALAND HEALTHY SCHOOL LUNCHES PROGRAMME IMPACT EVALUATION

Technical Report and Appendices

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31 October 2022

Authorship

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We work with our partners and clients to ensure the right data and the right insight are brought to every project. Dr Eberhard Feess provided guidance on the evaluation design, Owen Hall MSc (statistician) and Dr Michele Morris provided guidance and peer review in the analytical approach and decisions.

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Images: Ministry of Education

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Appendix A: Wellbeing among secondary-school aged ākonga

Method

Learner wellbeing questionnaire

To estimate the effects of the Ka Ora, Ka Ako programme on secondary school-aged ākonga wellbeing, ākonga were asked to complete a wellbeing questionnaire in May 2022. Apart from collating demographic information about the ākonga (age, gender and ethnicity), the questionnaires were developed to measure ākonga wellbeing and for context, their food behaviours. The questionnaire consisted of different measures. These were:

1. WHO-5 (World Health Organisation 5-Wellbeing Index):[1] The WHO-5 is an internationally recognised measure of mental wellbeing, and among the most widely used questionnaires assessing subjective psychological wellbeing in the world. The wellbeing index is a short and simple assessment and is appropriate for children aged nine and older. It is based on five individual items measuring positive mood (good spirits, relaxation), vitality (being active, waking up fresh and rested), and general interest (being interested in things). The WHO-5 has been found to have high clinimetric validity, can be used as an outcome measure balancing the wanted and unwanted effects of treatments, is a sensitive and specific screening tool for depression, and its applicability across study fields is very high.[2]

2. PedsQL™ (Pediatric Quality of Life Inventory, Generic Core scale, Version 4.0 – Australian English, Child self-report 13-18[3]): PedsQL™ is a widely used and brief measure of quality of life. It is a multidimensional scale measuring physical, emotional, social and school functioning of the child. It estimates the quality of life as a total score as well as physical health and psychosocial health. The PedsQL™ has been found to be a valid and reliable scale, applicable in clinical trials, research, clinical practice, school health settings, and community populations.[4]

3. Hua Oranga[5] (individual self-assessment): Hua Oranga is a wellbeing measure developed in New Zealand and is aligned to the Framework for Measuring Māori Wellbeing (Durie 2006). It measures outcomes consistent with Māori concepts of health and wellness: wairua (spiritual wellbeing), tinana (physical wellbeing), hinengaro

[1] https://www.psykiatri-regionh.dk/who-5/Pages/default.aspx
[2] Christian Winther Topp, Søren Dinesen Østergaard, Susan Søndergaard, Per Bech (2015), The WHO-5 Well-Being Index: a systematic review of the literature, Psychotherapy and Psychosomatics, 84(3):167-76.
[3] The license to use the instruction was purchased specifically for this evaluation.
[4] J W Varni 1, M Seid, P S Kurtin (2001). PedsQL 4.0: reliability and validity of the Pediatric Quality of Life Inventory version 4.0 generic core scales in healthy and patient populations, Medical Care 2001, Aug: 39(8): 800-12.
[5] Kingi, TK, M. Durie (1997). Framework for Measuring Maori Mental Health Outcomes. A report prepared for the Ministry of Health, Department of Maori Studies, Massey University, Palmerston North, https://www.massey.ac.nz/massey/fms/Te%20Mata%20O%20Te%20Tau/Reports%20-%20Te%20Kani/T%20Kingi%20&%20M%20Durie%20Hua%20Oranga%20A%20maori%20measure%20of%20mental%20health%20outcome.pdf, downloaded December 2021.

(mental wellbeing) and whānau (family and relationship wellbeing). The tool was developed for use by individuals within the clinical setting, and ideally including consideration among those around whaiora – notably the whānau and clinician. Nonetheless, Hua Oranga can be used as a self-assessment tool. Hua Oranga, as noted by Kingi, was developed and is theoretically sound as a cultural measure but needs to complement more clinically focused, targeted measures. Nevertheless, some evidence is available on the adequateness of the instrument's psychometric properties for use with Māori and Pacific people.[6]

4. Food consumption: Bespoke measures about food availability and consumption were developed specifically for the Ka Ora, Ka Ako evaluation. The evaluation didn't have the opportunity to collect baseline information. Although food consumption in school and kura has likely changed for ākonga within the programme, the broader context and food security would likely have remained the same outside of school, such as at home. Understanding food consumption and availability at home was therefore used to identify those ākonga most underserved in terms of food security.[7]

The responses to these measures provide estimates that reflect the previous five days at school or kura, and the previous week at home (food consumption), and the previous two weeks (WHO-5) or month (PedsQL™) for the wellbeing measures.

The instrument underwent two rounds of testing, in addition to incorporating feedback and views from the Ministry of Education. Different testing techniques were used, including groups of researchers undertaking practice sessions as well as individual cognitive tests facilitated with three ākonga within the age range targeted for the survey.[8] The evaluation team modified the questionnaire as a result of this process.[9] The subsequent instrument is provided overleaf.

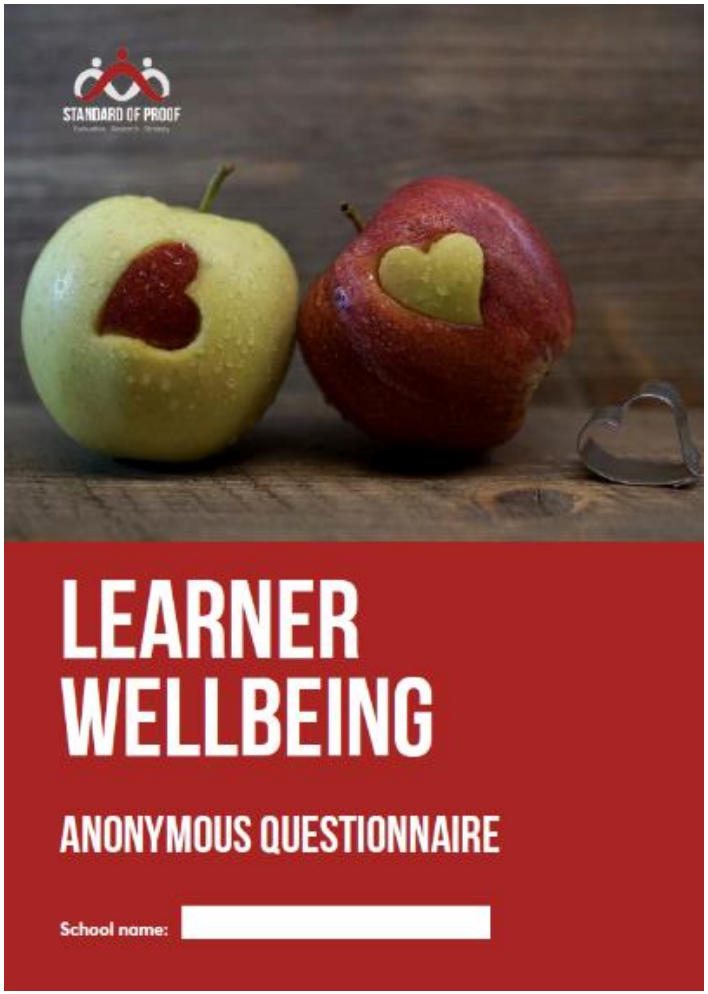
[6] Matire Harwood, Mark Weatherall, Api Talemaitoga, P Alan Barber, John Gommans, William Taylor, Kathryn McPherson, Harry McNaughton (2012). An assessment of the Hua Oranga outcome instrument and comparison to other outcome measures in an intervention study with Māori and Pacific people following stroke. NZMJ 26 October 2012, Vol 125 No 1364; ISSN 1175 8716

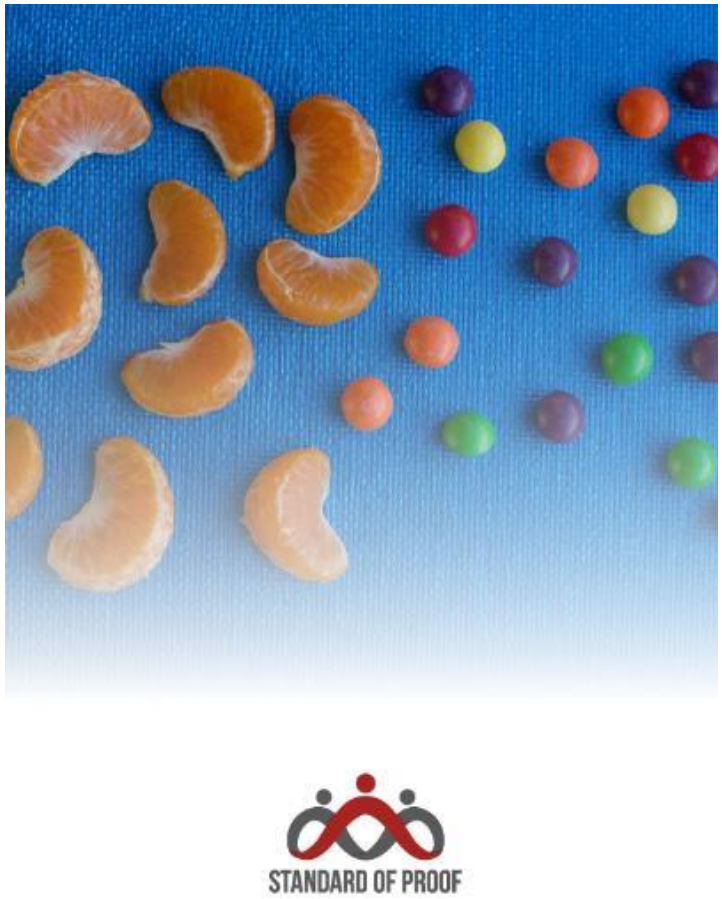
[7] Fram, M.S., et al., 2010. Children are aware of food insecurity and take responsibility for managing food resources. Journal of Nutrition, 141: p. 1114-1119: "The context of child compared with adult food insecurity differs in important ways as well. Prior research with adults has indicated that the money/economic context in which food experiences take place is key to distinguishing food insecurity from other phenomena that may manifest in similar ways (e.g. cutting back portions because of money constraints vs. a desire to lose weight). This is evident in the USDA measurement approach in which each question is conditioned on not having enough money to buy food (e.g. ". . . did you ever eat less than you felt you should because there wasn't enough money to buy food?"). Children, however, talk about food insecurity in terms of their direct experiences of the household food environment. Rather than worrying about not having money to buy food, children worry when they see less food (or less desirable food) in the home, when they are given or allowed different or less food to eat, and when they see parents behaving differently vis-á-vis mealtimes and food management.

[8] Those included in the testing ranged in age (12-16 years), ethnicity (Pākeha and Māori), and sex (male and female), and included one individual with a sight impairment.

[9] To improve reliability, we changed from the more generic frequency response scale ("never", "sometimes", etc) to more specific frequency scale (e.g. number of days per week); and modified the order of the questions, separating home-relevant questions from school-relevant questions. To reduce social-desirability bias, modified item focus away from inadequacy ('how often did you go hungry because there was not enough food available at home') towards sufficiency ('I had access to enough food to feel 'just right' at home).

Figure 1: Learner wellbeing questionnaire





Survey of learner wellbeing as part of the evaluation of the Ka Ora, Ka Ako programme

Information for secondary school learners

Te Tāhuhu o te Mātauranga Ministry of Education (the Ministry) delivers a school lunch programme, Ka Ora, Ka Ako. This programme provides healthy school lunches to learners in Aotearoa New Zealand. The programme aims to improve access to quality food and increase wellbeing of learners.

The Ministry needs to know if Ka Ora, Ka Ako is making a difference to learners' wellbeing and school attendance. It wants to make sure learners are getting the right support.

Why are we doing this evaluation?

The programme has so far given out over 30 million lunches to more than 205,000 learners in 873 schools. We are asking you to take part in this evaluation to help the Government understand if the programme is making a difference to learners.

The evaluation will collect, store and use personal information in line with the Privacy Act 2020.

Who is doing the evaluation?

The Ministry asked an independent research and evaluation company, Standard of Proof, to evaluate the programme. Standard of Proof is asking learners in secondary schools to complete this short questionnaire about their food and wellbeing. This includes learners receiving the school lunches, and those not receiving them.

Standard of Proof will collect and store the information on their computer system while the evaluation is happening. They will securely delete all the information six months after the report is done in October 2022.

What does the survey include?

The questions ask about your food and wellbeing. It will take about 10 minutes to do.

Who can help me complete the questionnaire?

Staff at your school can help you if you have any questions. Your school will send your (unnamed) answers to these questions to the research company Standard of Proof.

What if I don't want to complete the questionnaire?

If you don't want to complete the questionnaire that's not a problem. Nothing will happen to you if you don't want to do it. Your school knows it's up to you and understands it's your choice. You can tell your teachers you don't want to take part, or you can return your closed, incomplete booklet to them.

What if I complete the questionnaire and later want to edit my answers or change my mind about taking part?

The questionnaire is anonymous. This means we would not be able to find your questionnaire to send it back to you to change. Make sure you are happy with your answers before handing it in.

Are there any risks from doing the questionnaire?

There are no known risks from doing the questionnaire. Your name will not be collected, only your unnamed answers. After the evaluation ends in October 2022, the Ministry will make the evaluation report public and won't identify anyone who took part.

Are there any benefits for me for doing the questionnaire?

The questionnaire will be used evaluate the programme, and assess if there are any benefits of the programme for learners. It will not be used to select (or deselect) specific schools to receive school lunches.

How will my information be used?

Your (unnamed) answers will be combined with other learners' answers. These answers will be analysed as a group, and reported to the Ministry and your school. The report will be made available online, on a government website.

Standard of Proof will compare the results between learners receiving and not receiving school lunches so they can see if the programme makes a difference to wellbeing. This information will help us advise whether the Ministry might need to make changes to better support learners. The final report will be made available to everyone online.

Standard of Proof will also put answers together from your school to show the overall wellbeing effect for your school community.

Your information will not be used for any other purpose.

What if I have questions or want to know more?

If you have any questions about the evaluation, contact Standard of Proof (team@standardofproof.nz). To find our more contact the Ministry (school.lunches@education.govt.nz). You can also ask for a copy of the evaluation report after October 2022.

What if I want to take part?

You can answer the questions and then return this booklet to the school staff.

1. Are you:

Circle one

Male	Female	Other

2. How old are you?

Circle one

12	13	14	15	16	17	18	19	Other

3. Which ethnic group do you belong to?

Circle all that apply to you

New Zealand European	Māori	Samoan	Cook Islands Māori
Tongan	Niuean	Chinese	Indian
Other, e.g. Dutch, Japanese, Tokelauan			

4. In the past week, how often did you access and eat different types of food at home?

Circle one for each statement		0	1	2	3	4
1	I ate fresh fruit at home	Never	1-2 days in the past week	3-4 days in the past week	5-6 days in the past week	Every day
2	I ate fresh or cooked vegetables at home	Never	1-2 days in the past week	3-4 days in the past week	5-6 days in the past week	Every day
3	I drank a can, bottle or glass of fizzy drink at home	Never	1-2 days in the past week	3-4 days in the past week	5-6 days in the past week	Every day
4	I ate snacks and sweets at home, such as chippies, lollies, biscuits or chocolates	Never	1-2 days in the past week	3-4 days in the past week	5-6 days in the past week	Every day
5	I had access to enough food to feel 'just right' at home (not too hungry and not too full)	Never	1-2 days in the past week	3-4 days in the past week	5-6 days in the past week	Every day

5. In the past ONE month, how much of a problem has this been for you...

ABOUT MY HEALTH AND ACTIVITIES (PROBLEMS WITH...)		NEVER	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
1	It is difficult for me to walk more than 100 meters	0	1	2	3	4
2	It is difficult for me to run	0	1	2	3	4
3	It is difficult for me to play sport or do exercise	0	1	2	3	4
4	It is difficult for me to lift something heavy	0	1	2	3	4
5	It is difficult for me to have a bath or shower by myself	0	1	2	3	4
6	It is difficult for me to help around the house	0	1	2	3	4
7	I get aches and pains	0	1	2	3	4
8	I have low energy	0	1	2	3	4

ABOUT MY FEELINGS (PROBLEMS WITH...)		NEVER	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
1	I feel afraid or scared	0	1	2	3	4
2	I feel sad	0	1	2	3	4
3	I feel angry	0	1	2	3	4
4	I have trouble sleeping	0	1	2	3	4
5	I worry about what will happen to me	0	1	2	3	4

HOW I GET ALONG WITH OTHERS (PROBLEMS WITH...)		NEVER	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
1	I have trouble getting along with other teenagers*	0	1	2	3	4
2	Other teenagers do not want to be my friend	0	1	2	3	4
3	Other teenagers tease me	0	1	2	3	4
4	I cannot do things that other people my age can do	0	1	2	3	4
5	It is hard to keep up with other teenagers	0	1	2	3	4

ABOUT SCHOOL (PROBLEMS WITH...)		NEVER	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
1	It is hard to pay attention in class	0	1	2	3	4
2	I forget things	0	1	2	3	4
3	I have trouble keeping up with my school work	0	1	2	3	4
4	I am away from school because I feel sick	0	1	2	3	4
5	I am away from school to go to the doctor or hospital	0	1	2	3	4

*young people your age

6. Thinking about the last 5 days you were at school, how often did you access and eat different types of food while at school?

Circle one for each statement

		0	1	2	3
1	I ate fresh fruit at school	None of the last 5 days	1-2 days out of the last 5	3-4 days out of the last 5	All of the last 5 days
2	I ate fresh or cooked vegetables at school	None of the last 5 days	1-2 days out of the last 5	3-4 days out of the last 5	All of the last 5 days
3	I drank a can, bottle or glass of fizzy drink at school	None of the last 5 days	1-2 days out of the last 5	3-4 days out of the last 5	All of the last 5 days
4	I ate snacks and sweets at school, such as chippies, lollies, biscuits or chocolates	None of the last 5 days	1-2 days out of the last 5	3-4 days out of the last 5	All of the last 5 days
5	I had access to enough food to feel 'just right' at school (not too hungry and not too full)	None of the last 5 days	1-2 days out of the last 5	3-4 days out of the last 5	All of the last 5 days

7. Please indicate for each of the five statements which is closest to how you have been feeling over the last two weeks.

Circle one for each statement

OVER THE LAST TWO WEEKS		ALL OF THE TIME	MOST OF THE TIME	MORE THAN HALF OF THE TIME	LESS THAN HALF OF THE TIME	SOME OF THE TIME	AT NO TIME
1	I have felt cheerful and in good spirits	5	4	3	2	1	0
2	I have felt calm and relaxed	5	4	3	2	1	0
3	I have felt active and vigorous	5	4	3	2	1	0
4	I woke up feeling fresh and rested	5	4	3	2	1	0
5	My daily life has been filled with things that interest me	5	4	3	2	1	0

8. Tick the response for each category which best reflects the way you are feeling now

1 WAIRUA — SPIRITUAL WELLBEING

	TICK ONE	
I feel that my spiritual health is **extremely good** at present	____	5
I feel that my spiritual health is **good** at present	____	4
I feel that my spiritual health is **just okay** at present	____	3
I feel that my spiritual health is **not good** at present	____	2
I feel that my spiritual health is **very bad** at present	____	1

2 TINANA — PHYSICAL WELLBEING

	TICK ONE	
I feel that my physical health is **extremely good** at present	____	5
I feel that my physical health is **good** at present	____	4
I feel that my physical health is **just okay** at present	____	3
I feel that my physical health is **not good** at present	____	2
I feel that my physical health is **very bad** at present	____	1

3 HINENGARO — MENTAL WELLBEING

	TICK ONE	
I feel that my mental health is **extremely good** at present	____	5
I feel that my mental health is **good** at present	____	4
I feel that my mental health is **just okay** at present	____	3
I feel that my mental health is **not good** at present	____	2
I feel that my mental health is **very bad** at present	____	1

4 WHĀNAU — FAMILY AND RELATIONSHIP WELLBEING

	TICK ONE	
I feel that my relationships with my whānau are **extremely good** at present	____	5
I feel that my relationships with my whānau are **good** at present	____	4
I feel that my relationships with my whānau are **just okay** at present	____	3
I feel that my relationships with my whānau are **not good** at present	____	2
I feel that my relationships with my whānau are **very bad** at present	____	1

If you would like to talk to anyone about your responses, please contact your school guidance counsellor or school leader.

Sampling strategy

The objective of this evaluation was to estimate the effects of the programme, and comparison groups are necessary to examine the effects above and beyond what would have been achieved otherwise (without the programme). A randomised trial is not possible in this instance given the programme was fully implemented by the time the evaluation was commissioned, and nearly all eligible schools and kura were providing lunches to their ākonga at this time.

