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NEW ZEALAND HEALTHY SCHOOL LUNCH PILOT | KA ORA, KA AKO INTERIM EVALUATION

17 May 2021

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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. For this evaluation, we're working with the Ministry of Education and our partners, supported by Dr Nick Kimber (Elevate Health), Owen Hall MSc (statistician), and Sue Yates (proofreader).

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THE NEW ZEALAND HEALTHY SCHOOL LUNCH PILOT | KA ORA, KA AKO INTERIM EVALUATION

STANDARD OF PROOF

Food insecurity in New Zealand is a real issue for many households, with research showing approximately 19% of children in New Zealand lived in households that lacked access to sufficient amounts of nutritionally adequate and safe foods. This level of food insecure learners is concerning, as food insecurity and hunger have been reliably linked to lower levels of concentration, cognitive functioning, attendance, engagement and school achievement. Food insecurity has also been linked to worse developmental trajectories for children, including impaired social skills development and reading development, and mental disorders for children and adults.

In 2020, a government-sponsored healthy school lunch programme – Ka Ora, Ka Ako – was introduced, focusing on providing lunches to all learners in schools with the highest levels of deprivation, and focused on primary and intermediate learners in the Bay of Plenty/Waiariki, Hawke's Bay/Tairāwhiti, and Otago Southland regions (the 'pilot').

Providing regular access to nutritious food is intended to reduce the risk of food insecurity, specifically by providing nutritious food every day to learners who may not otherwise have adequate quantities and/or nutritious food available at lunch. It was expected that this lunch would alleviate hunger and improve nutrition while promoting attendance at school. It was further expected that the provision of nutritious school lunches will lead to greater food security for learners as well as improved wellbeing, in particular for those most disadvantaged learners.

Why evaluate?

The interim evaluation serves an accountability function and informs the New Zealand Government (funders), the Ministries responsible for implementation and the New Zealand public about the value of the pilot for learners. Specifically, it was important to determine the extent to which the pilot has contributed to the achievement of the outcomes of improving learner food security, attendance and wellbeing, in particular for Māori learners and those most in need.

It was also important to document any unintended, broader benefits for schools, their learners and whānau, and their community.

How do we know it's been effective?

The interim evaluation assessed if the pilot contributed a net benefit for primary and intermediate learners in the Hawke's Bay and Bay of Plenty regions, as well as the additional benefit for those learners most in need of the programme. The evaluation evidence was collected and collated in the second half of 2020. The subsequent information was triangulated and synthesised to estimate the impact of the pilot on four outcomes: consumption, satiety, wellbeing and attendance.

- Learner food diaries collected over 2 1-week periods from 2,729 learners in 129 classes across 38 schools
- Focus groups with school staff in 9 schools
- Lunch photos, collected from a selection of classes in 18 schools
- Attendance data from 87 schools

WHAT WAS ACHIEVED BY THE PILOT?

CONSUMPTION

Large benefits for the average primary and intermediate learner

The pilot performed exceptionally well with regards to changing the types of food learners have available to them and consume.

SATIETY

Large benefits for those most disadvantaged learners

The pilot performed very well at improving satiety for learners. Learners who previously had insufficient food showed large gains in satiety after the pilot was introduced, and these large gains were over and above their more advantaged classmates. There were also significant, albeit smaller, improvements to satiety for the average learner in the pilot.

WELLBEING

Some benefits

The pilot performed adequately at improving wellbeing for learners. Learners with insufficient food prior to the pilot had greater gains in mental wellbeing than their more advantaged classmates. There were also significant improvements, albeit smaller, for physical and emotional functioning and overall health quality of life for the average learner in the pilot.