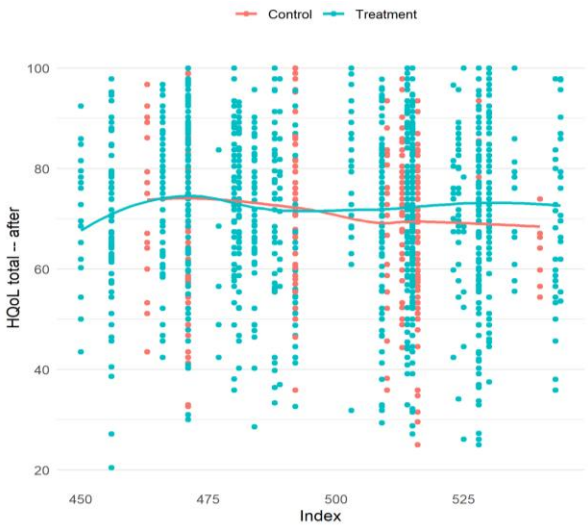
A matched-comparison group design consists of a group that are receiving the programme (our 'treatment'), and a group that are not receiving the programme (our 'comparison'). For valid comparisons to be made, it is important that both groups are similar prior to the introduction of the programme, otherwise any measured differences between the groups may be due to factors that have nothing to do with the programme.

The Equity Index (EQI) provided an opportunity to identify similar populations of ākonga. The EQI is calculated for each child using information contained within the Statistics New Zealand Integrated Data Infrastructure (IDI). The EQI estimates the extent to which a child faces socio-economic barriers that may influence their likelihood of achieving in education. These individual child-level EQI scores are aggregated as an average across the school population, and this school-level estimate approximates socio-economic barriers within the school and is used by the programme to identify eligible schools as those at or above 461.

Although the eligibility to the programme depends on the aggregated EQI score of a school, it is likely that ākonga within each school are quite different in terms of needs. This assumption was tested using the data from the Ka Ora, Ka Ako interim evaluation[10]data, examining the spread of wellbeing scores (vertical Y-axis) for primary and intermediate ākonga (dots) within schools according to the schools' EQI (horizontal X-axis). Figure 2 clearly shows that there is a very broad range of wellbeing scores within each school or kura, illustrated by the overall spread of dots vertically.

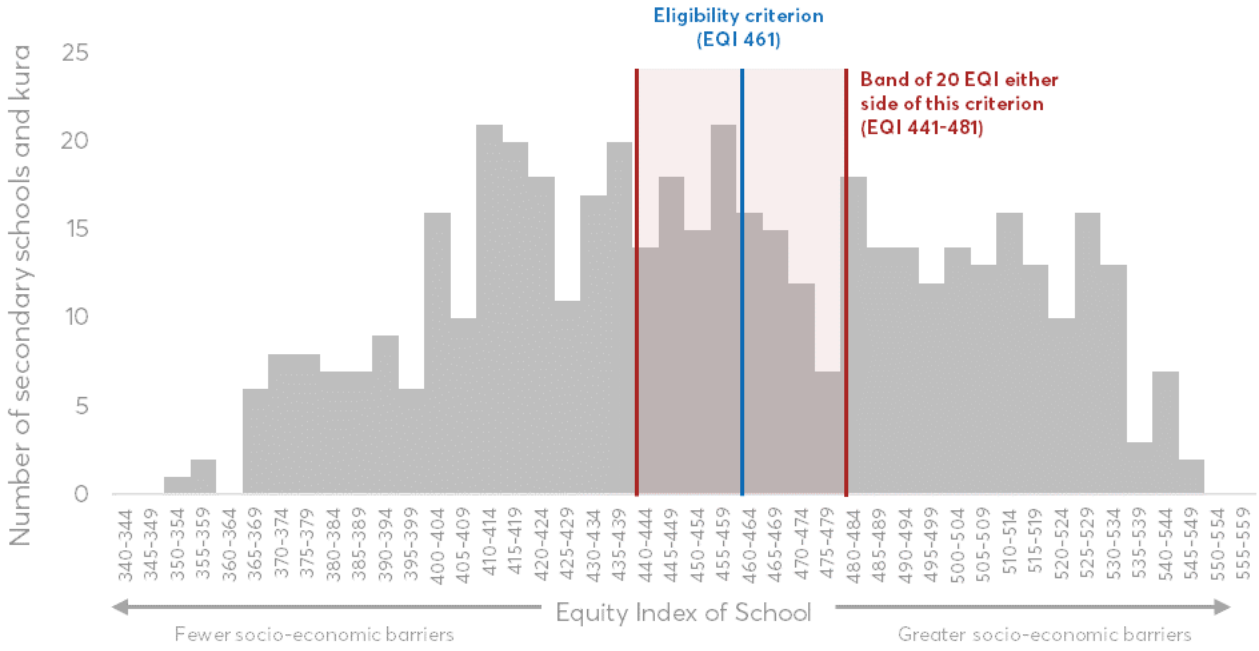
[10] Vermillion Peirce, P., E. Blackie, M. Morris, B. Jarvis-Child and S. Engelbertz (2021). New Zealand Healthy School Lunch pilot Ka Ora, Ka Ako Interim Evaluation. Ministry of Education. https://assets.education.govt.nz/public/Ka-Ora-Ka-Ako-Evaluation_ImpactFinal_20210517_revisedFINAL.pdf

Figure 2: Ka Ora, Ka Ako interim evaluation data (published 2021), showing the difference in overall Health Quality of Life (HQoL) for ākonga in schools and kura at different EQI levels, comparing both ākonga in schools and kura receiving the programme (treatment) with ākonga in schools and kura not yet receiving the programme (control)



The evaluation took advantage of this school-level variation and applied a cluster sampling approach and a Regression Discontinuity Design (RDD) to evaluate the programme. This means we surveyed ākonga within the schools (our 'cluster'), selecting the specific schools and kura around the eligibility threshold and comparing groups of ākonga in schools and kura immediately above (within the programme) and below (not in the programme) this threshold. The distribution of ākonga in schools and kura (providing for secondary school-aged ākonga) around this threshold is shown below.

Figure 3: The distribution of secondary schools and kura across bands of the Equity Index.

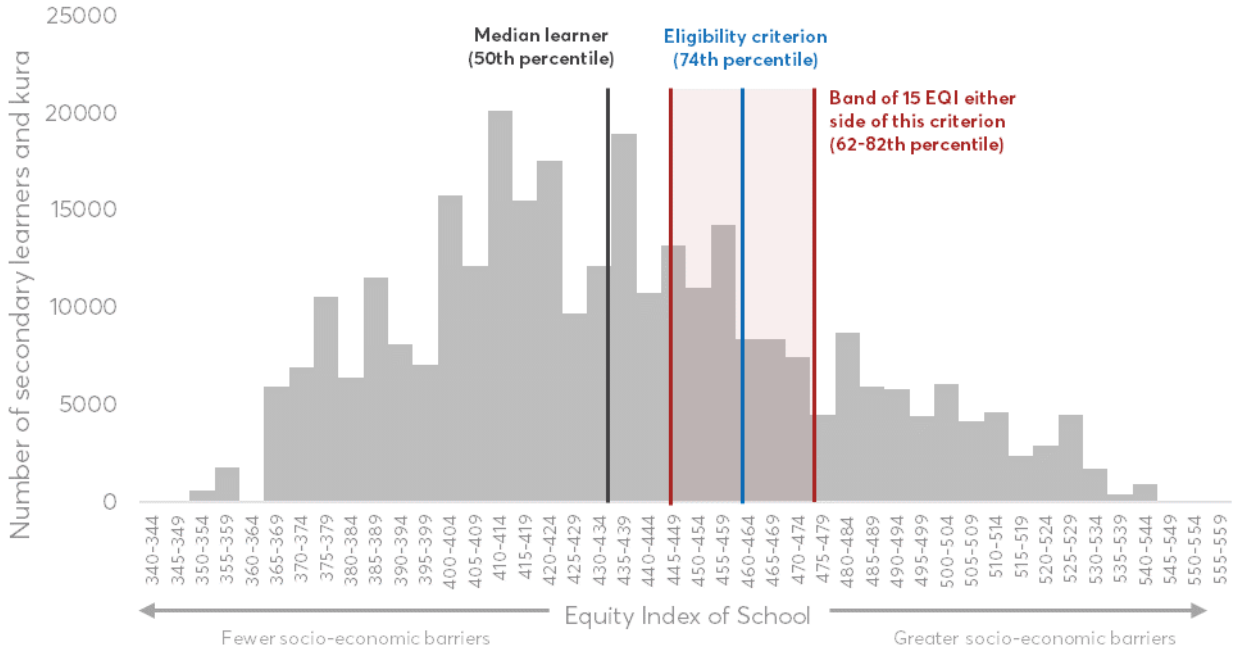


The school populations should be, on average, almost identical, and selecting a narrow band around the threshold is certainly one way to do this. The bandwidth was selected, notably including schools and kura providing for secondary ākonga within the EQI band 440-480, to provide a sufficient sample of secondary ākonga for the evaluation. Further balance tests across the control and treatment schools and kura (c.f. Table 3) and the selected bandwidth (c.f. Tables 4-6) were carried out to confirm comparability, and ultimately the rigour of our impact estimates.

Cohort characteristics

The sample of ākonga within the selected secondary schools and kura was unique from the population of ākonga. What is shown below is that the distribution of ākonga across schools and kura, according to the school-level Equity Index (grey bars). The threshold for eligibility is also shown, demonstrating the distribution of ākonga in schools and kura eligible for the programme (right of the blue line). Using school-level EQI we observe that ākonga eligible for the programme are in the 74th percentile of the Equity Index. The bands around this threshold capture ākonga within the 62nd-82nd percentile (red lines), and therefore highlight ākonga in schools with moderate levels of disadvantage and socio-economic barriers.

Figure 4: The distribution of all secondary school ākonga according to their school's Equity Index



Sample size

Although the evaluation budget (and willingness of schools and kura to participate) would not allow for capturing data from all schools and kura and their ākonga, the evaluation would need to have a sufficient sample size (and power) to detect differences between ākonga in the programme as well as those outside the programme. More importantly, it was necessary to

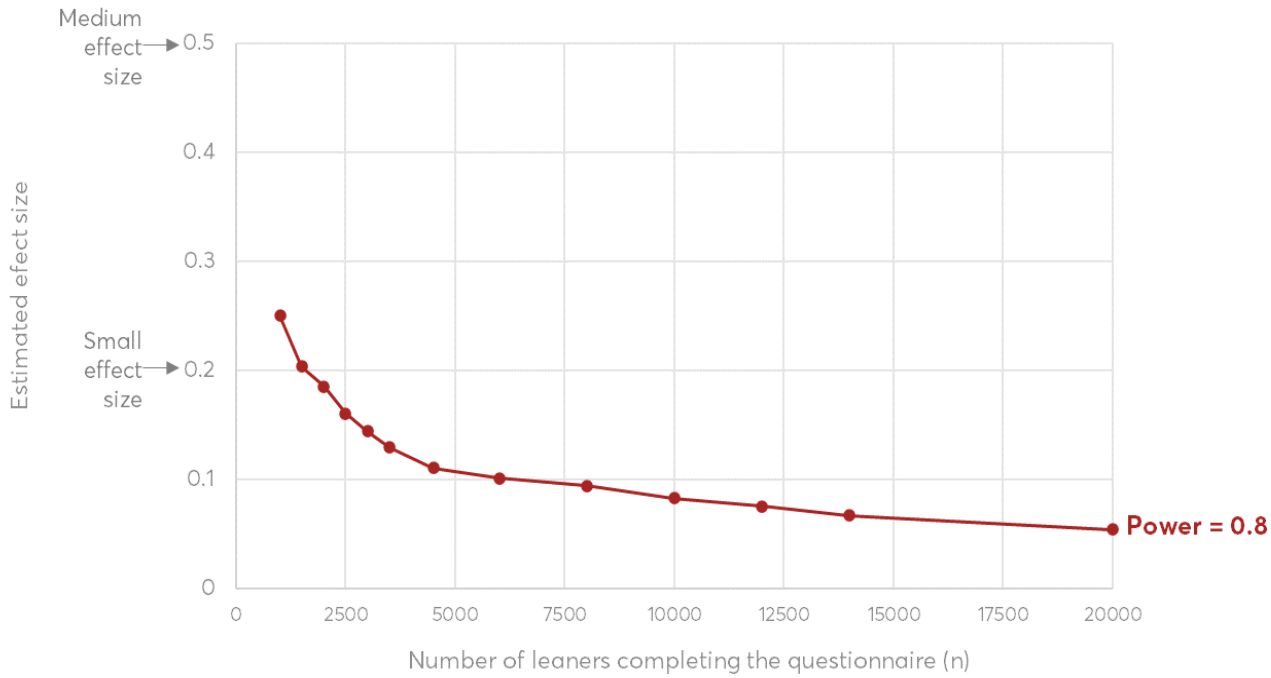
detect differences for those ākonga who were "most underserved", and it was not possible to identify these specific ākonga from the outset.

Those ākonga that rarely (either "never" or "1-2 days") had access to enough food at home to feel 'just right' (not too hungry and not too full) in the past week were defined as those "most underserved" for the purposes of the evaluation.

For our sampling strategy, we assumed: a single-stage, cluster design at the school level, whereby a cohort of selected schools and kura would survey all ākonga within the school or kura; this helped determine the number of schools and kura to include in the evaluation. We also assumed that the group of most underserved ākonga accounts for less than 14% of the population, as was indicated in the Ka Ora, Ka Ako interim evaluation; this helped determine the number of ākonga required to capture information from this subsample of ākonga. Based on these assumptions, as well as model estimates, we estimated requiring at least 10,700 ākonga to detect a small effect (0.2) on most underserved ākonga (n=1,500).

The sample size was estimated using a mixed effects model that contained seven predictor variables (treatment, Māori, age, gender, region, delivery model, school/kura) under the following assumptions: equal allocations to treatment and control groups; that the predictors have no predictive power; normality of outcome variables and 100 different providers. Power was estimated given 1- β = 0.80; α = 0.003, applying the Bonferroni correction accounting for the wellbeing outcomes and subpopulation analyses on the dataset.

Figure 5: Sample size estimates to achieve a power of 0.80



We also overestimated the sample size requirements given the likely attrition between invitation and completion of the questionnaire.[11]

Learner wellbeing survey facilitation

The questionnaires were facilitated by the school staff, which was considered the most reasonable approach given COVID-19. Introducing external researchers to facilitate the classroom exercise wasn't appropriate given the likely ongoing health concerns and anxieties felt by schools and kura, their whānau and communities. Procedures were developed for classroom teachers and the protocols included:

1. Staff teachers/kaiako gather consenting secondary ākonga[12] to complete the questionnaire immediately following lunch on the Friday following receipt of diaries.
2. Staff hand out the questionnaire to ākonga, allowing several minutes for ākonga to review the information sheet within the questionnaire.
3. Staff ask ākonga to complete the nine questions on the following four pages, assisting ākonga that may need individual help.
4. Staff ask ākonga to check that they have completed all questions, and then collate the questionnaires.

Questionnaires were printed and couriered to each participating school and kura by late April 2022. Administration instructions were also provided to each school and kura, and in each envelope were instructions and questions about confirming the administration procedures were followed.

Data entry and cleaning

The evaluation team incorporated two processes to promote accuracy of data coded into a spreadsheet from the submitted paper forms. First, the team of five individuals who coded the data were trained as a group, and the coding rules were explained and discussed. The coding rules were made available on a whiteboard and data anomalies were identified as coding was underway. These were discussed with the team to determine alignment with the established coding rules, and protocol was established on the whiteboard for the entry of these anomalies.

Data was entered into a live Excel spreadsheet. Double data entry was performed whereby the data was entered independently by two coders. The duplicate entries made by the second coder aid in verification and reconciliation by identifying any transcription errors or discrepancies. This helps to get a cleaner database and ensures better consistency and a

[11] Attrition rates in the pilot evaluation between those ākonga invited to take part and those completing the tasks, providing complete data and cleaned, was 32%.
[12] Staff should exclude any ākonga: not in secondary years (9-13); who do not want to take part; whose whānau do not want their child to take part; who are not able to understand the purpose and implications of taking part (those that cannot give 'informed consent').

lower error rate. Manual double entry of data is defined as the definitive gold standard and has been shown to exceed accuracy beyond visual inspections and read-aloud methods.[13] [14]

The quality assurance process was undertaken while the 'first-pass' data entry was underway. Researchers randomly selected schools and kura, being sure they personally had not entered the specific school's data in the first pass, and then entered the data a second time. Any errors were flagged and discussed as a team, and the errors and corrections documented. In total, **20.1%** of individual questionnaires underwent a second pass data entry, resulting in **479** errors identified in the total questionnaires between the two coders; this means approximately 4 errors were identified (and then corrected) for every 1,000 item responses entered. With the corrections made to these, we are 95% confident that **99.34% (±0.31%)** of the questionnaires accurately reflect the paper-based data submitted by the ākonga.

Sample size and response rate

There were 113 schools and kura providing for secondary ākonga within the 440-480 band. From this 'eligible population' of 113 schools and kura, six were omitted from the survey population on advice from the Ministry of Education. Of the 107 remaining schools and kura, 47% dropped out after declining the invitation, leaving a total of 61 that participated in the evaluation. Following the survey period, a further 11 schools and kura (18%) did not return any questionnaires. In total, 50 schools and kura returned questionnaires from 10,385 ākonga across 10 regions, which represents a response rate of 82% at the school level and an estimated response rate of 62% at the ākonga level.

At the ākonga level, the initial omission of six schools and kura resulted in the loss of about 6% of the total eligible ākonga population. The loss of the 46 schools and kura that declined to participate accounted for an estimated 57% loss of ākonga from the sample frame. School staff had indicated the numbers of questionnaires they needed to survey their school (or class) populations;[15] there were questionnaire forms sent out to approximately 41% of the secondary population enrolled in the participating schools and kura. From this subset of ākonga, around 38% did not complete/return the questionnaire. A further 3% of the responding ākonga were removed during the data cleaning and validation process as a result of non-response or invalid responses. Table 1 shows the number of schools and kura, and ākonga at each stage and demonstrates the attrition rates per stage.

[13] Ohmann C, Kuchinke W, Canham S, Lauritsen J, Salas N, et al. (2011). Standard requirements for GCP-compliant data management in multinational clinical trials. Trials 12: 85.
[14] Kimberly A BarchardYevgeniya Verenikina (2013). Improving data accuracy: Selecting the best data checking technique. Computers in Human Behavior 29(5):1917–1922.
[15] Some schools had opted to survey specific classes rather than the entire school population to make the survey process easier for them. We assumed no ākonga-level bias in this sample selection, as the ākonga did not self-select. Nevertheless, balance across the samples were assessed to determine any bias (see subsequent section, "Sample subset comparisons").

Table 1: Rates of attrition across sampling, response and cleaning stages

	Source of attrition					
	School and kura sample			Ākonga sample		Data cleaning
	Eligible	Invited	Accepted	Ākonga invited	Ākonga returned	Validated
Schools and kura	113	107	61	61	50	50
Ākonga	72975	68402	28883	17155	10694	10385

Sample respondents (control vs. treatment vs. eligible)

There were 50 schools and kura, and 10,385 ākonga who responded to the questionnaire. There was moderate balance between the treatment and control schools and kura in relation to age (c.f. Figure 6), Māori ethnicity and gender (c.f. Figure 7). However, treatment schools and kura tended to be more concentrated in Auckland, Wellington, Taranaki and the Bay of Plenty regions relative to the control group schools and kura (c.f. Figure 8), while these control group schools and kura were comprised of proportionally more rural schools and kura, and treatment schools and kura were comprised of proportionally more main urban schools and kura (c.f. Figure 8). While the regression discontinuity approach ensures the two groups of ākonga are similar, these descriptive results meant it was prudent to control for school isolation and region within the analysis (c.f. Analysis section).

Figure 6: Sample representation of ākonga in control and treatment groups, by age

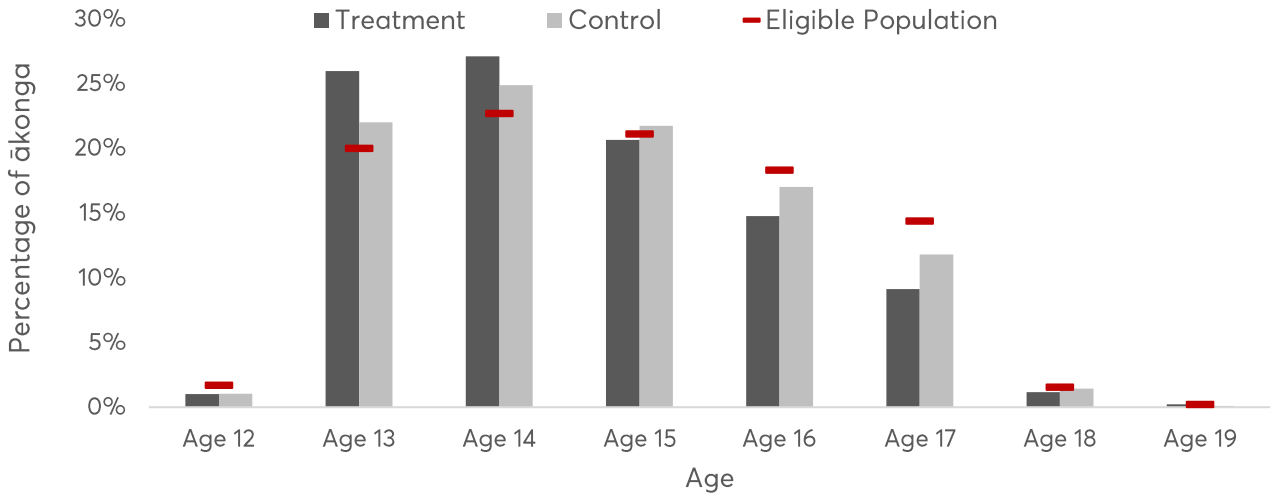


Figure 7: Sample representation of ākonga in control and treatment groups, by Māori ethnicity and gender

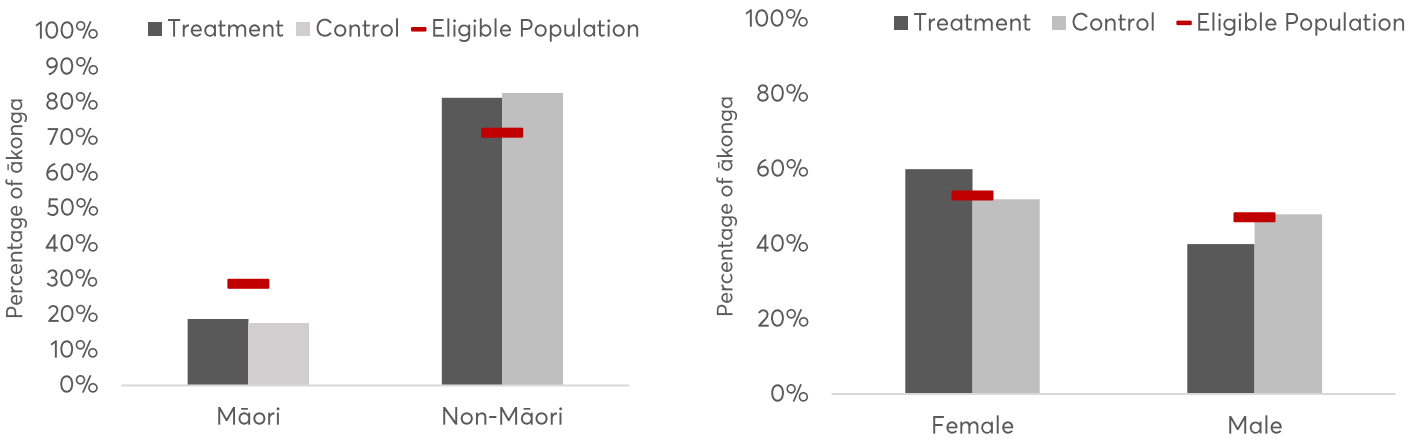
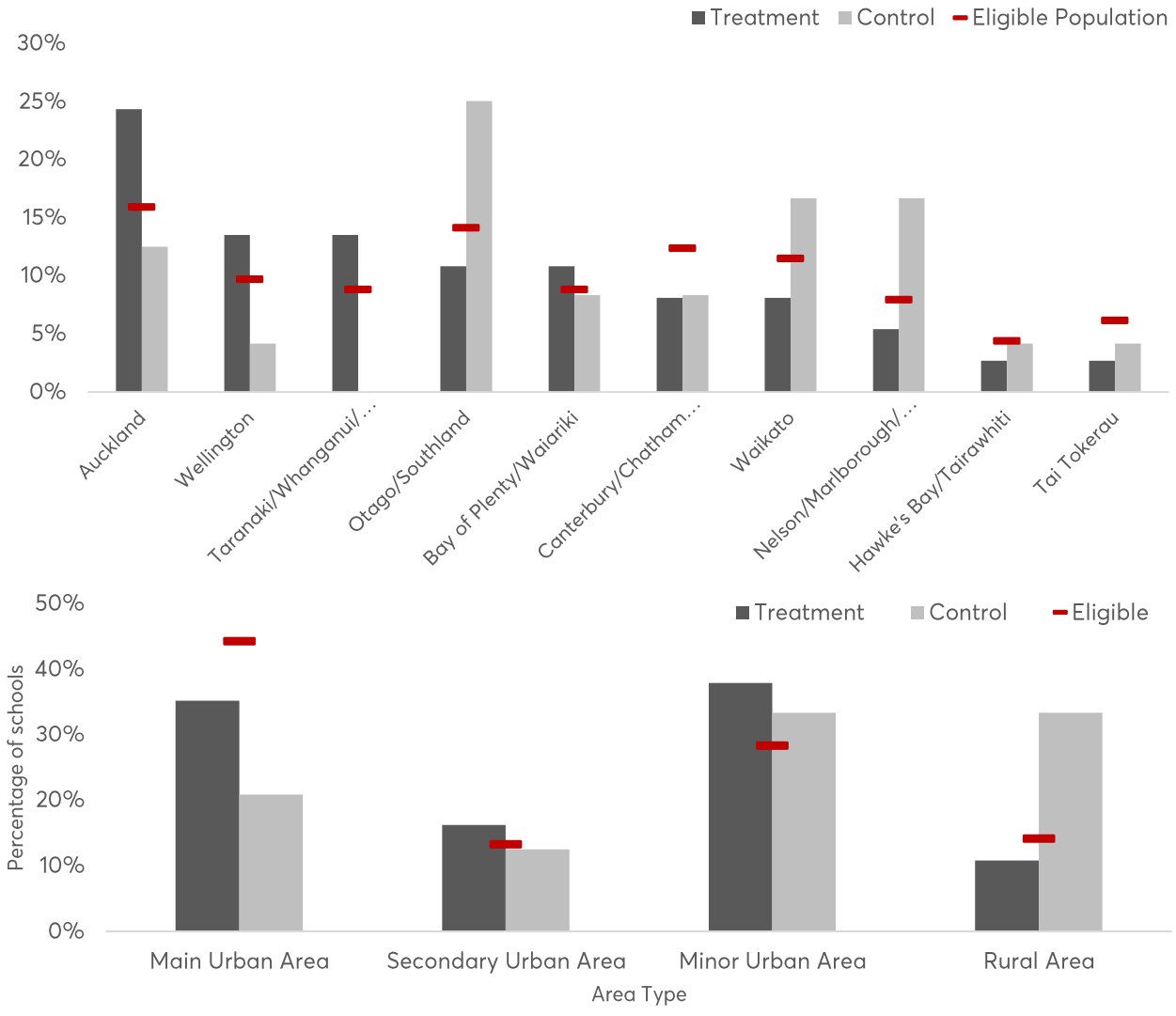


Figure 8: Distribution of schools and kura by region (above) and area type (below)



Item analysis and construct scores

The overall response rates for each question within the questionnaire are provided below. As shown, gender, age and ethnicity were the items that attracted the highest response rates with nearly all respondents answering these questions (99-100%). Nearly all participants answered the remaining groups of questions about their home context (98-99%), as well as PEDS-QL (98-99%), school or kura context (96-97%), the WHO-5 (97%) and Hua Oranga (93-94%) questions. The decreasing response rates across the questions may indicate that the length of the questionnaire (45 questions) was an issue for some ākonga.

Table 2: Response rate for each item recorded in the leaner wellbeing questionnaire

	Item	Item completion rates
Demographics	Gender	99.9%
	Age	98.7%
	Ethnicity (any)	99.3%
Home context	Fruit at home	98.6%
	Vegetables at home	98.5%
	Fizzy drinks at home	98.2%
	Snacks and sweets at home	98.3%
	Enough food at home	98.4%
Peds-QL	Peds-QL Physical walk	99.3%
	PedsQL Physical run	99.3%
	PedsQL Physical sport	98.9%
	PedsQL Physical lift	98.7%
	PedsQLPhysical bath	99.1%
	PedsQL Physical help	98.8%
	PedsQL Physical aches	98.5%
	PedsQL Physical low energy	99.1%
	PedsQL Emotional afraid	99.1%
	PedsQL Emotional sad	98.9%
	PedsQL Emotional angry	98.8%
	PedsQL Emotional sleep	98.8%
	PedsQL Emotional worry	99.0%
	PedsQL Social get along	99.2%
	PedsQL Social friend	98.1%
	PedsQL Social tease	98.6%
	PedsQL Social others can do	98.5%
	PedsQL Social keep up	98.7%
	PedsQL School pay attention	99.1%
	PedsQL School forget	99.0%
	PedsQL School schoolwork	98.7%
	PedsQL School sick	98.7%
	PedsQL School doctor	99.0%
School / kura context	Fruit at school	96.8%
	Vegetables at school	96.5%
	Fizzy drinks at school	96.5%
	Snacks and sweets at school	96.5%
	Enough food at school	96.1%
WHO-5	Who5 1 cheer	96.9%
	Who5 2 calm	97.1%
	Who5 3 active	96.6%
	Who5 4 fresh	97.0%
	Who5 5 dailylife	97.0%
Hua Oranga	Hua Oranga Wairua (spiritual)	93.1%
	Hua Oranga Tinana (physical)	93.9%
	Hua Oranga Hinengaro (mental)	93.1%
	Hua Oranga Whānau (relationships)	93.5%

Given the high response rates, we did not impute any data.

The scoring procedures and completion rates are provided below for each assessment:

- PedsQL: Responses were transformed onto a scale ranging from 0 to 100, with higher scores indicating better quality of life. These scores were calculated for each construct (physical, emotional, social, school) when at least 50% of items were answered within the scale. The overall Quality of Life was estimated as the mean across these constructs only if all constructs were calculated.
- WHO-5: The overall wellbeing score, ranging from 0 to 100, was calculated as the sum of scores across the five questions, multiplied by four. The scores were calculated when all of the items were answered within the scale.

Analysis

In this report, we adopted a regression discontinuity (RD) design that made use of the EQI eligibility threshold to estimate the impacts of the Ka Ora, Ka Ako programme on ākonga wellbeing. The programme was introduced only to schools and kura with an Equity Index of 461 or above.[16] An RD design assumes that schools and kura around the eligibility threshold are similar in terms of both observed and unobserved ākonga characteristics and therefore any differences in the outcomes can be attributed to the programme. To implement the RD design, we used the school Equity Index *(EQI)* as the running variable[17] and constructed a dummy variable based on the running variable to indicate the treatment status. For student *i* in school or kura *s*, $treat_{is}$ equals one if the student is in a school or kura with the programme and zero otherwise:

$$treat_{is} = 1 \text{ if } EQI_s \geq 461$$

$$= 0 \text{ if } EQI_s < 461. \quad (1)$$

We investigated the effects of the programme on several measures of wellbeing (WHO-5 score, spiritual, physical, mental, and relationship) and functioning (emotional, social, school, physical, total health quality of life HQoL), and a dummy variable indicating an 'at risk' status for impaired HQoL below 69.7). To examine our assumption that sufficient food was being provided as part of the programme, we also looked at the direct impact of the programme on food consumption at school *(just0);* the probability that a student never has enough food at school *(just1);* the probability that a student has enough food less than 1-2 days a week at school *(just2);* the probability that a student has enough food for all 5 days at school (*diff*: days with enough food at school or kura minus days with enough food at home). Collectively, we studied these outcomes with RD regressions of the following specification:

$$y_{is} = \alpha + \beta \times treat_{is} + f(EQI_s) + \mathbf{X}_{is}\boldsymbol{\theta} + u_{is}, \quad (2)$$

where y_{is} is one of the above outcome variables for student *i* in school or kura *s*; $f(EQI_s)$ is a smooth function that accounts for the associations between school Equity Index and the

[16] Those few exceptional schools, those above the threshold and not in the programme vs. those below the threshold and in the programme, were removed from any sample selection considerations.
[17] A *running variable* within Regression Discontinuity is the score crossing the threshold and determines who is eligible and who is not.

outcome variables on both sides of the threshold; $\mathbf{X}_{is}$ is a vector of ākonga and school or kura characteristics including age, dummy variables for being female, Māori and Pasifika, school isolation index, a dummy variable indicating schools and kura in Auckland, and a dummy variable indicating non-pilot schools and kura with existing lunch programmes.

The coefficient β represents the difference in average outcomes for ākonga who are in schools and kura just below the 461 threshold and those who are in schools and kura at or just above the 461 threshold (controlling for the observed ākonga and school and kura characteristics). The coefficient β of the above RD regression can be interpreted as the local average treatment effects of the programme on the outcome variable. The effect is "local" at the EQI threshold because the RD design relies on quasi-randomness ("as good as random") at the threshold. While theoretically the RD design only guarantees a causal effect at the threshold, the homogeneity of this sample strongly supports the validity of extrapolating the effects to similarly underserved ākonga in general.

Impact estimate (ākonga in control vs. treatment schools and kura)

To implement the above RD design in equation (2), several econometric modelling decisions must be made. First, we used a local linear regression in which $f(EQI_s)$ consists of linear functions of EQI_s above and below the threshold:

$$f(EQI_s) = \delta_0 (EQI_s - 461) + \delta_1 (EQI_s - 461) \times treat_{is}. \quad (3)$$

Second, we estimated the local linear regressions with three different bandwidths of EQI: 10, 15, and 20 (the entire sample). To balance the sample sizes and the RD exogeneity assumption, our preferred bandwidth was 15, i.e. schools and kura with EQI from 446 to 476.[18] Importantly, our results were generally robust to the choice of bandwidths (c.f. Tables 4-6). Third, as standard in the RD design, we used a triangular kernel and therefore the observations farther away from the threshold received smaller weights.[19] Finally, the standard errors were clustered at the EQI level and therefore accounted for heteroskedasticity and arbitrary forms of correlations across ākonga within schools and kura of the same EQI level. Clustering is particularly important in the current context as the running variable EQI varies at school level instead of individual level and exhibits strong discreteness.

Before we turn to our results, we conducted a balance test to indirectly verify that the RD assumption of quasi-randomness is not violated. We used ākonga, and school and kura characteristics as well as a proxy for most underserved ākonga ("enough food at home") as outcome variables and estimate the above RD regression Equation 2 (without student and school and kura characteristics as the control variables). If the RD assumption of quasi-randomness holds, we would expect no discontinuity in these ākonga and school and kura characteristics at the threshold. In Table 3 below, all of the estimates are small and statistically insignificant, except for the proportion of Pasifika ākonga. The estimate for the Pasifika student was only marginally significant at the 10% level and likely a result of different

[18] The RD assumption states quasi-randomness only at the threshold and thus there is a trade-off between exogeneity and efficiency. A smaller bandwidth implies better exogeneity but worse precision, while a larger bandwidth implies worse exogeneity but better precision.
[19] Estimating the local linear regression by OLS without weighting is equivalent to using a uniform kernel. Our results are not sensitive to the choice of kernel.

locations of schools and kura.[20] Therefore, the balance test supports the validity of the RD design.

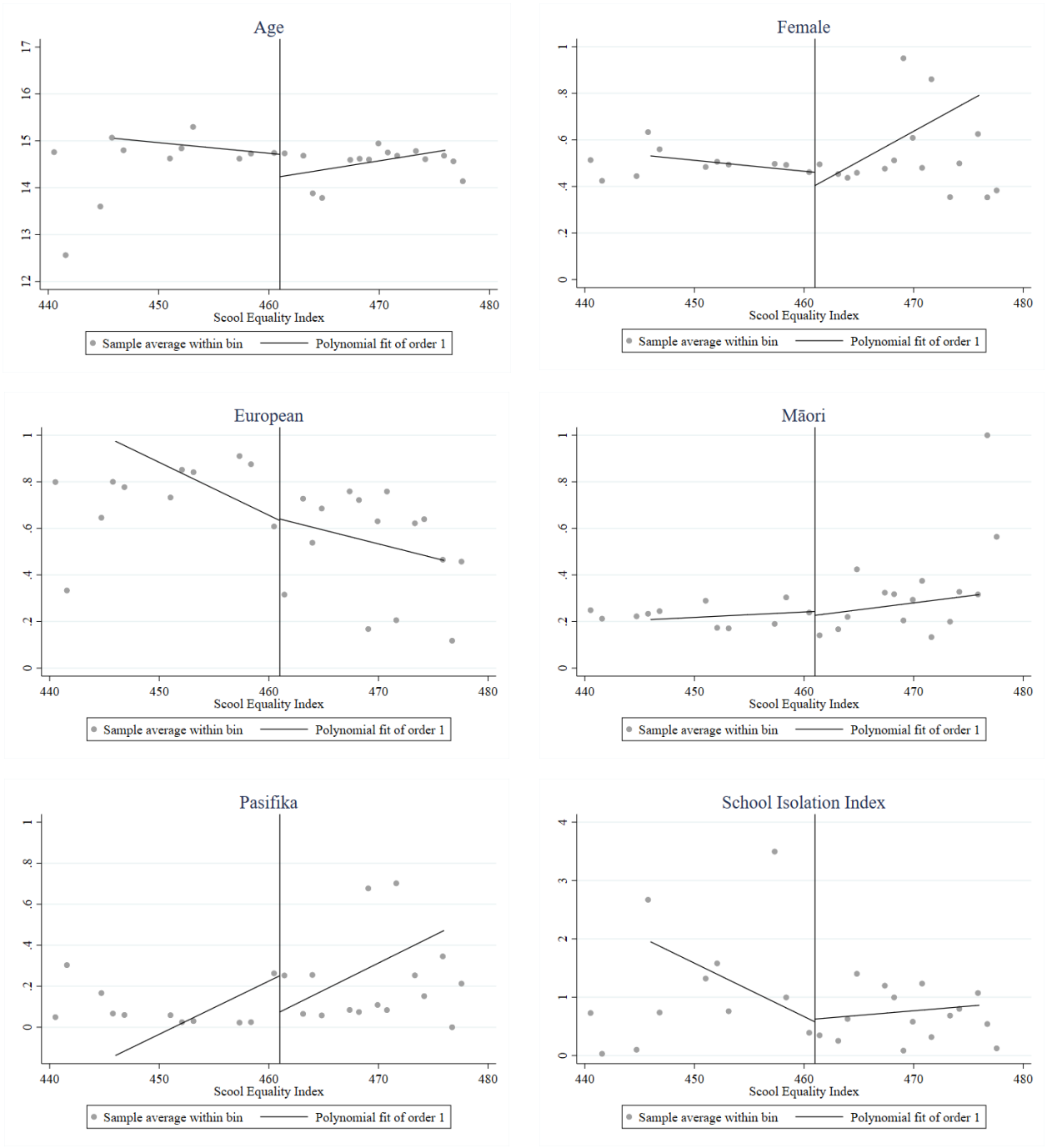
Table 3: Balance test estimates for each variable, providing both the RD estimate and standard errors. Significance is indicated with "*" at the following levels: *** p<0.01, ** p<0.05, * p<0.1).

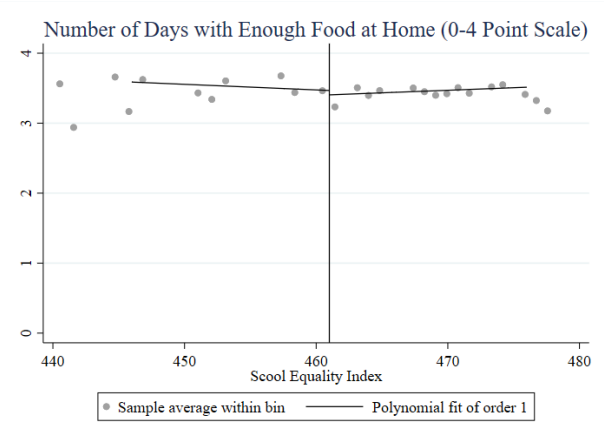
Variables		Estimates
Age	RD estimate	-0.477
	Standard error	(0.294)
Proportion of female	RD estimate	-0.057
	Standard error	(0.045)
Proportion of European	RD estimate	0.007
	Standard error	(0.123)
Proportion of Māori	RD estimate	-0.017
	Standard error	(0.058)
Proportion of Pasifika	RD estimate	-0.177*
	Standard error	(0.094)
School isolation index	RD estimate	0.048
	Standard error	(0.437)
Enough food at home	RD estimate	-0.063
(0-4 point response scale, 4 = having enough food at home every day)	Standard error	(0.064)

[20] In a RD design, the point estimate is largely driven by observations just above and just below the threshold. In the current context, the EQI only vary by school and not a strictly smoothly continuous variable. Therefore, the RD estimates are heavily driven by difference in outcomes from schools of 461 EQI and schools of 460 EQI. Nearly 90% of ākonga in schools of EQI 460 are from a large Auckland school, while only half of ākonga in schools of EQI 461 are from another Auckland school. This location difference is the reason as to why the RD estimates in Table 3 are negative for the proportions of Māori and Pasifika ākonga and positive for the school isolation index (positive being more isolated). To account for this location difference, we control for school location in all of our RD regressions for estimating the programme effects.

The following figures further demonstrate these results, showing no significant discontinuity in these ākonga and school and kura characteristics at the threshold, except for Pacific.