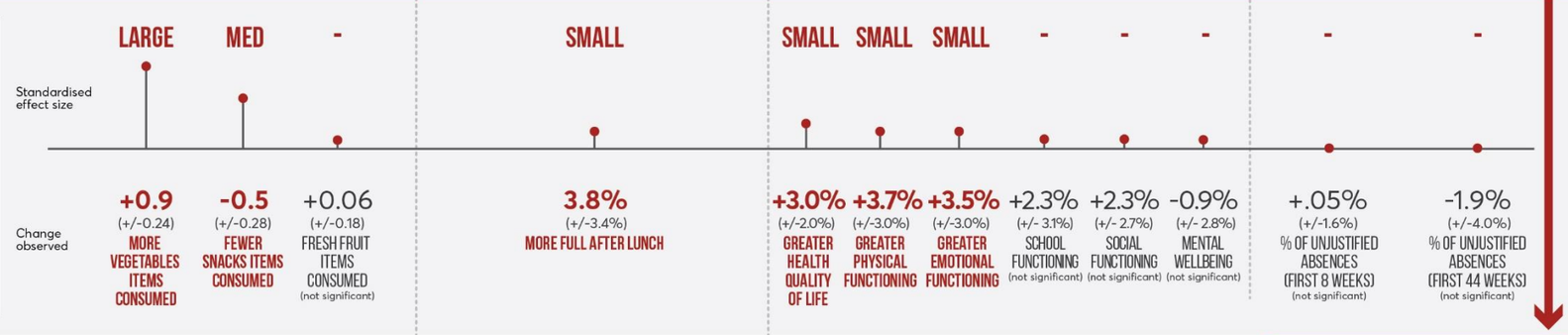
ATTENDANCE

No clear benefits for the average primary and intermediate learner

Although there were no clear benefits for the average learner with regards to attendance, the evidence could not determine if there were any benefits for those most disadvantaged learners.

HOW LARGE WAS THE PILOT'S NET EFFECT* ON PRIMARY AND INTERMEDIATE LEARNERS?

*The net effect estimates the impact of the pilot on learners over and above changes in the background (those not in the pilot).



HOW HAS THE PREVALENCE* OF NEED CHANGED IN PILOT SCHOOLS?

*Prevalence of need estimates the impact of the pilot on learners over and above changes in the background (those not in the pilot).

39.0% more lunches have at least one vegetable

15.7% fewer lunches have snacks and sweets available

0.8% fewer learners hungry after lunch

*not statistically significant

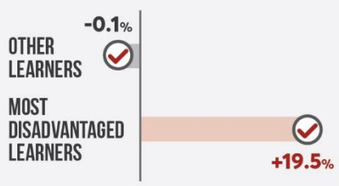
9.0% fewer learners with low overall health quality of life, and designated as 'at risk' of impaired health quality of life (according to thresholds developed for the USA)

DID THE MOST DISADVANTAGED LEARNERS REALISE EVEN GREATER BENEFITS* THAN THE AVERAGE LEARNER?

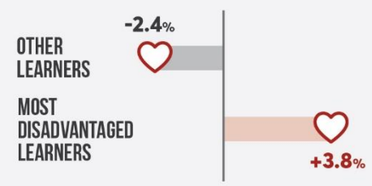
*statistically significant differences ($p<0.05$) among those learners within pilot schools

Learners with more snacks & sweets available prior to the pilot saw a significantly greater increase in the **number of vegetable items consumed** at lunch when compared to other learners in the pilot.

Learners who were often hungry after lunch prior to the pilot saw a significantly greater increase in **fullness** than other learners in the pilot.



Learners who were often hungry after lunch prior to the pilot saw significantly greater gains in **mental wellbeing** than other learners in the pilot.



What does this mean?

The pilot contributed to a significant change towards healthy eating behaviour, and a slightly happier and healthier (average) primary and intermediate learner in the first few months. Those most disadvantaged learners benefitted even more than the average learner; most notably, learners who previously had insufficient food experienced greater food security and mental wellbeing improvements. The longer-term benefits are not yet known, but research suggests even minimal changes towards consuming healthier food can have broad health, cognition and wellbeing benefits for individuals.

What's next?

The next steps will be to evaluate the expanded programme, including secondary students and wider regions, while tracking larger numbers of those most disadvantaged learners over one year to determine if the pilot contributes to improved (and sustained) attendance for these specific learners, and further to estimate the contribution of the pilot to longer-term benefits, such as social and school functioning. It will also be important to integrate the growing evidence base collected as part of the Ka Ora, Ka Ako monitoring programme into the evaluation, while potentially expanding it to include the wider community benefits and experiences.

INTRODUCTION

FOOD INSECURITY IN NEW ZEALAND is a real issue for many households, including whānau and children. Published results from the New Zealand health survey in 2015/16 showed that approximately 19% of children in New Zealand lived in households with moderate to severe food insecurity (i.e. they lacked access to sufficient amounts of nutritionally adequate and safe foods). Due to structural and systemic problems such as poverty and inequality, children from Māori and Pacific households are disproportionately affected by food insecurity.[1] Further, with increasing numbers of families/whānau experiencing unemployment and receiving job seeker support since March 2020, it was expected that food insecurity will become even more pronounced in New Zealand.

Childhood is a period of immense physical and cognitive development, and inadequate diets or food insecurity can have serious and long-lasting negative effects on physical or cognitive functioning. Food insecurity and hunger have been reliably linked to lower levels of concentration, cognitive functioning, attendance, engagement and school achievement.[2] Food insecurity has also been linked to worse developmental trajectories for children, including impaired social skills development and reading development[3+4], and mental disorders for children and adults.[5]

New Zealand developed a national *Child and Youth Wellbeing Strategy*[6] (August 2019) aiming to improve the wellbeing of all children and young people under the age of 25 years. Having regular access to nutritious food was a key indicator of determining whether or not children and young people have what they need. The New Zealand Government focus is therefore on ensuring availability of nutritious food to young people, reducing the effects of food insecurity while improving overall wellbeing of children and young people.