Figure 9: RD figures for the balance tests





Identification of those most underserved ākonga

To identify the most underserved ākonga who would likely to benefit most from the programme, we stratified the sample by how many days in the previous week an ākonga reported having enough food at home. First, we estimated the RD regressions using all ākonga regardless of their food consumption status at home as the baseline. Nearly three quarters of ākonga reported having enough food at home. To investigate those most underserved, we estimate the RD regression using the subsamples of ākonga who reported having 0-2 days of enough food at home (i.e. "rarely"), ākonga who reported having 0-4 days of enough food at home, and ākonga who reported having 0-6 days of enough food at home. We included in our report those that "rarely" had enough food given the sample size, and to make the results easier to understand. Nevertheless, the effects were generally seen to decrease as the cohort sizes increased, with decreasing effects from those who never/rarely had enough food at home to those who reported having enough food over the preceding 0-4 days at home, and again to include those who reported having enough food at home over the preceding 0-6 days. This result adds credibility to the use of the responses to the question about the number of days ākonga had access to enough food to feel 'just right' at home (not too hungry, not too full) – as a proxy indicator of those most underserved ākonga.

Learner wellbeing questionnaire: results

Table 4: Regression discontinuity regression results: WHO-5

		All students						Most underserved students					
	Bandwidth	EQI 451-470		EQI 446-475		EQI 441-480		EQI 451-470		EQI 446-475		EQI 441-480	
	Ethnicity	All	Māori	All	Māori	All	Māori	All	Māori	All	Māori	All	Māori
Who-5 score	RD Estimate	8.200***	-5.486***	3.782***	-5.291***	2.286**	-3.751***	13.071***	-20.360***	6.551***	-33.317***	4.199	-21.257***
	Standard error	(1.449)	(1.716)	(1.201)	(1.493)	(1.015)	(1.348)	(2.175)	(3.628)	(2.334)	(4.015)	(2.75)	(4.855)
	Observations	5502	1376	7783	1940	10086	2588	410	125	563	166	708	219
	Obs in control	1629	359	2252	521	4098	975	108	23	140	33	236	61
	Obs in treatment	3873	1017	5531	1419	5988	1613	302	102	423	133	472	158

Table 5: Regression discontinuity regression results: Peds-QL constructs

		All students						Most underserved students					
	Bandwidth	EQI 451-470		EQI 446-475		EQI 441-480		EQI 451-470		EQI 446-475		EQI 441-480	
	Ethnicity	All	Māori	All	Māori	All	Māori	All	Māori	All	Māori	All	Māori
Overall Health Quality of Life	RD Estimate	3.839***	0.211	2.675***	0.28	1.917***	0.604	9.868***	-5.175*	8.907	-9.683***	7.546***	-5.724
	Standard error	(0.69)	(1.21)	(0.535)	(1.072)	(0.472)	(0.986)	(0.841)	(2.737)	(0.863)	(3.549)	(0.963)	(3.678)
	Observations	5688	1438	8024	2015	10384	2683	431	130	586	171	740	227
	Obs in control	1677	374	2308	538	4198	1003	111	24	144	34	246	63
	Obs in treatment	4011	1064	5716	1477	6186	1680	320	106	442	137	494	164
Dummy for hql <=69.7	RD Estimate	-0.140***	0.032	-0.084***	0.067**	-0.061***	0.038	-0.263***	0.345***	-0.162***	0.315***	-0.127***	0.167
	Standard error	(0.007)	(0.027)	(0.008)	(0.028)	(0.008)	(0.025)	(0.025)	(0.06)	(0.02)	(0.094)	(0.022)	(0.103)
	Observations	5688	1438	8024	2015	10384	2683	431	130	586	171	740	227
	Obs in control	1677	374	2308	538	4198	1003	111	24	144	34	246	63
	Obs in treatment	4011	1064	5716	1477	6186	1680	320	106	442	137	494	164

		All students						Most underserved students					
	Bandwidth	EQI 451-470		EQI 446-475		EQI 441-480		EQI 451-470		EQI 446-475		EQI 441-480	
	Ethnicity	All	Māori	All	Māori	All	Māori	All	Māori	All	Māori	All	Māori
Physical functioning	RD Estimate	3.245***	2.659***	2.308***	1.853***	1.439***	1.296*	11.354***	-1.576	11.242***	-6.022	8.947***	-3.837
	Standard error	(0.488)	(0.515)	(0.395)	(0.668)	(0.391)	(0.747)	(1.214)	(3.166)	(1.585)	(4.762)	(1.608)	(4.659)
	Observations	5699	1443	8038	2021	10402	2689	431	130	587	171	742	227
	Obs in control	1677	374	2309	538	4203	1003	111	24	144	34	247	63
	Obs in treatment	4022	1069	5729	1483	6199	1686	320	106	443	137	495	164
Emotional functioning	RD Estimate	5.330***	-3.212	3.420***	-1.787	2.835***	-0.785	8.569***	-9.798***	6.766***	-12.536***	6.462***	-5.915
	Standard error	(0.813)	(2.72)	(0.715)	(2.105)	(0.645)	(1.798)	(1.382)	(2.072)	(1.405)	(4.255)	(1.744)	(4.416)
	Observations	5677	1433	8013	2011	10369	2678	430	130	585	171	739	227
	Obs in control	1674	374	2304	538	4190	1002	110	24	143	34	245	63
	Obs in treatment	4003	1059	5709	1473	6179	1676	320	106	442	137	494	164
Social functioning	RD Estimate	3.196***	-0.019	2.737***	0.325	1.914***	0.798	4.378**	-9.088***	5.821***	-9.238***	5.530***	-5.613**
	Standard error	(0.658)	(1.702)	(0.613)	(1.514)	(0.598)	(1.443)	(2.024)	(2.293)	(1.435)	(2.533)	(1.51)	(2.591)
	Observations	5674	1432	8004	2007	10360	2673	428	129	583	170	737	226
	Obs in control	1674	373	2302	536	4189	1000	110	24	143	34	245	63
	Obs in treatment	4000	1059	5702	1471	6171	1673	318	105	440	136	492	163
School functioning	RD Estimate	3.643***	0.041	2.253**	-0.155	1.636**	0.68	14.513***	-2.405	10.835***	-13.142*	8.765***	-8.942
	Standard error	(1.185)	(1.634)	(0.918)	(1.345)	(0.752)	(1.142)	(2.335)	(8.327)	(2.058)	(6.96)	(1.809)	(5.786)
	Observations	5681	1438	8013	2013	10371	2681	431	130	586	171	739	227
	Obs in control	1675	374	2305	538	4193	1003	111	24	144	34	245	63
	Obs in treatment	4006	1064	5708	1475	6178	1678	320	106	442	137	494	164

Table 6: Regression discontinuity regression results: Hua Oranga items

		All students						Most underserved students					
	Bandwidth	EQI 451-470		EQI 446-475		EQI 441-480		EQI 451-470		EQI 446-475		EQI 441-480	
	Ethnicity	All	Māori	All	Māori	All	Māori	All	Māori	All	Māori	All	Māori
Spiritual	RD Estimate	0.259***	0.091	0.125***	0.042	0.042	0.001	0.514***	0.079**	0.204**	-0.701***	0.059	-0.528***
	Standard error	(0.041)	(0.089)	(0.041)	(0.08)	(0.04)	(0.066)	(0.097)	(0.035)	(0.093)	(0.138)	(0.1)	(0.163)
	Observations	5322	1327	7561	1870	9812	2490	385	119	528	158	664	205
	Obs in control	1593	345	2199	498	4005	934	102	22	133	31	221	55
	Obs in treatment	3729	982	5362	1372	5807	1556	283	97	395	127	443	150
Physical	RD Estimate	0.224***	0.284***	0.078*	0.169**	-0.018	0.063	0.184***	-0.903***	0.252***	-0.692***	0.084	-0.492***
	Standard error	(0.035)	(0.093)	(0.042)	(0.067)	(0.046)	(0.061)	(0.068)	(0.122)	(0.074)	(0.112)	(0.089)	(0.12)
	Observations	5364	1332	7621	1879	9884	2502	389	119	536	158	672	205
	Obs in control	1606	346	2217	499	4033	938	102	22	133	31	221	55
	Obs in treatment	3758	986	5404	1380	5851	1564	287	97	403	127	451	150
Mental	RD Estimate	0.305***	-0.019	0.156***	-0.055	0.062	-0.077	0.537***	0.690***	0.363***	-0.214	0.148	-0.14
	Standard error	(0.053)	(0.091)	(0.053)	(0.068)	(0.048)	(0.065)	(0.11)	(0.18)	(0.095)	(0.18)	(0.106)	(0.186)
	Observations	5352	1329	7603	1874	9858	2497	388	118	534	157	670	204
	Obs in control	1600	344	2209	497	4017	935	102	22	133	31	221	55
	Obs in treatment	3752	985	5394	1377	5841	1562	286	96	401	126	449	149
Relationship	RD Estimate	-0.013	-0.025	-0.114***	-0.217***	-0.122***	-0.185***	-0.055	-0.249**	-0.111	-0.505***	-0.035	-0.071
	Standard error	(0.02)	(0.044)	(0.022)	(0.047)	(0.021)	(0.045)	(0.121)	(0.105)	(0.093)	(0.114)	(0.08)	(0.149)
	Observations	5362	1328	7614	1870	9877	2495	388	118	533	155	670	202
	Obs in control	1606	345	2215	497	4029	936	102	22	133	31	222	55
	Obs in treatment	3756	983	5399	1373	5848	1559	286	96	400	124	448	147

Table 7: Sample observations and estimates (means and standard deviations) relevant to wellbeing constructs

	All			Treatment			Control		
Variables	Obs.	Mean	Standard Deviation	Obs.	Mean	Standard Deviation	Obs.	Mean	Standard Deviation
Who-5 score	10,305	58.17	24.30	6,121	57.52	24.56	4,184	59.12	23.88
Hua Oranga spiritual	10,017	3.59	0.94	5,928	3.58	0.94	4,089	3.61	0.92
Hua Oranga physical	10,091	3.72	0.94	5,975	3.68	0.94	4,116	3.78	0.92
Hua Oranga mental	10,065	3.39	1.13	5,966	3.36	1.14	4,099	3.43	1.12
Hua Oranga relationships	10,086	4.08	0.96	5,974	4.06	0.97	4,112	4.10	0.96
Peds-QL Overall Health Quality of Life	10,625	71.78	15.27	6,339	71.68	15.18	4,286	71.92	15.40
HQL	10,625	0.43	0.49	6,339	0.43	0.50	4,286	0.42	0.49
Peds-QL Physical functioning	10,648	79.04	16.17	6,354	78.89	16.02	4,294	79.27	16.37
Peds-QL emotional functioning	10,609	66.03	23.19	6,331	66.30	23.12	4,278	65.62	23.28
Peds-QL social functioning	10,595	74.96	19.71	6,318	74.74	19.97	4,277	75.27	19.32
Peds-QL school functioning	10,606	62.78	19.51	6,327	62.57	19.55	4,279	63.08	19.45

Learner wellbeing questionnaire: cross-sectional results

The following tables present the results from the full populations of respondents (those in the programme and those not in the programme). The results are presented both as unweighted and weighted data, with the weighted data weighted at the level of respondent age to reflect the overall population of ākonga. Confidence intervals (95%) are obtained by robust estimates to account for the school-level clustering that was part of the sampling design.[21] The results provide generalisable statistics on the overall prevalence of food availability, consumption and wellbeing across secondary school-aged ākonga that experience similar levels of socio-economic barriers (c.f. Figure 4).

[21] *sandwich* package available in R (authors: Zeileis A, Köll S, Graham N).

Table 8: Numbers (and %) of ākonga in the programme (treatment) and not in the programme (control) who consumed food at home, with robust confidence intervals

	Control				Treatment			
	Count	Percentage	CI lower	CI upper	Count	Percentage	CI lower	CI upper
Fruit	4036	93.7%	92.5%	94.7%	5848	91.6%	90.6%	92.4%
Vegetables	4177	97.0%	96.1%	97.7%	6101	95.5%	94.6%	96.3%
Fizzy drinks	3364	78.1%	76.5%	79.7%	5346	83.7%	81.7%	85.6%
Snacks	4101	95.2%	94.9%	95.5%	6147	96.2%	95.8%	96.7%
Just right	4214	97.8%	97.5%	98.2%	6205	97.2%	96.7%	97.6%

Table 9: Numbers (and %) of ākonga in the programme (treatment) and not in the programme (control) who consumed food at school, with robust confidence intervals

	Control				Treatment			
Food type	Count	Percentage	CI lower	CI upper	Count	Percentage	CI lower	CI upper
Fruit	3093	71.8%	67.5%	75.7%	4755	74.4%	69.8%	78.6%
Vegetables	1882	43.7%	40.3%	47.1%	3992	62.5%	58.3%	66.5%
Fizzy drinks	1255	29.1%	22.5%	36.7%	2433	38.1%	33.1%	43.4%
Snacks	3402	79.0%	76.9%	80.9%	4629	72.5%	69.4%	75.4%
Just right	3772	87.6%	84.5%	90.1%	5558	87.0%	85.7%	88.3%

Table 10: Numbers of ākonga in the programme (treatment) and not in the programme (control) in each category for consuming food at home

	Control					Treatment				
	Never	1-2 days in the past week	3-4 days in the past week	5-6 days in the past week	Everyday	Never	1-2 days in the past week	3-4 days in the past week	5-6 days in the past week	Everyday
Fruit	266	894	1025	604	1478	530	1802	1606	753	1613
Vegetables	128	442	865	968	1862	282	895	1470	1399	2252
Fizzy drinks	922	1964	730	292	350	1011	2622	1356	580	720
Snacks	198	1352	1413	659	642	232	1952	2115	964	1030
Just right	92	162	358	415	3230	179	331	568	637	4582

Table 11: Numbers of ākonga in the programme (treatment) and not in the programme (control) in each category for consuming food at school

	Control				Treatment			
	None of the last 5 days	1-2 days in the last 5	3-4 days in the past 5	All of the last 5 days	None of the last 5 days	1-2 days in the last 5	3-4 days in the past 5	All of the last 5 days
Fruit	1176	981	908	1123	1573	1963	1444	1199
Vegetables	2349	989	479	366	2300	2005	1139	718
Fizzy drinks	2960	806	264	148	3804	1429	580	344
Snacks	873	1449	1161	700	1693	2499	1339	636
Just right	516	612	810	2238	795	1455	1451	2443

Table 12: Mean score (and robust confidence interval) of ākonga (by age) according to five PEDS QL constructs and WHO-5 (unweighted), for schools and kura in the programme (treatment) and not in the programme (control)

		n	Age 12	Age 13	Age 14	Age 15	Age 16	Age 17	Age 18	Overall
Control	**Emotional functioning**	**4254**	**64.5**	**66.7**	**66.4**	**65.3**	**64.8**	**64.6**	**65.9**	**65.7**
	Lower limit		55.5	65.1	65.1	63.9	62.0	60.6	59.8	64.7
	Upper limit		73.4	68.4	67.7	66.7	67.6	68.7	71.9	66.6
	Physical functioning	**4254**	**68.5**	**79.3**	**79.7**	**79.5**	**79.3**	**79.7**	**80.9**	**79.4**
	Lower limit		61.4	77.5	79.0	78.3	78.4	78.1	76.4	78.5
	Upper limit		75.5	81.1	80.5	80.8	80.3	81.2	85.5	80.2
	Social functioning	**4254**	**68.0**	**74.5**	**74.8**	**75.7**	**75.3**	**78.0**	**79.9**	**75.3**
	Lower limit		57.2	71.9	73.3	75.2	74.1	76.0	76.3	74.8
	Upper limit		78.7	77.1	76.3	76.3	76.6	79.9	83.6	75.9
	School functioning	**4254**	**65.0**	**66.3**	**62.9**	**62.2**	**61.8**	**61.8**	**63.0**	**63.2**
	Lower limit		61.1	64.8	61.8	61.1	59.3	59.2	60.1	62.4
	Upper limit		69.0	67.9	64.1	63.4	64.4	64.4	65.9	64.0
	Total functioning	**4254**	**66.8**	**72.7**	**72.1**	**71.9**	**71.5**	**72.1**	**73.5**	**72.0**
	Lower limit		61.6	71.1	71.2	71.2	69.9	70.0	70.4	71.5
	Upper limit		72.0	74.3	73.0	72.6	73.1	74.3	76.6	72.5
	WHO wellbeing	**4254**	**52.5**	**63.5**	**58.7**	**58.1**	**56.7**	**58.0**	**61.8**	**59.2**
	Lower limit		43.7	60.6	57.2	56.1	53.8	54.4	55.7	57.9
	Upper limit		61.4	66.4	60.3	60.2	59.6	61.7	67.9	60.4
Treatment	**Emotional functioning**	**6295**	**65.9**	**68.1**	**66.2**	**65.8**	**64.8**	**65.2**	**63.9**	**66.3**
	Lower limit		60.1	66.4	64.4	64.2	62.9	62.9	58.9	65.0
	Upper limit		71.7	69.9	67.9	67.4	66.7	67.5	68.9	67.6
	Physical functioning	**6295**	**78.1**	**79.2**	**79.0**	**79.0**	**78.4**	**79.1**	**76.8**	**78.9**
	Lower limit		73.1	78.0	78.1	78.0	77.4	77.9	72.9	78.2
	Upper limit		83.0	80.3	79.9	80.0	79.3	80.4	80.7	79.6
	Social functioning	**6295**	**72.7**	**74.3**	**74.0**	**74.9**	**75.7**	**77.0**	**75.7**	**74.7**
	Lower limit		69.7	73.1	72.6	73.7	74.3	74.7	71.7	74.1
	Upper limit		75.7	75.5	75.3	76.1	77.1	79.2	79.7	75.4
	School functioning	**6295**	**63.8**	**65.3**	**62.6**	**61.5**	**59.4**	**61.7**	**62.2**	**62.6**
	Lower limit		60.1	63.9	61.4	60.2	58.1	58.6	58.1	61.7
	Upper limit		67.4	66.6	63.8	62.8	60.8	64.8	66.3	63.4
	Total functioning	**6295**	**71.2**	**72.7**	**71.5**	**71.4**	**70.7**	**71.8**	**70.6**	**71.7**
	Lower limit		67.8	71.5	70.5	70.5	69.6	70.2	68.0	71.0
	Upper limit		74.5	73.8	72.6	72.4	71.8	73.4	73.2	72.4

		n	Age 12	Age 13	Age 14	Age 15	Age 16	Age 17	Age 18	Overall
	WHO wellbeing	6295	**55.6**	**61.2**	**57.3**	**56.6**	**53.0**	**56.1**	**56.8**	**57.4**
	Lower limit		49.4	59.6	55.4	54.5	51.2	53.1	47.2	56.0
	Upper limit		61.8	62.9	59.2	58.7	54.8	59.1	66.4	58.9

Table 13: Mean score (and robust confidence interval) of ākonga (by age) according to Hua Oranga, for schools and kura in the programme (treatment) and not in the programme (control), with robust estimates for "overall"

		n	Age 12	Age 13	Age 14	Age 15	Age 16	Age 17	Age 18	Overall
Control	**Spiritual wellbeing**	**4254**	**3.4**	**3.6**	**3.5**	**3.4**	**3.3**	**3.3**	**3.4**	**3.4**
	Lower limit		3.0	3.6	3.4	3.3	3.2	3.1	3.1	3.4
	Upper limit		3.8	3.7	3.5	3.4	3.4	3.4	3.6	3.5
	Physical wellbeing	**4254**	**3.8**	**3.9**	**3.8**	**3.8**	**3.7**	**3.7**	**3.8**	**3.8**
	Lower limit		3.6	3.8	3.7	3.7	3.6	3.5	3.5	3.7
	Upper limit		3.9	4.0	3.8	3.9	3.8	3.9	4.1	3.8
	Mental wellbeing	**4254**	**4.0**	**4.2**	**4.1**	**4.1**	**4.0**	**4.1**	**3.9**	**4.1**
	Lower limit		3.7	4.2	4.0	4.0	3.9	3.9	3.7	4.1
	Upper limit		4.3	4.3	4.2	4.1	4.1	4.2	4.1	4.1
	Relationship wellbeing	**4254**	**3.4**	**3.7**	**3.6**	**3.6**	**3.5**	**3.6**	**3.6**	**3.6**
	Lower limit		3.1	3.7	3.5	3.5	3.4	3.4	3.4	3.6
	Upper limit		3.7	3.8	3.7	3.6	3.6	3.7	3.7	3.6
Treatment	**Spiritual wellbeing**	**6295**	**3.6**	**3.6**	**3.3**	**3.3**	**3.1**	**3.2**	**3.3**	**3.4**
	Lower limit		3.2	3.5	3.3	3.2	3.0	3.0	2.8	3.3
	Upper limit		4.0	3.7	3.4	3.4	3.2	3.4	3.7	3.4
	Physical wellbeing	**6295**	**3.9**	**3.8**	**3.7**	**3.7**	**3.5**	**3.5**	**3.5**	**3.7**
	Lower limit		3.6	3.8	3.6	3.6	3.4	3.3	3.2	3.6
	Upper limit		4.2	3.9	3.8	3.7	3.6	3.6	3.8	3.7
	Mental wellbeing	**6295**	**4.1**	**4.2**	**4.1**	**4.0**	**3.9**	**4.0**	**4.0**	**4.1**
	Lower limit		3.9	4.1	4.0	3.9	3.9	3.9	3.7	4.0

		n	Age 12	Age 13	Age 14	Age 15	Age 16	Age 17	Age 18	Overall
	Upper limit		4.3	4.2	4.2	4.1	4.0	4.1	4.3	4.1
	Relationship wellbeing	**6295**	**3.8**	**3.7**	**3.6**	**3.5**	**3.4**	**3.5**	**3.6**	**3.6**
	Lower limit		3.6	3.7	3.6	3.5	3.3	3.4	3.3	3.5
	Upper limit		4.1	3.8	3.7	3.6	3.4	3.6	3.9	3.6

Table 14: Percentage of ākonga designated 'at risk' (weighted by age), based on levels determined clinically important for a USA adolescent population,[22] with robust 95% CI

	Cut off	Control					Treatment				
PEDS - QL	Score	n	Above	Below	Lower CI	Upper CI	n	Above	Below	Lower CI	Upper CI
Emotional functioning	59.57	4307	64.1%	**35.9%**	34.6%	37.3%	6387	64.7%	**35.3%**	33.2%	37.6%
Physical functioning	72.98	4307	70.0%	**30.0%**	28.5%	31.6%	6387	69.5%	**30.5%**	28.2%	32.8%
School functioning	62.99	4307	53.0%	**47.0%**	45.3%	48.7%	6387	51.3%	**48.7%**	47.0%	50.4%
Social functioning	66.6	4307	68.7%	**31.3%**	29.7%	32.9%	6387	67.5%	**32.5%**	31.0%	34.0%
Health Quality of Life	69.71	4307	58.0%	**42.0%**	40.4%	43.5%	6387	56.8%	**43.2%**	40.7%	45.7%

[22] Varni JW, Burwinkle TM, Seid M, et al. The PedsQL™ 4.0 as a pediatric population health measure: Feasibility, reliability, and validity. Ambulatory Pediatrics. 2003;3: 338.

Appendix B: Attendance

We used attendance data and other ākonga-related data sourced from the Ministry's internal database *(EVa_DataMart)*. Attendance was calculated for individual ākonga at a week and term level. The primary analysis of attendance is at the term level. Attendance data is made up of half days where an ākonga may be recorded as present, justified absent or unjustified absent. In this analysis attendance is calculated at the term level by:

$$Attendance = \frac{\sum halfdays = present}{\sum halfdays}$$

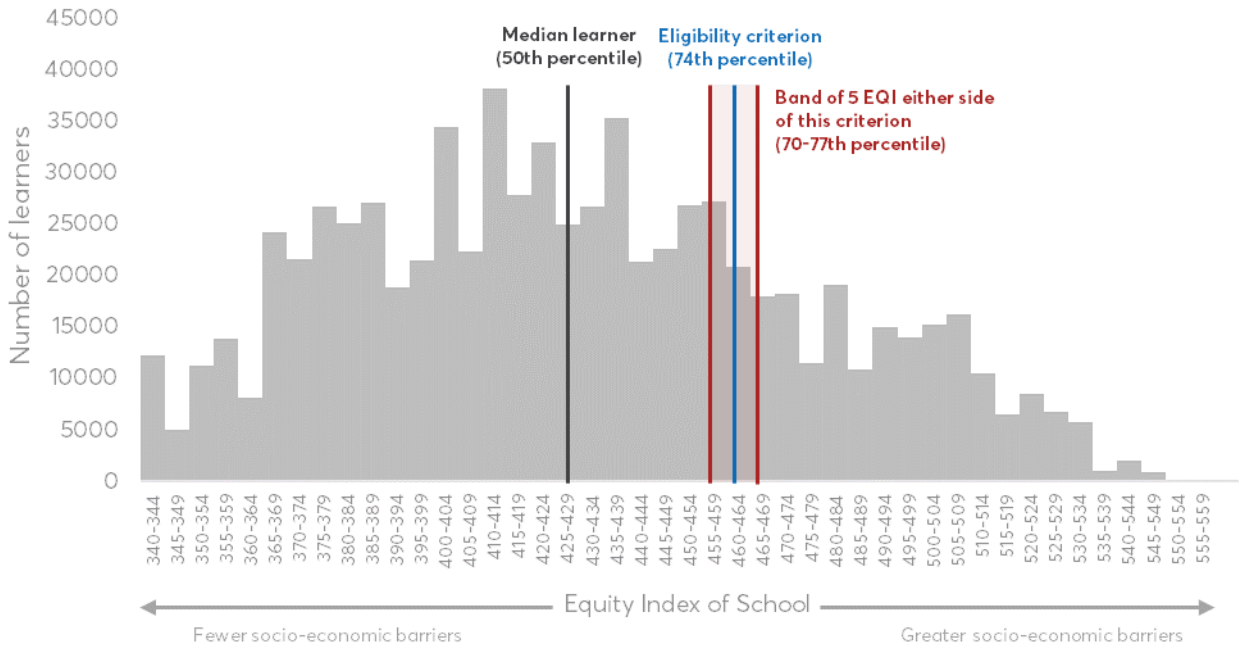
Selecting schools and kura for comparison

Equity Index

The approach makes use of a Regression Discontinuity (RD) design given how schools and kura were allocated (or not) a place in the programme. As noted above, schools and kura were selected into the programme using school-level Equity Index (EQI) which is calculated from ākonga-level EQI. Schools and kura with an EQI above 460 were selected to participate in Ka Ora, Ka Ako. To begin with, all schools and kura within a 20 EQI threshold around this eligibility criteria (EQI 441-480) were selected to be investigated, although these were not necessarily the final cohort. It is worth noting that of the eligible schools and kura in this range, 15 above EQI 461 were not a part of the programme and were removed from the analysis, as was done for the wellbeing analysis. Similarly, 37 schools and kura in this range were below EQI 461 and part of the programme and were also removed from the analysis. Those ākonga in eligible schools and kura are considered to have greater levels of socioeconomic disadvantage than those in schools and kura below EQI 461. Because all ākonga in schools and kura with an EQI above 460 were selected for the programme, we used information from those ākonga within schools and kura not in the programme but with a similar Equity Index (just below the threshold of 461). Because these two groups of ākonga are similar insofar as the school-level estimate of socio-economic barriers, difference in their attendance can reasonably be attributed to the programme, in particular when controlling for the impacts of other confounding factors.

A band of schools and kura either side of the 461 cut off were selected to ensure that schools and kura were comparable, while also allowing for a large enough sample. Three aspects were considered when selecting the appropriate band. These were prior patterns of attendance, adequate sample size/power, and school-level demographics. The resulting sample of ākonga within the selected schools and kura was unique from the population of ākonga. As shown below, the ākonga eligible for the programme are in the 74th percentile of disadvantage. The bands around this threshold capture ākonga within the 70th – 77th percentile (red lines).

Figure 10: The distribution of ākonga in schools and kura, according to their school-level Equity Index

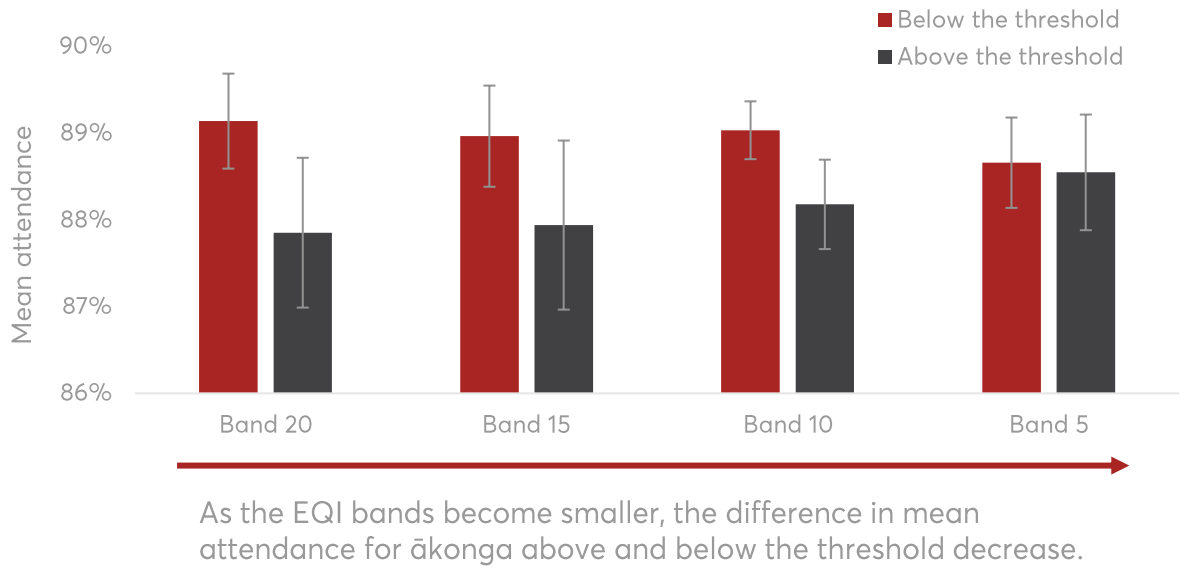


Prior attendance patterns

Overall, in New Zealand there is negative relationship between socio-economic barriers and attendance. Because the programme is allocated using the Equity Index we must ensure that this is not having a significant influence on impact estimates. To do this, pre-treatment attendance patterns (2019) were investigated at different EQI bands as it's important that those above and below the threshold have similar overall attendance before the programme. Figure 10 illustrates that as the band around the threshold is reduced, the difference in attendance for ākonga above and below the threshold becomes smaller. Statistical tests were conducted to test for a difference in mean attendance between ākonga above and below the threshold at each band. When accounting for the clustered nature of the data[23] a significant difference was only found for a band of 20 ($p=0.014$). When not accounting for the clustered nature of the data a significant difference was detected for bands of 20, 15 and 10 ($p<0.001$). For a band of 5, no significant difference was found ($p=0.246$). Additional tests were performed comparing the mean attendance between schools and kura above and below the 461 EQI threshold while controlling for age, gender and ethnicity.[24] These results were similar, with significant differences found for a band of 20 ($F(291)= -3.74$, $p<0.001$), a band of 15 ($F(224)= -3.21$, $p= 0.0015$) and a band of 10 ($F(155)= -2.66$, $p=0.008$). For schools and kura within a band of 5, mean attendance in 2019 was not significantly different ($F(85)= -1.04$, $p=0.29$). These results provide evidence that for the smaller band of 5 there are no statistically significant pre-existing differences in the outcome variable prior to treatment and provide the rationale for our school/kura selection.

[23] Using cluster robust standard errors at the school level.
[24] Fixed effects model with cluster robust standard errors, like the model used in the difference in difference analysis.

Figure 11: Mean attendance of ākonga above and below the threshold at different EQI bands prior to the programme (2019), cluster robust 95% CI



Control and treatment school and kura demographics

A final test was done to ensure that the demographic characteristics of schools and kura either side of the threshold in the band of 5 were comparable. These were further compared to the characteristics of the wider population (EQI 441-480) for reference. The most notable difference between treatment and control schools and kura is in age, where treatment schools and kura are underrepresented at the ages 13-18. This is due to more secondary schools and kura being included in the control group, although the reason behind this is currently unknown.

Figure 12: Distribution of treated and control schools and kura (EQI 456-465) and all wider schools and kura (EQI 440-480) by area type

Figure 13: Distribution of treated and control schools and kura (EQI 456-465) and all wider schools and kura (EQI 440-480) by region

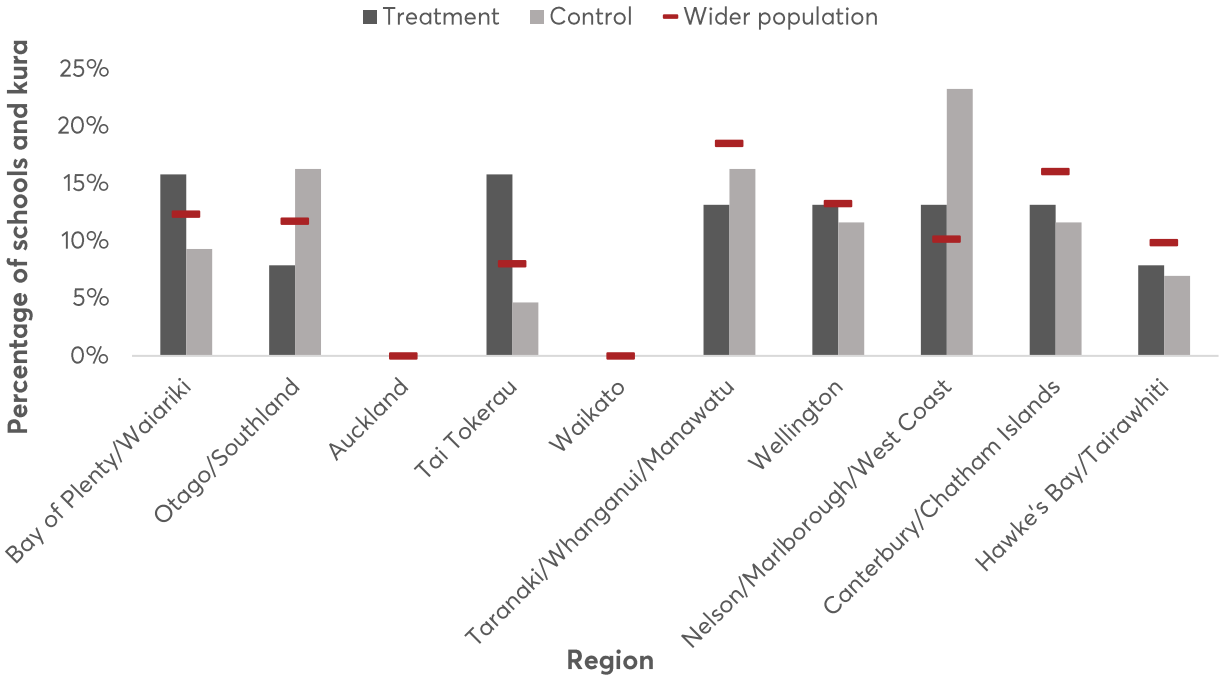


Figure 14: Distribution of treated and control schools and kura (EQI 456-465) and all wider schools and kura (EQI 440-480) by ethnicity

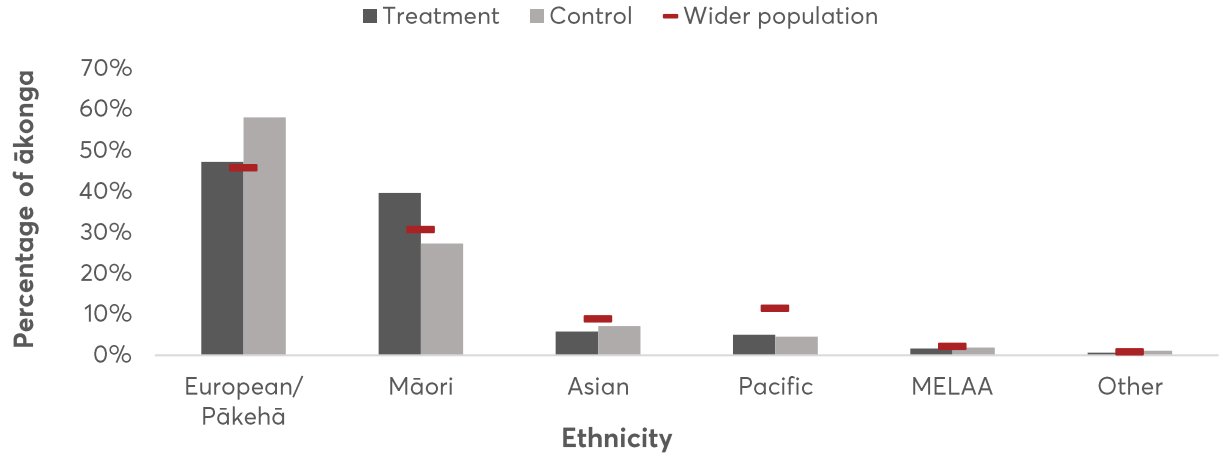
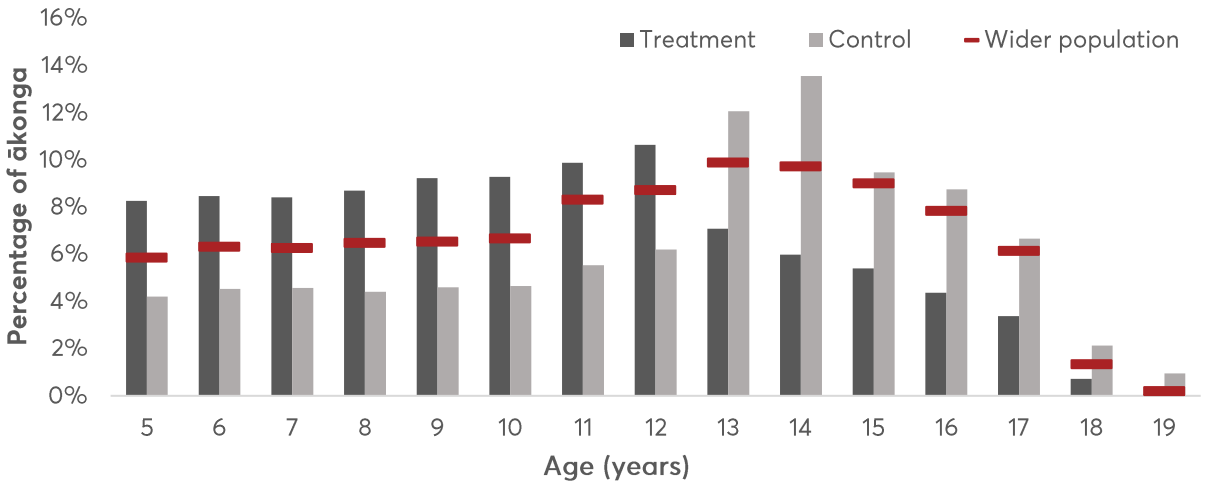


Figure 15: Distribution of treated and control schools and kura (EQI 456-465) and all wider schools and kura (EQI 440-480) by age



Sample size/power

Given that a smaller EQI band results in more comparable groups, a sample size calculation was important to consider if there remained to be sufficient statistical power to detect a small impact (1% increase in attendance). Statistical power was calculated using the sample sizes given at each band. Sample size was estimated using a fixed-effects model with cluster robust standard errors. The model contained six predictor variables (treatment, Māori, Pacific, other, gender, age) under the following assumptions: unequal allocations of treatment and control groups; that the predictors have no predictive power; normality of outcome variables and an equivalent number of schools and kura as seen in the data. Significance was set at $\alpha = 0.05$ (a Bonferroni correction was not necessary as each term has unique data). The power estimates for each term were all greater than 0.8. More specifically, the estimated power for each term was 0.98, 0.99, 0.99 and 0.99 for Terms 1 to 4 respectively.

The EQI bandwidth of 5 provided sufficient samples to detect small effect sizes of the programme on attendance.

Sample comparisons: 2020-2021

We focus on comparisons of attendance between 2020 and 2021 for three reasons:

1. Comparability: these two years are quite similar in the conditions regarding the impact of the COVID-19 pandemic.
2. High rates of attrition: we do not compare between 2019 and 2021 because a significant number of ākonga in the 2019 data is no longer available in the 2021 data. This is because there are large numbers of ākonga either entering into or leaving school or kura, as well as transitioning between schools and kura over a two-year timeframe.

3. Smaller relative samples: most of the schools and kura started their programme in Term 1, 2021 such that comparisons between 2019 and 2020 provide a small sample with a short time length for the programme to have an impact.

An important consideration for the evaluation is the high degree of variability in weekly attendance rates across terms and between years. Analysis presented on the Ministry of Education's Attendance website[25] shows that regular attendance is typically high at the beginning of a term and drops off in the last weeks of a term. This pattern is consistent across terms and years. A difference in difference approach will contribute to accounting for this variability, however the data required transformation so that these patterns could be aligned. For example, in 2020 Term 1 started in week 5, whereas in 2021 Term 1 started in week 6. Week numbers were shifted so that the first week of Term 1, 2020 was being compared with the first week of Term 1, 2021.

Schools and kura eligible for the programme have different delivery start dates. This means that control and treatment allocation is based both on the school-level Equity Index and the programme start date. Schools and kura were not allocated to the treatment group until they had started delivery, meaning that a school or kura that started delivery in Term 2, 2021 would be considered in the control group for Term 1. Some schools and kura began delivery in late 2020 and therefore were removed from Term 4 altogether. For this reason, terms were analysed separately which resulted in different sample sizes for control and treatment groups for each term.

Table 15: Number of ākonga in control and treatment groups (band of 5, EQI 456-465), by term after cleaning

Treatment	Term 1	Term 2	Term 3	Term 4
Control	11633	11648	8936	7711
Treatment	3565	4460	6235	4945
Total	15198	16108	15171	12656

Table 16: Number of schools and kura in control and treatment groups (band of 5, EQI 456-465), by term after cleaning

Treatment	Term 1	Term 2	Term 3	Term 4
Control	61	57	40	43
Treatment	19	24	37	30
Total	80	81	77	73

[25] (https://www.educationcounts.govt.nz/data-services/national/attendanceshow)

Data description and cleaning

Regions and weeks removed

We found that in Terms 1 and 2 in 2020 there were large variations in reported attendance across regions. This coincides with the first national lockdown in New Zealand, starting on 25 March 2020; attendance dropped down below 60% in the first few weeks then reached almost 100% in the subsequent weeks. Because teaching and learning were online during the lockdown, schools and kura reported 100% attendance. Therefore, we excluded weeks 12-20 from the analysis. In addition, Term 3 in 2021 experienced large variations in a few weeks due to another national lockdown (between 17 August 2021 and 02 September 2021). We exclude weeks 33-36 of Term 3 and calculate weekly and termly attendance based on the remaining weeks of the term. The last two weeks of Term 4 were also excluded as they were highly variable across years.

Auckland and Waikato were further affected by lockdowns in Term 1 and in Term 4. Therefore, we excluded Auckland and Waikato from the data for the subsequent analyses. Although Auckland is the region with high numbers of ākonga, the exclusion of this region with abnormalities is vital to ensure non-confoundedness of changes in attendance contributable to the healthy school lunches programme (Ka Ora, Ka Ako).

Figure 16: Raw data: mean attendance for eligible schools and kura by week, 2019-2021, weeks that were removed are highlighted red

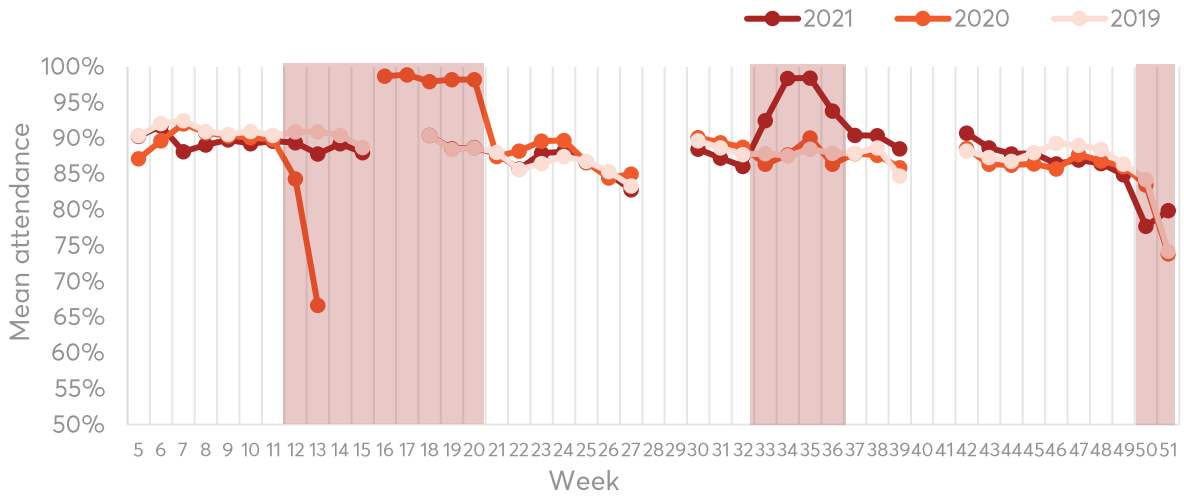
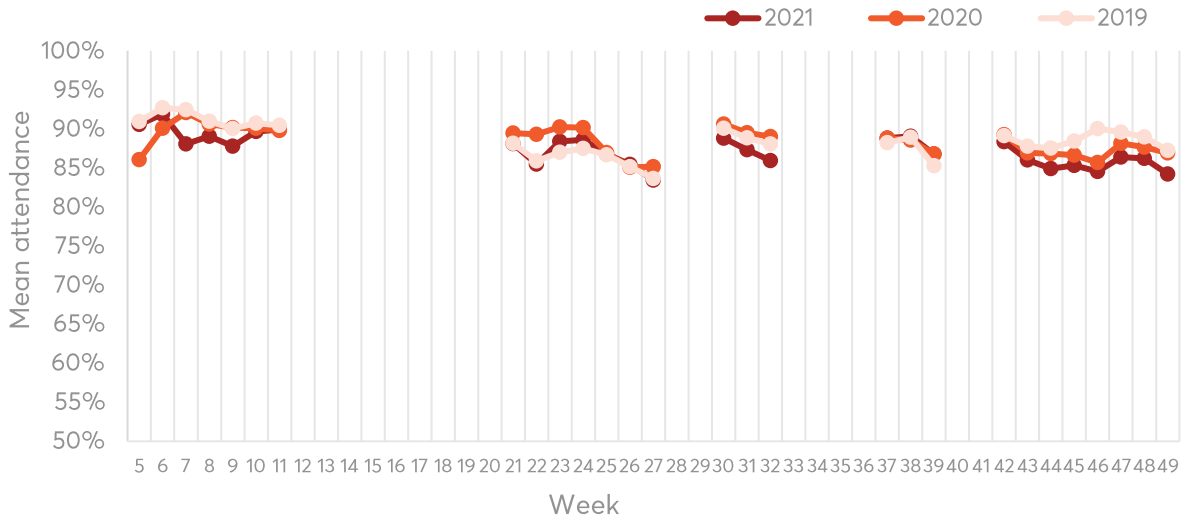


Figure 17: Clean data: having removed Auckland and Waikato and weeks impacted by Covid, mean attendance by week, 2019-2021



Missing data

Missingness is common in attendance data. It occurs when no records on ākonga attendance can be found on a particular day such that we are not sure if the ākonga were present or absent from school or kura. We explored missingness in daily attendance data and how this missingness may have effects on the overall attendance and interpretation of the results. One standard day of school or kura includes two half days. After excluding the weeks related to lockdown, the number of weeks in a term varied from seven to nine.

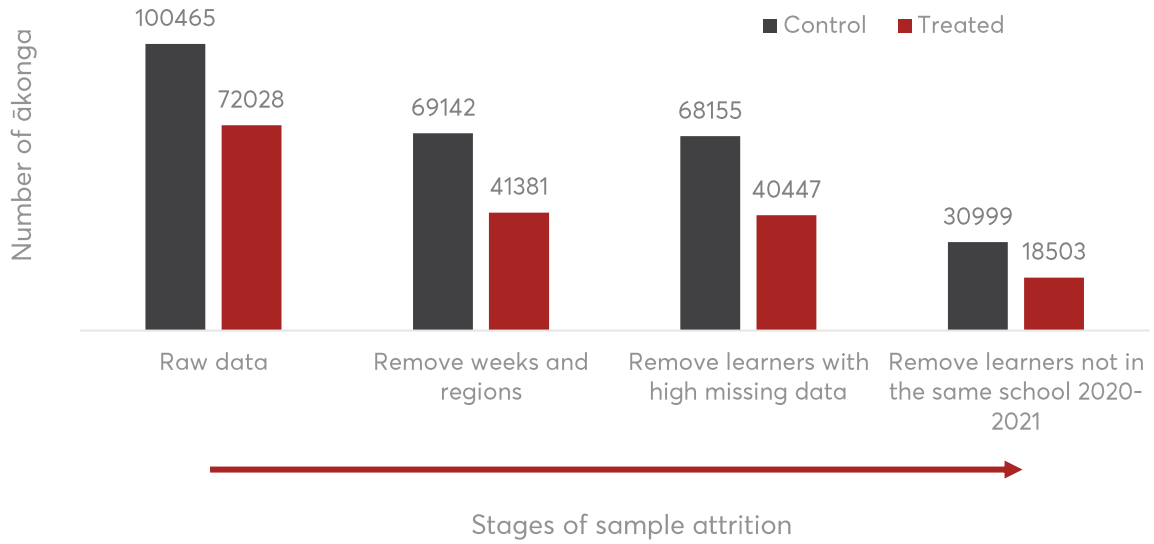
First, we calculated each ākonga proportions of missing records for a standard week and a standard term. Next, we used a threshold of missing records of 50% for a standard term to divide the sample into two groups: those with high records of missing values (50% or below a standard term records) and those with low records of missing values (greater than 50% of standard term records). Ākonga with below 50% of the total half days for a term were removed, which accounted for around 6% of the sample size. A small number of ākonga also had a total number of half days greater than that of the term, and these were also removed as they were likely errors. The groups of ākonga with high missing records were compared to those with low missing records. It was found that those with high missing records tended to be older ākonga aged 14 to 17. There was no noticeable difference by treatment, gender or ethnicity.

Matching by school / kura between 2020 and 2021

We retained only ākonga who remained in the same school or kura during 2020 and 2021. Those ākonga with changing school status were removed from the sample. This practice is important to ensure that we adjust for variations in ākonga conditions when estimating programme impacts on attendance. Overall, the steps taken to ensure the data is fit for analysis included removing weeks and regions impacted by Covid lockdowns, removing those with high missing data, and matching individuals in the same schools and kura between 2020

and 2021. These steps have resulted in attrition to the sample size of ākonga, and schools and kura. The most significant stages of attrition came from removing Auckland and Waikato, and matching ākonga by school or kura between 2020-2021. The figure below illustrates this attrition for a band of 20 (EQI 441-480), however we would expect similar patterns of attrition for a smaller band.

Figure 18: Sample attrition for eligible ākonga (band of 20, EQI 441-480) due to data cleaning



Analysis approach

Summary statistics

Summary statistics can be calculated to demonstrate how the change in attendance differs for those receiving the programme compared to not. However, the general change in attendance does not consider the multitude of factors that will influence these changes over time, such as changes in age and past attendance behaviour, especially when changes in conditions are not the same on all ākonga. In addition, the general change in attendance in summary tables assumes that the impacts of the programme are the same across different groups of ākonga (ethnicity, region, gender). The initial analysis findings demonstrated the need to control for at least some of these influencing factors to estimate the net effect of the programme on ākonga. These controlled factors included:

- age
- gender
- ethnicity
- past unjustified absence rates (2020)
- interactions between the programme and other factors to see whether the programme has different impacts on different groups of ākonga.

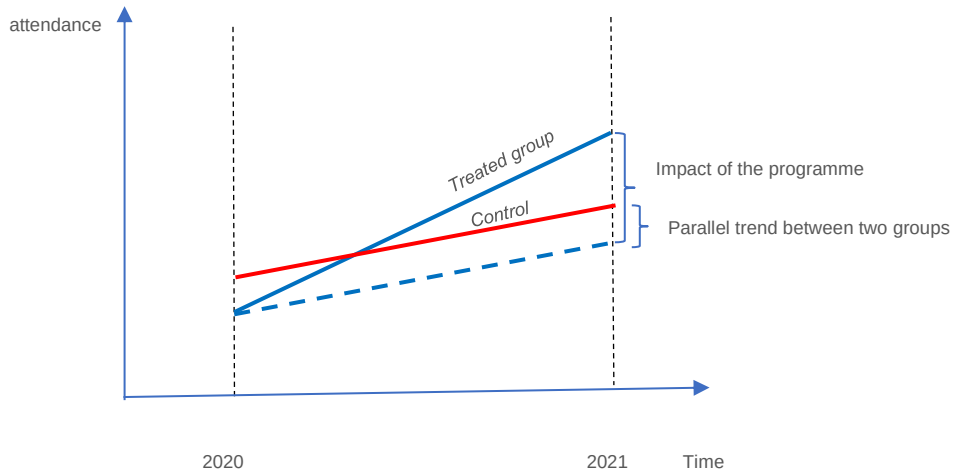
Difference in Difference

We estimate a Difference in Difference (DID) model using a binary treatment variable representing if the ākonga was in a participating school or kura, or not, and its interactions with other variables. The main objective of the DID approach is to confirm the statistical significance of the overall impact of the programme on ākonga attendance and to adjust for pre-existing differences between the two groups. Ākonga from the same school or kura may have the same pattern of reported attendance. This is potentially due to their similar contextual condition, and the school or kura attitude towards reporting ākonga attendance. Therefore, we cluster the standard errors by school or kura to account for this. The model utilised the lm robust() function in the estimatr package in R.

DID is one of the most important evaluation tools that can help control for the impacts of other confounding factors when estimating the impact of a treatment on outcome measures. The DID model uses data on the treated (ākonga provided with healthy school lunches) and control groups (ākonga not provided with healthy school lunches) with similar conditions at two time periods, one period before the treatment and at least one period after the treatment. The control group of ākonga did not receive the treatment in both periods and therefore, any changes in attendance for this group are not related to the programme but rather to other broader factors. The treated group was provided with healthy school lunches in 2021, and changes in attendance for this group are likely related to the programme as well as the broader factors that would also be affecting those not in the programme. The difference between these groups, assuming these groups are similar, is therefore whether or not they are benefiting from the healthy school lunches.

The below figure illustrates the DID method used for estimating the impact of Ka Ora, Ka Ako on attendance.

Figure 19: Illustration of the DID approach



One important aspect of assessing the Ka Ora, Ka Ako programme is that different groups of ākonga (e.g. age, gender, ethnicity) might have responded differently to the programme. We take into account this potential heterogeneity in the impacts by introducing interactions between the binary 'treatment' variable with other factors likely relevant to any change. This practice is important and can help reveal interesting features of the programme impacts given the high heterogeneity in the contexts where the programme is delivered.

Sample description

For the analysis an EQI band of 5 was selected. This meant that ākonga from schools and kura with an Equity Index of 456-460 were selected for the 'control' group, and ākonga from schools and kura with an Equity Index of 461-465 were selected to represent the 'treatment' group. Because schools and kura entered the programme at different times, the impact of attendance was investigated separately for each of the four terms.

Table 17: Number of ākonga in control and treatment groups (band of 5, EQI 456-465), by term after cleaning

Treatment	Term 1	Term 2	Term 3	Term 4
Control	11633	11648	8936	7711
Treatment	3565	4460	6235	4945
Total	15198	16108	15171	12656

Table 18: Number of schools and kura in control and treatment groups (band of 5, EQI 456-465), by term after cleaning

Treatment	Term 1	Term 2	Term 3	Term 4
Control	61	57	40	43
Treatment	19	24	37	30
Total	80	81	77	73

Table 19: Number of ākonga in control and treatment groups (band of 5, EQI 456-465), by age and term

	Term 1		Term 2		Term 3		Term 4	
Age	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment
5	106	42	307	166	333	374	480	426
6	885	417	803	479	544	664	638	556
7	883	427	800	490	541	674	610	562
8	975	480	878	557	610	762	715	618
9	948	459	881	510	587	724	691	589
10	822	375	739	442	507	592	608	505
11	812	264	770	258	510	413	639	374
12	1448	319	1317	347	843	599	1042	584
13	560	87	593	136	467	196	476	272
14	1394	215	1432	351	1272	401	1039	264
15	1236	186	1314	306	1162	373	471	104
16	1005	169	1153	244	1006	275	203	50
17	525	115	607	163	508	174	90	28
18	30	6	49	7	42	9	6	6
19	4	2	5	2	4	3	3	2
20		2		2		2		5
Total	11633	3565	11648	4460	8936	6235	7711	4945

Table 20: Number of ākonga in control and treatment groups (band of 5, EQI 456-465), by gender and term

	Term 1		Term 2		Term 3		Term 4	
Gender	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment
Female	5755	1785	5824	2193	4560	3038	3816	2368
Male	5876	1780	5824	2267	4376	3197	3895	2577
Total	11631	3565	11648	4460	8936	6235	7711	4945

Table 21: Number of ākonga in control and treatment groups (band of 5, EQI 456-465), by ethnicity and term

	Term 1		Term 2		Term 3		Term 4	
	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment
European NZ	6795	1607	6811	2317	5150	3265	4336	2772
Maori	3465	1600	3486	1633	2662	2296	2370	1570
Pacific Peoples	501	131	468	185	397	237	360	208
Asian	613	152	619	220	508	295	468	259
MELAA	71	9	81	11	75	15	44	14
Other	188	66	183	94	144	127	133	122

Attendance results

The mean attendance for ākonga in treatment and control groups are calculated for terms in 2020 and 2021. A mean change in attendance was further calculated by subtracting the mean attendance in 2020 from the mean attendance in 2021. These differences, while accounting for time-invariant factors (via the difference in difference approach) do not account for the time-variant factors, such as gender and ethnicity, and therefore do not fully isolate the effect of the programme. What these estimates do show is the general trend of attendance between the treatment and control groups, and how these changes differ by term.

Table 22: Mean attendance for treatment and control groups in 2020 and 2021 with mean change in attendance for each term, lower and upper bound are 95% cluster robust confidence intervals

Term 1	Treatment			Control		
	Estimate	Lower bound	Upper bound	Estimate	Lower bound	Upper bound
Attendance in 2020	91.5%	89.8%	93.2%	91.8%	91.0%	92.6%
Attendance in 2021	89.2%	84.8%	93.6%	89.6%	88.7%	90.5%
Change in attendance	-2.3%	-5.2%	0.6%	-2.2%	-2.9%	-1.6%

Term 2	Treatment			Control		
	Estimate	Lower bound	Upper bound	Estimate	Lower bound	Upper bound
Attendance in 2020	88.8%	87.2%	90.4%	90.0%	89.4%	90.5%
Attendance in 2021	85.8%	82.2%	89.5%	86.6%	85.2%	87.9%
Change in attendance	-3.0%	-5.5%	-0.5%	-3.4%	-4.5%	-2.3%

Term 3	Treatment			Control		
	Estimate	Lower bound	Upper bound	Estimate	Lower bound	Upper bound
Attendance in 2020	89.9%	88.1%	91.6%	90.4%	89.3%	91.4%
Attendance in 2021	87.5%	84.1%	90.8%	87.6%	86.0%	89.2%
Change in attendance	-2.4%	-4.2%	-0.5%	-2.8%	-3.7%	-1.9%

Term 4	Treatment			Control		
	Estimate	Lower bound	Upper bound	Estimate	Lower bound	Upper bound
Attendance in 2020	89.4%	87.9%	91.0%	89.2%	88.0%	90.5%
Attendance in 2021	87.9%	86.6%	89.3%	86.4%	84.8%	88.1%
Change in attendance	-1.5%	-2.7%	-0.3%	-2.8%	-3.7%	-2.0%

The above results show that the estimates for mean attendance between treatment and control groups were similar in 2020 across the four terms. Although the changes in attendance differ slightly, there is a consistent negative trend between 2020 and 2021 for both treatment and control groups.

To control for confounding factors a fixed effects model was used. This model treated mean change in attendance at the term level as the dependent variable, with treatment (in the programme or not), age, gender (male, female), ethnicity (European, Māori, Pacific, other) and past unjustified absence as predictor variables. This allowed for cluster robust standard errors to be calculated at the school level.

For each of the four terms the overall models were statistically significant.[26] Tables 23 to 26 present the results for each term. These results show the effect of the programme on changes in attendance between 2020 and 2021 while controlling for the variables described above. Across the four terms the impact of the programme (treatment) was not statistically significant. More specifically, being in the programme did not significantly predict a change in mean attendance for Term 1: (β =-0.0088 , p = 0.3856), Term 2: (β = -0.0105 , p = 0.2432), Term 3 (β = -0.0118 , p = 0.1130) or Term 4 (β = 0.0073 , p = 0.294).

The model also tells us how the confounding variables (age, gender, etc) impact changes in attendance. While these results are not relevant to the impact of the programme, they do help us understand the changes in attendance between 2020 and 2021.

[26] Term 1 (R2 = 0.1081, F(7,79) = 85.9, p < 0.001) , Term 2 (R2 = 0.099, F(7,80) = 49.63, p < 0.001), Term 3 (R2 = 0.054, F(7,76) = 28.96, p < 0.001), Term 4 (R2 = 0.0416, F(7,72) = 13.15, p < 0.001)

Across all four terms, age has a significant negative impact on changes in mean attendance among ākonga. On average, as ākonga get older, their change in attendance between years decreases. This finding is consistent with the Ministry's finding on the inverse relationship between age and attendance among ākonga.[27]

Gender was a significant predictor of change in attendance for Terms 1 and 2. Here, males on average saw a positive increase in attendance compared to females. This however was not significant in Terms 3 or 4.

Table 23: Term 1 main effects model results

Variable	Estimate	95% CI Lower	95% CI Upper	Statistics	Cluster robust SE	p-value
(Intercept)	0.0166	-0.0120	0.0453	1.1546	0.0144	0.2517
Treatment	**-0.0088**	**-0.0288**	**0.0113**	**-0.8725**	**0.0101**	**0.3856**
Age	-0.0048	-0.0071	-0.0025	-4.0820	0.0012	0.0001
Gender (M=1)	0.0072	0.0028	0.0115	3.2720	0.0022	0.0016
Past unjustified absence	0.5660	0.4754	0.6566	12.4299	0.0455	0.0000
Māori (Yes=1)	-0.0174	-0.0296	-0.0052	-2.8477	0.0061	0.0056
Pacific (Yes=1)	-0.0097	-0.0236	0.0043	-1.3815	0.0070	0.1710
Other (Yes=1)	0.0127	0.0045	0.0208	3.1052	0.0041	0.0026
df	79					

Table 24: Term 2 main effects model results

Variable	Estimate	95% CI Lower	95% CI Upper	Statistics	Cluster robust SE	p-value
(Intercept)	0.0353	0.0066	0.0640	2.4513	0.0144	0.0164
Treatment	**-0.0105**	**-0.0282**	**0.0073**	**-1.1757**	**0.0089**	**0.2432**
Age	-0.0075	-0.0099	-0.0051	-6.1109	0.0012	0.0000
Gender (M=1)	0.0097	0.0046	0.0148	3.7568	0.0026	0.0003
Past unjustified absence	0.4717	0.3794	0.5640	10.1712	0.0464	0.0000
Māori (Yes=1)	-0.0122	-0.0223	-0.0021	-2.3975	0.0051	0.0188
Pacific (Yes=1)	-0.0127	-0.0254	0.0000	-1.9906	0.0064	0.0499
Other (Yes=1)	0.0101	0.0014	0.0187	2.3186	0.0043	0.0230
df	80					

[27] Reporting on the Child Poverty Related Indicators 2020/2021.

Table 25: Term 3 main effects model results

Variable	Estimate	95% CI Lower	95% CI Upper	Statistics	Cluster robust SE	p-value
(Intercept)	0.0603	0.0349	0.0856	4.7347	0.0127	0.0000
Treatment	**-0.0118**	**-0.0264**	**0.0029**	**-1.6035**	**0.0073**	**0.1130**
Age	-0.0079	-0.0100	-0.0058	-7.4900	0.0010	0.0000
Gender (M=1)	0.0003	-0.0057	0.0063	0.1021	0.0030	0.9189
Past unjustified absence	0.2915	0.2139	0.3692	7.4753	0.0390	0.0000
Māori (Yes=1)	-0.0195	-0.0287	-0.0103	-4.2344	0.0046	0.0001
Pacific (Yes=1)	-0.0108	-0.0256	0.0040	-1.4556	0.0074	0.1496
Other (Yes=1)	0.0049	-0.0022	0.0120	1.3732	0.0036	0.1737
df	76					

Table 26: Term 4 main effects model results

Variable	Estimate	95% CI Lower	95% CI Upper	Statistics	Cluster robust SE	p-value
(Intercept)	0.0201	-0.0014	0.0415	1.8646	0.0108	0.0663
Treatment	**0.0073**	**-0.0065**	**0.0211**	**1.0570**	**0.0069**	**0.2940**
Age	-0.0053	-0.0075	-0.0032	-5.0010	0.0011	0.0000
Gender (M=1)	0.0006	-0.0043	0.0055	0.2307	0.0025	0.8182
Past unjustified absence	0.2896	0.2127	0.3665	7.5053	0.0386	0.0000
Māori (Yes=1)	-0.0216	-0.0294	-0.0138	-5.5408	0.0039	0.0000
Pacific (Yes=1)	-0.0016	-0.0166	0.0135	-0.2065	0.0075	0.8370
Other (Yes=1)	0.0062	-0.0038	0.0162	1.2316	0.0050	0.2221
df	72					

Interactions

One important aspect of assessing Ka Ora, Ka Ako is that different groups of ākonga (e.g. age, gender, ethnicity) might have responded differently to the programme. We take into account this potential heterogeneity in the impacts by introducing interactions between the binary 'treatment' variable with other factors. This practice is important and can help reveal interesting features of the programme impacts given the high heterogeneity in the contexts where the programme is delivered.

While we cannot directly include time-invariant factors into a Difference in Difference model, we are able to include interactions between programme participation status and other time-invariant factors. This approach helps reveal interesting features about the programme.

The tables of model results for each of the four terms are provided below along with plots of significant interactions.

Table 27: Term 1 fixed effects model results with interactions

Variable	Estimate	95% CI Lower	95% CI Upper	Statistics	Cluster robust SE	p-value
(Intercept)	0.0009	-0.0171	0.0188	0.0947	0.0090	0.9248
Treatment	**0.0516**	**0.0101**	**0.0931**	**2.4749**	**0.0209**	**0.0155**
Age	**-0.0036**	**-0.0054**	**-0.0018**	**-3.9473**	**0.0009**	**0.0002**
Gender (M=1)	0.0065	0.0013	0.0117	2.5085	0.0026	0.0142
Past unjustified absence	**0.5848**	**0.4834**	**0.6862**	**11.4819**	**0.0509**	**0.0000**
Māori (Yes=1)	**-0.0141**	**-0.0211**	**-0.0070**	**-3.9477**	**0.0036**	**0.0002**
Pacific (Yes=1)	-0.0091	-0.0249	0.0066	-1.1527	0.0079	0.2525
Other (Yes=1)	**0.0160**	**0.0076**	**0.0244**	**3.7824**	**0.0042**	**0.0003**
Treatment: Age	**-0.0055**	**-0.0089**	**-0.0021**	**-3.1944**	**0.0017**	**0.0020**
Treatment: Gender	0.0034	-0.0064	0.0132	0.6934	0.0049	0.4901
Treatment: Past unjustified	-0.0722	-0.2653	0.1209	-0.7447	0.0970	0.4587
Treatment: Māori	-0.0054	-0.0366	0.0257	-0.3458	0.0157	0.7304
Treatment: Pacific	0.0004	-0.0314	0.0322	0.0245	0.0160	0.9805
Treatment: Others	-0.0127	-0.0327	0.0073	-1.2665	0.0100	0.2091
df	79					

Figure 20: Term 1, significant interaction between treatment and age

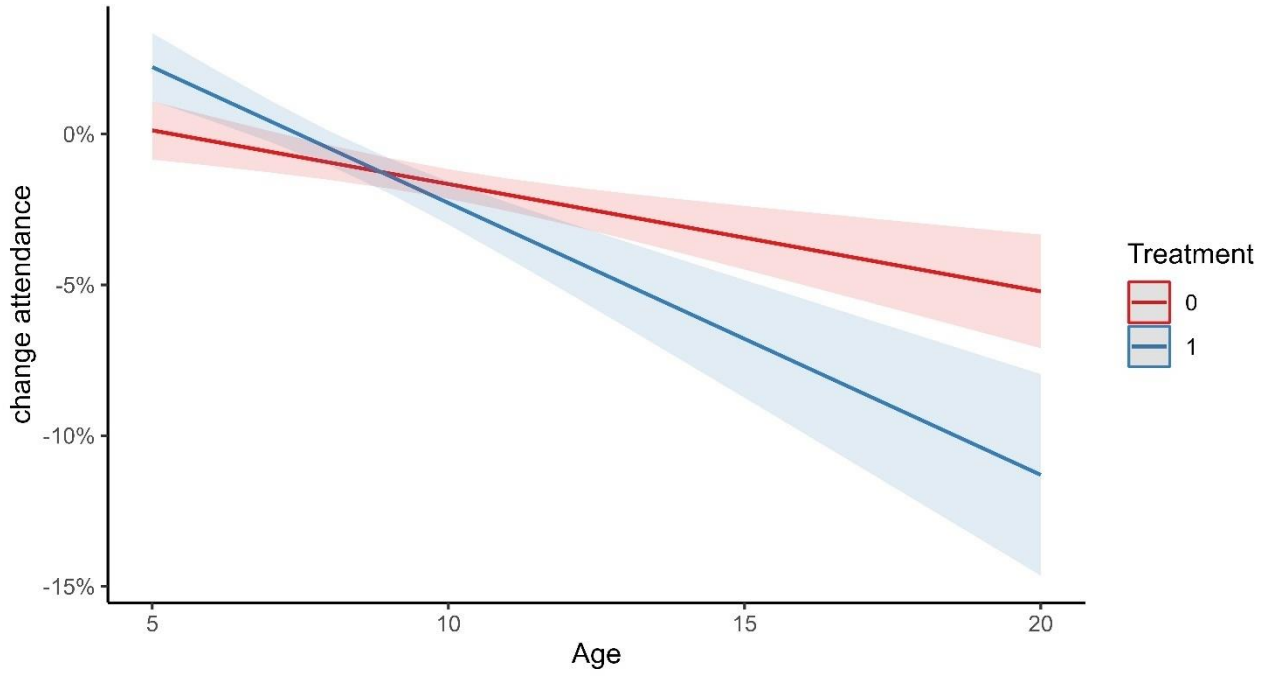


Table 28: Term 2 fixed effects model results with interactions

Variable	Estimate	95% CI Lower	95% CI Upper	Statistics	Cluster robust SE	p-value
(Intercept)	0.0151	-0.0141	0.0443	1.0266	0.0147	0.3077
Treatment	**0.0560**	**0.0115**	**0.1005**	**2.5031**	**0.0224**	**0.0143**
Age	**-0.0060**	**-0.0086**	**-0.0033**	**-4.5100**	**0.0013**	**0.0000**
Gender (M=1)	**0.0112**	**0.0054**	**0.0170**	**3.8320**	**0.0029**	**0.0003**
Past unjustified absence	**0.4641**	**0.3323**	**0.5960**	**7.0070**	**0.0662**	**0.0000**
Māori (Yes=1)	-0.0081	-0.0183	0.0021	-1.5725	0.0051	0.1198
Pacific (Yes=1)	-0.0159	-0.0317	-0.0001	-1.9964	0.0079	0.0493
Other (Yes=1)	**0.0177**	**0.0087**	**0.0267**	**3.9185**	**0.0045**	**0.0002**
Treatment: Age	**-0.0057**	**-0.0096**	**-0.0018**	**-2.9226**	**0.0020**	**0.0045**
Treatment: Gender	-0.0043	-0.0153	0.0067	-0.7733	0.0055	0.4416
Treatment: Past unjustified	0.0430	-0.1226	0.2087	0.5170	0.0832	0.6066
Treatment: Māori	-0.0106	-0.0289	0.0077	-1.1515	0.0092	0.2530
Treatment: Pacific	0.0089	-0.0145	0.0324	0.7601	0.0118	0.4494
Treatment: Others	**-0.0271**	**-0.0454**	**-0.0089**	**-2.9559**	**0.0092**	**0.0041**
df	80					

Figure 21: Term 2, significant interaction between treatment and age

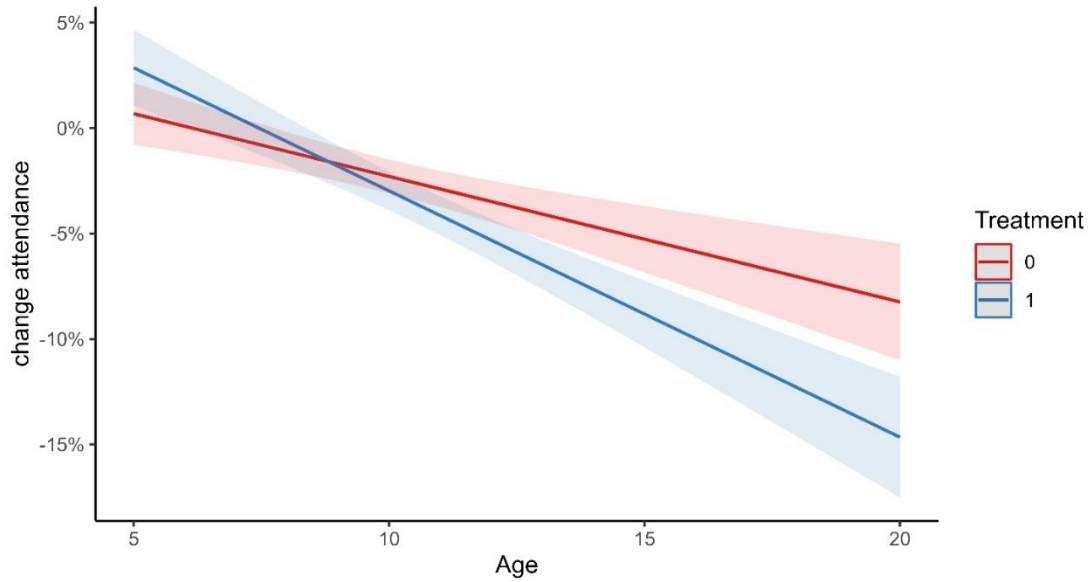


Figure 22: Term 2, significant interaction between treatment and 'other' ethnicity

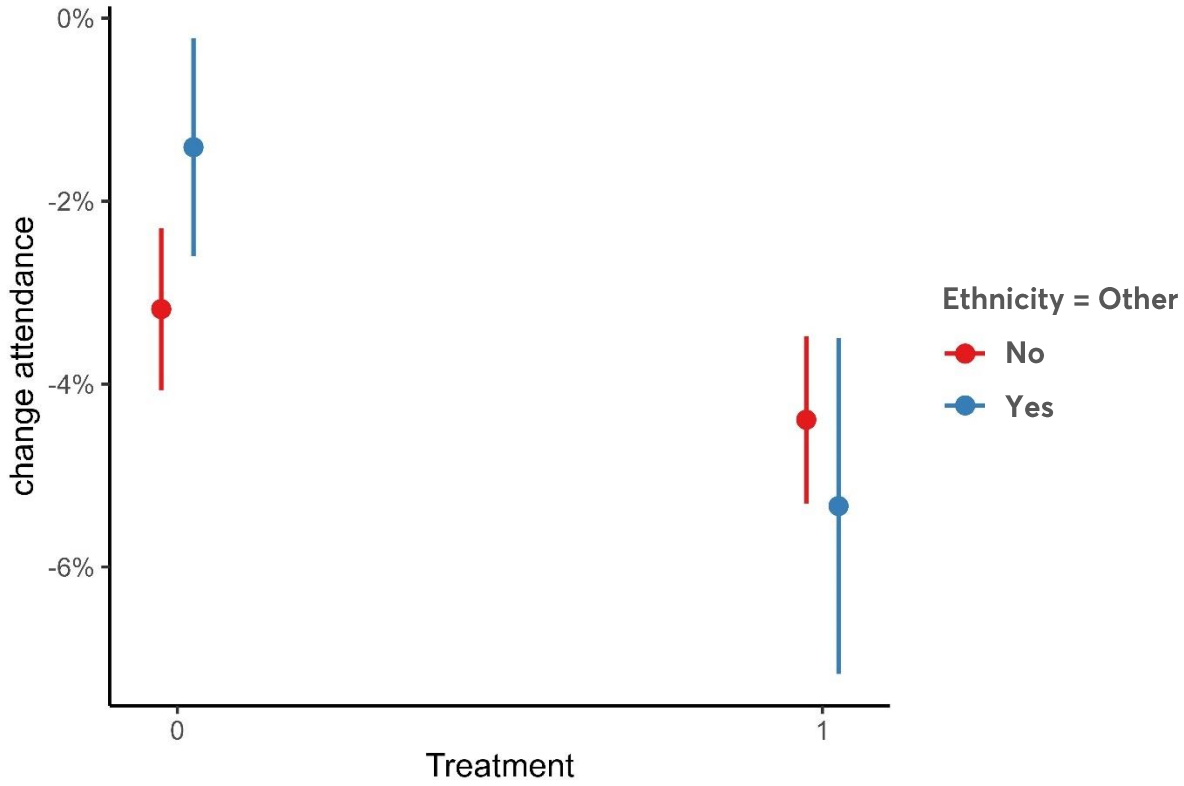


Table 29: Term 3, fixed effects model results with interactions

Variable	Estimate	95% CI Lower	95% CI Upper	Statistics	Cluster robust SE	p-value
(Intercept)	0.0371	0.0143	0.0600	3.2340	0.0115	0.0018
Treatment	**0.0422**	**0.0065**	**0.0778**	**2.3552**	**0.0179**	**0.0211**
Age	**-0.0060**	**-0.0080**	**-0.0040**	**-5.9575**	**0.0010**	**0.0000**
Gender (M=1)	0.0023	-0.0055	0.0100	0.5795	0.0039	0.5640
Past unjustified absence	**0.2777**	**0.1603**	**0.3951**	**4.7106**	**0.0589**	**0.0000**
Māori (Yes=1)	**-0.0197**	**-0.0270**	**-0.0123**	**-5.3461**	**0.0037**	**0.0000**
Pacific (Yes=1)	-0.0087	-0.0256	0.0081	-1.0315	0.0085	0.3056
Other (Yes=1)	0.0058	-0.0045	0.0162	1.1196	0.0052	0.2664
Treatment: Age	**-0.0051**	**-0.0086**	**-0.0016**	**-2.9393**	**0.0017**	**0.0044**
Treatment: Gender	-0.0041	-0.0155	0.0072	-0.7203	0.0057	0.4736
Treatment: Past unjustified	0.0454	-0.1039	0.1947	0.6051	0.0750	0.5469
Treatment: Māori	0.0025	-0.0146	0.0196	0.2911	0.0086	0.7717
Treatment: Pacific	-0.0039	-0.0355	0.0276	-0.2482	0.0158	0.8047
Treatment: Others	0.0002	-0.0136	0.0140	0.0256	0.0069	0.9796
df	76					

Figure 23: Term 3, significant interaction between treatment and age

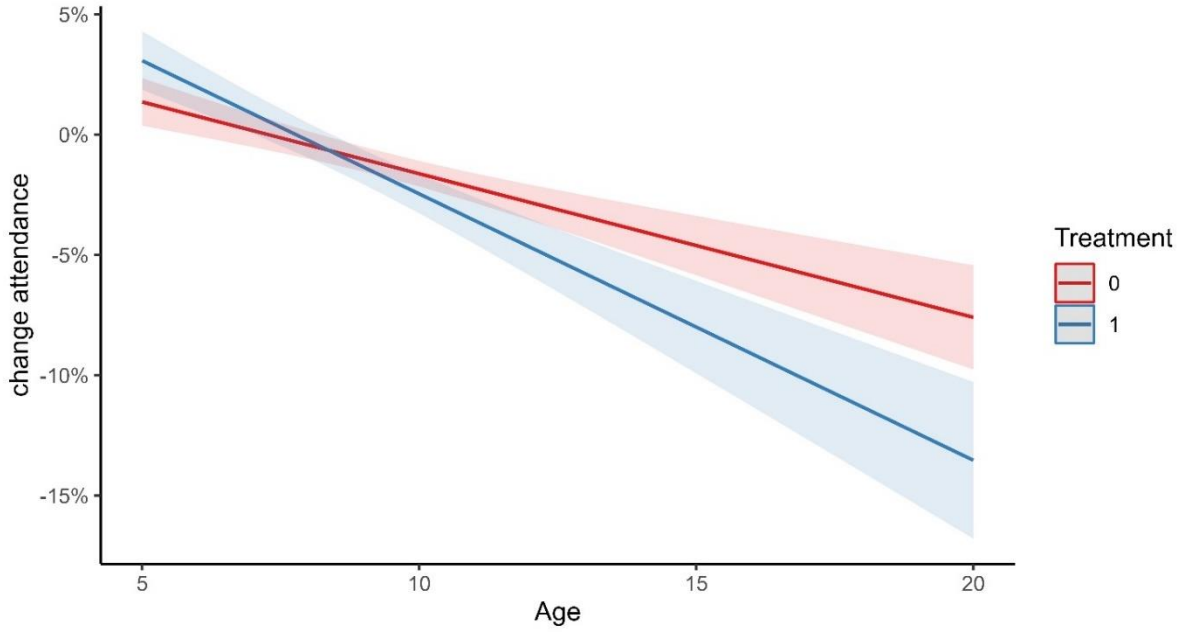
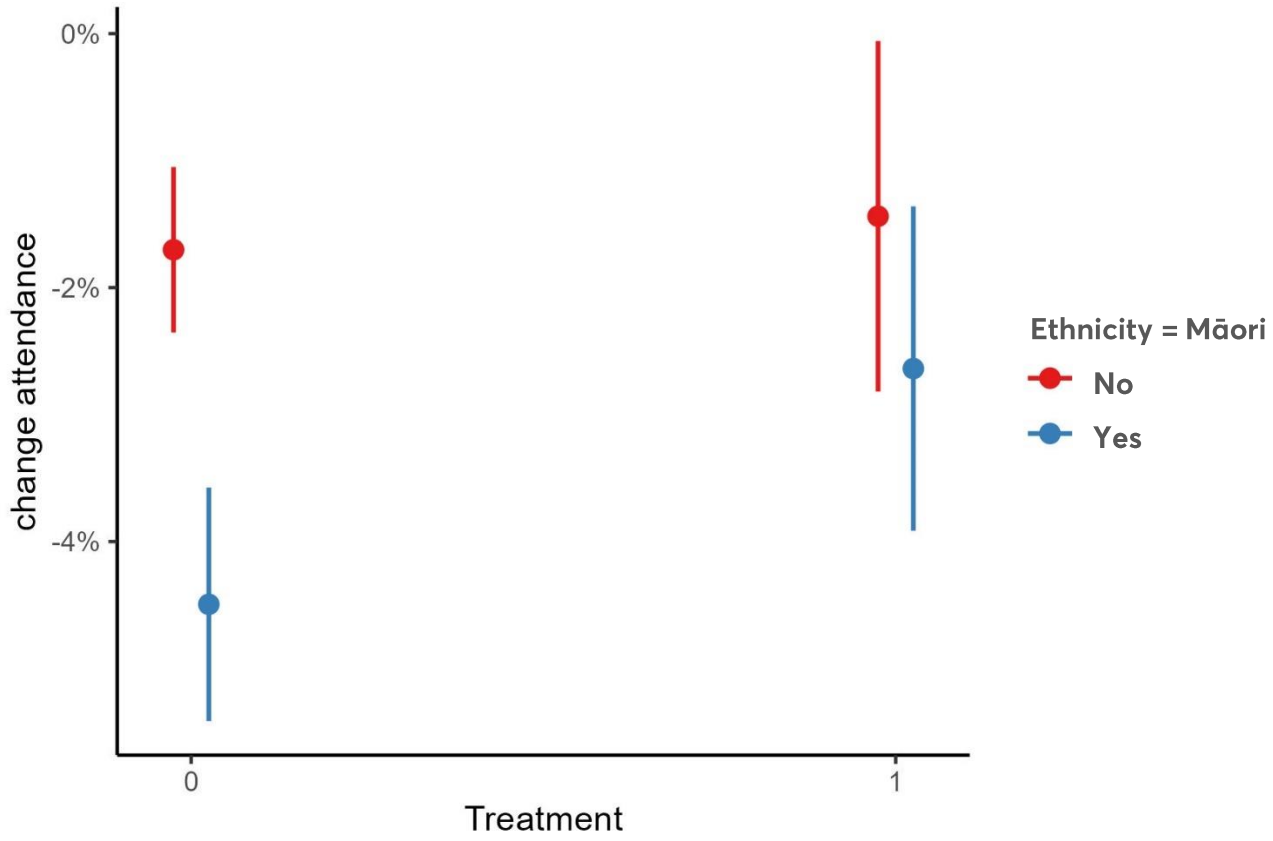


Table 30: Term 4 fixed effects model results with interactions

Variable	Estimate	95% CI Lower	95% CI Upper	Statistics	Cluster robust SE	p-value
(Intercept)	0.0295	0.0101	0.0489	3.0269	0.0097	0.0034
Treatment	**-0.0158**	**-0.0569**	**0.0252**	**-0.7692**	**0.0206**	**0.4443**
Age	**-0.0058**	**-0.0081**	**-0.0036**	**-5.1943**	**0.0011**	**0.0000**
Gender (M=1)	-0.0018	-0.0083	0.0047	-0.5549	0.0032	0.5807
Past unjustified absence	**0.2808**	**0.2101**	**0.3515**	**7.9155**	**0.0355**	**0.0000**
Māori (Yes=1)	**-0.0279**	**-0.0364**	**-0.0194**	**-6.5531**	**0.0043**	**0.0000**
Pacific (Yes=1)	-0.0060	-0.0264	0.0145	-0.5828	0.0103	0.5618
Other (Yes=1)	-0.0004	-0.0148	0.0140	-0.0569	0.0072	0.9548
Treatment: Age	0.0013	-0.0036	0.0061	0.5191	0.0024	0.6053
Treatment: Gender	0.0058	-0.0035	0.0152	1.2408	0.0047	0.2187
Treatment: Past unjustified	0.0245	-0.1531	0.2020	0.2747	0.0891	0.7844
Treatment: Māori	**0.0159**	**0.0006**	**0.0313**	**2.0653**	**0.0077**	**0.0425**
Treatment: Pacific	0.0108	-0.0186	0.0403	0.7330	0.0148	0.4659
Treatment: Others	0.0160	-0.0005	0.0326	1.9274	0.0083	0.0579
df	72					

Figure 24: Term 4, significant interaction between treatment and Māori ethnicity



Identifying the most underserved ākonga

Ka Ora, Ka Ako is a New Zealand Government initiative to tackle the food insecurity issue, with a special focus on young ākonga with some extent of food insecurity. An important component of this evaluation is to identify those ākonga most underserved and assess how the programme contributed to their improved attendance.

Child poverty is multi-dimensional such that no single measurement is perfect. Ākonga-level Equity Index (EQI) is a good proxy for child poverty, although this child-level information is not available within the Ministry dataset. Although we have school-level EQI, we do not use this information as the criteria for identification of those most underserved ākonga for the important reason that school-level EQI is averaged across different ākonga within a school or kura. Given this practice, school-level EQI, albeit representative, does not reflect ākonga-specific EQI.

We have explored different ways for identification of ākonga most underserved. Each approach makes assumptions about the most underserved ākonga. First, we used past unjustified absence as a proxy indicator of ākonga that are "underserved". This practice assumes that underserved ākonga have higher past unjustified absence because they experience some form of poverty that cause higher absenteeism (frequent relocation, lack of

access to food) with low report rates ("unjustified").[28] Second, we exploited changes in ākonga attendance between 2020 and 2021 to identify cohorts of underserved ākonga. Here, we assumed that underserved ākonga exhibited systematic differences from an "average" ākonga in terms of measured changes in attendance.[29] Both approaches showed ambiguous and inconsistent results across the terms.

The IDI is an ideal dataset to identify the most underserved cohort of ākonga using the individual level EQI, and as such, estimate the effects of the programme on these ākonga. It would be important for the Ministry to proceed with this analysis, with the relevant data available from November 2022.

[28] The average unjustified absence was calculated as 3.5% across the whole of relevant ākonga. We used different cut points between 10% and 30% of past unjustified absence to select subsets of underserved ākonga. The resulting samples of underserved ākonga include between 753 and 7,783 ākonga depending on the cut point. However, the estimates of the programme impact from these groups of underserved ākonga indicate no significant impact of the programme on them. This may reflect either that past unjustified absence has nothing to do with the ākonga needs or that the sample for Term 1 is not enough for a true relationship to be revealed.

[29] The average changes in attendance are 1.7% for those ākonga in the programme, and 0.8% for those ākonga not in the programme. The distribution of ākonga against these changes in attendance were used to select a subset of ākonga with either above or below average improvement in attendance. The programme impact was then estimated using these subsets of ākonga. However, the estimates are not consistent between the whole sample and these groups. This may be due to the fact that the adopted practice is capturing attendance behaviours among those who responded strongly or weakly to the programme, not among those underserved.

Appendix C: Case studies

Approach

The evidence provided through the two approaches above estimated the impact on the key outcomes. The intention behind the qualitative approach was to provide an opportunity to examine potentially significant variability between people involved in the programme and the programme activities. More importantly, it sought to provide an opportunity for others to tell their story of success.

Sample selection/identification

Qualitative sampling is based on two principles, namely maximum variation and saturation. In terms of maximum variation it would be important to understand the different views and perspectives, and to a certain extent you can plan for these likely points of variation. We applied a strengths-based sampling approach, whereby individuals believed to illustrate positive benefits from the programme were selected to demonstrate some potential benefits in relation to Ka Ora, Ka Ako. We also understand that some variation will likely occur within the different contexts, such as different regional contexts as well as whānau contexts. It was for this reason that we are including schools and kura from different regions.

Our process was to identify three regions, and we selected 16 schools and kura in terms of diversity of different delivery models (e.g. internal, external, iwi/hapū, school type (e.g. providing for primary and secondary ākonga) and school size (e.g. school roll). The initial long list was segmented according to schools and kura with:

- greater needs (Equity Index greater than 400).
- mature delivery models (how long the schools and kura have been providing the programme).

These schools and kura were presented to the Ministry of Education, who then selected the specific schools and kura the evaluation team would visit. The evaluation team engaged with the selected schools and kura, and the final sample included a diverse range of schools and kura.

Table 31: Diversity of schools and kura selected for the 8 case studies

Regions	Equity Index	Roll size	Models	School types
• Wellington • Bay of Plenty • Nelson/Tasman	501-569	14-602	Internal, external, iwi/ hapū	Contributing, secondary, Teen Parent Unit, kura kaupapa Māori

Although saturation is the second key principle in qualitative sampling, we did not seek to achieve saturation in the interviews but rather to explore a range of different contexts.

The evaluation team provided guidance to schools to help them identify staff, providers and whānau willing to tell any stories of success around food security, wellbeing or attendance.

This guidance was:

- The provider interview is someone who knows about the healthy school lunches (rather than administration).
- The school staff interview is with a member of staff that knows about food and wellbeing before the programme (so this helps develop a story of change).
- The whānau interview is with whānau who had a child at the school or kura before the programme was introduced (again, so we can help develop a story of change).

Data collection

A minimum of three interviews were conducted at each school and kura. This included individual or small group interviews with the school staff, the lunch provider and the whānau (which included the ākonga in the case of the Teen Parent Units). The evaluation team undertook these interviews with whānau using a face-to-face approach to help us better understand the local context and the benefits from the programme.

The questions were similar insofar as seeking contextual information as well as stories of change as a result of the programme and capturing the most significant of these changes for those interviewed. The interview schedules are provided below, and these were used as guides for applying a semi-structured interview approach.

Figure 25: Interview schedule for school staff

Evaluation of the Healthy School Lunches programme

Interview guide for school staff

Welcome

- Welcome and karakia
- Mihi mihi
- Kaupapa o te ra: approach and purpose (see below)
- Review the information sheet
- Provide opportunity to ask any questions
- Review consent forms
- Confirm acceptance (or not) of recording

Background about the evaluation

As you know, the Ministry of Education is administering the Ka Ora, Ka Ako Programme in your school. This lunch programme aims to reduce food insecurity by providing access to a nutritious free lunch every day. The programme is being evaluated so that decisions are based on evidence. In the evaluation, we are trying to determine if the programme has made a difference to learners' wellbeing and attendance at school.

Our short conversation today is about exploring the context in which the programme is operating at your school / area. We want to use this to contextualise the programme around your school more broadly.

Context

We'd like to start by understanding the context of your community and food choices.

1. What options are there for purchasing lunch in the surrounding community? (e.g. supermarkets, dairies)
2. Did you learners visit these often before the programme was introduced?
3. What are/were the main factors influencing students' food choices?
4. Did you have any other food programmes in your school – either targeted to specific kids or overall provision of food?
5. What were the reasons for signing up to the programme?
    a. What was food security like (examples)
    b. What was wellbeing like (examples)
    c. What was attendance like (examples)
6. Why did your school to provide the programme as an external/internal model?

Programme delivery and impact

7. Have you made any adaptations to the way the programme is delivered to fit with the needs of your school and ākonga?
8. What are some of the changes you see as a result of administering the Ka Ora, Ka Ako programme?
9. What was the most significant change, from your perspective?
10. Why was this the most significant for you?
11. Can you tell me what it was like before the programme and this change?
12. What is it like now?

Closing

- OK to reference school's name in the report?

- Korero whakamutunga: confirm next steps and key responsibilities
- Karakia whakamutunga: closing prayer
- Hakari, shared kōrero and aroha.

Figure 26: Interview schedule for providers

Evaluation of the Healthy School Lunches programme

Interview guide for lunch provider

Welcome

- Welcome and karakia
- Mihi mihi
- Kaupapa o te ra: approach and purpose (see below)
- Review the information sheet
- Provide opportunity to ask any questions
- Review consent forms
- Confirm acceptance (or not) of recording

Background about the evaluation

As you know, the Ministry of Education is administering the Ka Ora, Ka Ako Programme in your school. This lunch programme aims to reduce food insecurity by providing access to a nutritious free lunch every day. The programme is being evaluated so that decisions are based on evidence. In the evaluation, we are trying to determine if the programme has made a difference to learners' wellbeing and attendance at school.

Our short conversation today is about exploring the context in which the programme is operating at your school / area. We want to use this to contextualise the programme around your school more broadly.

Context

We'd like to start by understanding the context of your community and food choices.

1. How long have you been delivering food as part of the programme?
2. How many staff does the programme employ?
    a. What were they doing before they were employed by the programme?
3. What were the reasons for agreeing to deliver the programme?

4. Have you made any adaptations to the way the programme is delivered to fit with the needs of your school and learners?
5. What does your day look like in terms of preparing and delivering the food?
6. Can you tell us about the lunch being provided today?
    a. What is being provided (list items)
    b. Nutrition in relation to your learners
    c. Other aspects of relevance to your learners
7. What are some of the changes you see as a result of administering the Ka Ora, Ka Ako programme?
8. What was the most significant change, from your perspective?
9. Why was this the most significant for you?

Closing

- OK to reference school's name in the report?
- Korero whakamutunga: confirm next steps and key responsibilities
- Karakia whakamutunga: closing prayer
- Hakari, shared kōrero and aroha.

Figure 27: Interview schedule for whānau/ākonga

Evaluation of the Healthy School Lunches programme

Interview guide for whānau / learner

Welcome

- Welcome and karakia
- Mihi mihi
- Kaupapa o te ra: approach and purpose (see below)
- Review the information sheet
- Provide opportunity to ask any questions
- Review consent forms
- Confirm acceptance (or not) of recording

Background about the evaluation

As you know, the Ministry of Education is administering the Ka Ora, Ka Ako Programme in your school. This lunch programme aims to reduce food insecurity by providing access to a nutritious free lunch every day. The programme is being evaluated so that decisions are based on evidence. In the evaluation, we are trying to determine if the programme has made a difference to learners' wellbeing and attendance at school.

Our short conversation today is about exploring the impacts this programme has had on your child and whanau. With your permission, we want to use this to contextualise the programme for readers, but we will anonymise it.

Context

We'd like to start by understanding the context of your community and food choices.

1. Can you tell us about how long you have been living in this area? Can you tell us what you like about it?
2. Can you tell us about your child's school? What do you like about it?
3. Can you tell us a little about your child?
    a. How old is your child?
    b. What hobbies or subjects does your child like or excel at school?
4. Does s/he eat different food at school? What does s/he say about the food?
5. As you know, your school started providing lunches to all ākonga at the school <insert term>. Since this point, what are some of the changes you see in your child or whanau that you believe are a result of the Ka Ora, Ka Ako programme?
6. What was the most significant change, from your perspective?
7. Why was this the most significant for you?
8. I'd like you to tell me a story about this significant change. Can you tell me
    a. what it was like before the programme was introduced at your child's school?
    b. what is it like now after this programme was introduced?
    c. How does this make you feel?

Closing

- Story sharing and validation
- Korero whakamutunga: confirm next steps and key responsibilities
- Karakia whakamutunga: closing prayer
- Hakari, shared kōrero and aroha.

Analysis

The interview and analysis approach sought to demonstrate success, focusing on describing the school and provider contexts, and staff experiences around the whānau/ākonga story of significant change. The analysis was therefore seeking to form a story from the shared information around successes and benefits of the programme. We adopted a participatory approach, each person considered the range of changes or successes they believed to have occurred as a result of the programme, and then selected the single most significant success. These experiences were then told in the form of a story, and these stories are pulled together as a consistent whole case study.

The created case study stories were shared with each participant to ensure accuracy, as well as to confirm their willingness to share the case study publicly through the evaluation report. Each participant was given two weeks to respond.

Case studies

Six of the eight case studies were included in the evaluation report. The six case studies were selected to exemplify how the programme could impact the community in relation to significant themes found in the quantitative data. The remaining two case studies are provided here.

Case Study 7: Ka Ora, Ka Ako in O Te Ara Whanui

Te Kura Kaupapa Māori o Te Ara Whanui is situated in Lower Hutt in the Wellington region and has a roll of 360 ākonga from Years 1 to 13. The kura consists of tamariki from a range of socioeconomic and parenting backgrounds. Te Ara Whanui is a Māori medium kura committed to maintaining a mana motuhake self-determination learning environment. The kura prioritises self-sustainability, *"if we look after the whenua, it will look after us."* A major part of this commitment is around the health and wellbeing of their tamariki. Prior to the commencement of Ka Ora, Ka Ako the kura had already been smoke-free and junk food-free for more than two decades. Philosophically, Ka Ora, Ka Ako aligned with the kura kaupapa of feeding tamariki and encouraging their learnings around nutrition.

The kura aims to remove challenges that prevent whānau from sending their tamariki to school, they want to, *"no longer let kai be a barrier."* Therefore, trialling the programme was a straightforward decision for the kura. They chose an external model of provision with a provider who caters to approximately 30 schools and kura in the region. When kai arrives at the kura, a group of older ākonga and a staff member organise and label the meals then deliver them to the classrooms. After lunch, the ākonga retrieve the trays and sort out the recycling and uneaten kai. Some of the snacks are collected and put onto grazing plates for the ākonga, where they can continue to snack on the kai throughout the day. Any leftover meals are picked up every afternoon for the YMCA men's shelter.

The mahi of packing and delivering is usually completed by the provider, but here the provider instead pays the equivalent amount directly to the kura. With the money from the provider, the kura can treat all the ākonga once a term. For example, recently all the kura ākonga went to see The Lion King Reo Māori movie.

The kura publish the upcoming lunch menus in their school newsletters. On this day, the lunch was a chicken katsu on rice and coleslaw, with a side of edamame beans and a sealed packet of popcorn. After feedback from the kura, the provider caters for 270 daily lunches in three sizes: small (Years 0-3), medium (Years 4-8), and large (Years 9-13). Other meals that have been provided include lasagne, paella rice, roast beef with baby carrots, meatballs and a ham and cheese croissant. The older ākonga who deliver the food can directly inform the kaiako and provider about what food is well received and what isn't.

Ka Ora, Ka Ako, *"should have been in schools years ago,"* and is helping this kura continue to help their ākonga change their lifestyles by making healthier food decisions. Many ākonga are now used to eating a variety of kai, adapting to new tastes, flavours and names. The programme also helps reduce the financial burden and stress for whānau to provide lunches for their tamariki. In particular, for whānau with three or more tamariki. Through Ka Ora, Ka Ako at this kura, *"children have the opportunity to be better learners."*

Niko* used to arrive at school hungry. He would arrive late so would miss attending the KidsCan breakfast club. Two kaiako at the kura started making and providing kai for Nico and other hungry ākonga. *"Niko was so hungry he would get hangry. He would get violent and throw chairs around. If that one boy didn't eat, your whole day was ruined, he mucked the whole class up."* Since the kura started Ka Ora, Ka Ako there has been a notable difference in Nico's focus on learning. There has also been a vast amount of pressure taken off the teachers who no longer need to pay for or make daily kai for the ākonga, *"Ka Ora, Ka Ako is marvellous, it should have happened years ago. It's an awesome initiative, I hope they don't scrap it. We can't go back to having hungry kids."*

Case Study 8: Ka Ora, Ka Ako in Blenheim School

Blenheim School is a diverse five-classroom primary school in a central location. Blenheim is a community-orientated town of approximately 29,000 residents with a sunny climate. Many of the jobs in the region are agricultural and specific to vineyards and farming. Prior to Ka Ora, Ka Ako the lack of food was a barrier for children going to school. In some families, *"parents find it tricky to get kids to school with food in their lunchboxes, it's an income challenge."* Therefore, the school decided to undertake Ka Ora, Ka Ako. For some families, *"if they couldn't provide food for their children then they wouldn't send them to school. Now, with the programme they come to school."*

The school use an external model of lunch provision for Ka Ora, Ka Ako. They work with a large provider that has grown to 500 staff nationwide. Many of the provider's national team are specialised, for example, there is a meal planning team based in Auckland. This team choose the daily menu, which in turn is delivered to the provider's commercial kitchen in Blenheim. The role of the eight staff in Blenheim is to put everything together and then deliver the lunches to the school. The provider leaves the lunches in large plastic tubs outside the appropriate classrooms. Teachers occasionally eat the leftovers, while the rest of the meals are given to families to take home at the end of each day.

The school receives an advance menu from the provider. There's a fixed number of meals provided to the school per day. On this day, the ākonga received a ham and cheese sandwich,

a yogurt and some carrot sticks. The school receives a variety of meals, including homemade pizza and butter chicken. The children are, *"really well catered to."*

Ka Ora, Ka Ako has enabled the ākonga to be fuller for longer with the meals they receive from the programme. By having continuously healthy meals, the ākonga seem to be more settled, and their behaviour has improved. There's a fixed number of meals provided to the school per day. It is thought that because of this the ākonga can concentrate on a task for longer. There are some ākonga who opt out of the programme, and there is a noticeable difference between the kids who have eaten the Ka Ora, Ka Ako meals and those who have not. As a result of the programme, *"kids are fuller for longer with the meals that they get right now. Their mood and behaviours have been impacted by having healthy, constant meals. The children are more settled."*

The financial impact of the programme on parents has been significant, especially for those who do not have much food at home. The impact on their time has also been significant. Thanks to the programme, in the morning parents don't have to spend time making lunches, and there is less conflict with their children. The availability and convenience of food were highlighted as being critical factors to both parents and ākonga at the school, *"it's about what's easy, where they are at, and whatever draws their attention."*

There are positive behavioural differences, and the ākonga are happier. Some ākonga have been hugely impacted by Ka Ora, Ka Ako. *"Kids come to school with nothing in their bag, no shoes on their feet. Maybe there's not sufficient food at home, you don't know what's going on in peoples' homes."*

Christina* is 5 years old and loves reading and being creative. She's, *"excited about learning and is right into everything."* Christina is a picky eater with a wide-ranging taste palate. She eats most of the food provided through Ka Ora, Ka Ako as it's similar to what she eats at home, items such as pasta, vegetables, pizza and nachos. *"The option of having food at school is amazing. Both kids and adults are fussy, there are always going to be kids who won't eat the food. Life is expensive, for the programme to take that pressure away from parents is huge."*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