DIFFERENT PROGRAMMES AND ACTIVITIES that focus on tackling food insecurity have been designed and tested in New Zealand and overseas. One

[1] Ministry of Health. (2019). Household Food Insecurity among Children: New Zealand Health Survey. Wellington. Food insecurity is defined as "a limited or uncertain availability of nutritionally adequate and safe foods or limited ability to acquire personally acceptable foods that meet cultural needs in a socially acceptable way." (p.1)
[2] Alaimo et al. (2001). Food Insufficiency and American School-Aged Children's Cognitive, Academic, and Psychosocial Development. PEDIATRICS, 108(3), 824–824. https://doi.org/10.1542/peds.108.3.824-a; Ni Mhurchu et al. (2013). Effects of a free school breakfast programme on children's attendance, academic achievement and short-term hunger: Results from a stepped-wedge, cluster randomised controlled trial. Journal of Epidemiology and Community Health, 67(3), 257–264. https://doi.org/10.1136/jech-2012-201540; Ball, J. and Watts, C. (2015). External Evaluation of Fruit in Schools Final Report. Report prepared for 5+ A Day Charitable Trust; Quigley and Watts 2005.
[3] Jyoti DF, Frongillo EA, Jones SJ. Food insecurity affects school children's academic performance, weight gain, and social skills. J Nutr.2005;135:2831–9.
[4] Winicki J, Jemison K. Food insecurity and hunger in the kindergarten classroom: its effect on learning and growth. Contemp Econ Policy. 2003; 21:[14]5–57.
[5] Burke, MP, LH Martin, E Çayır, HL Hartline-Grafton, RL Meade (2016). Severity of Household Food Insecurity Is Positively Associated with Mental Disorders among Children and Adolescents in the United States, Journal of Nutrition 2016 Oct;146(10):2019-2026. doi: 10.3945/jn.116.232298.
[6] Child and Youth Wellbeing Strategy | Child and Youth Wellbeing (childyouthwellbeing.govt.nz), downloaded 9 Feb 2021.

recently published journal supplement described several such activities[7], including: delivering food to homes in need, and providing vouchers to households; increasing existing financial support to families; collaborating between schools and communities to increase availability and enrolment in nutrition assistance pilots and educational pilots; and facilitating meal programmes through schools.

School-based food programmes focus on reducing food insecurity, specifically among children and young people, and provide food to children while at school (i.e. school lunch, breakfast clubs) and/or provide food to children to take home with them (e.g. food backpacks). School food pilots have demonstrated effectiveness across a number of pertinent outcomes and in many international settings. One systematic review of 216 programmes in 52 low- and middle-income countries found that school food programmes are one of the few education-relevant interventions that show a positive impact on school enrolment, attendance and completions, and learning.[8]

These same broad benefits, however, are not always replicable, particularly when comparing these results with those from trials conducted in high-income countries. For instance, one Virginia (USA) school-based food programme found no change in food security[9] due to a programme providing both food at school as well as food backpacks for weekends and school breaks.[10] However, when they examined their measure of food security more closely, they identified a decrease in the most severe form of food insecurity in children, such as skipping meals due to lack of food or money, but increased other, less severe forms of food security in children, adults and households.

Similarly, an evaluation of the New Zealand school-based breakfast pilot did not find a statistically significant effect on school attendance or academic achievement over the 1-year period, but found significant positive effects on children's short-term satiety.[11] While another school breakfast programme in the USA was found to only offset food-related concerns among at risk families,[12] suggesting that the programme may strengthen food security among families at the margin of food security as it provided a dependable meal for children and provided at least a portion of their food needs. The authors recognised such achievements, although apparently less than desired, were valuable; although "marginal food insecurity is a comparatively mild condition, it has been linked to worse developmental trajectories for children… suggesting that it is a meaningful indicator of child wellbeing".[13]

[7] Burke, M.,A Singh, D Berman,K Law (2021). The Development, Implementation, and Evaluation of Innovative Strategies to Reduce Food Insecurity among Children in the United States, Journal of the Academy of Nutrition and Dietetics, Vol 121, 1.
[8] World Food Programme. (2019). The impact of school feeding pilots. Rome; https://docs.wfp.org/api/documents/WFP-0000102338/download/ (downloaded 8 Feb 2021).
[9] Burke, M., C. Cabili, D. Berman, S. Forrestal, P. Gleason (2021). A Randomized Controlled Trial of Three School Meals and Weekend Food Backpacks on Food Security in Virginia, Journal of the Academy of Nutrition and Dietetics, Volume 121, Issue 1, Supplement, January 2021, Pages S34-S45.
[10] The authors suggested this unexpected result may have been due to the pilot providing apparent low-cost food, and the items in the questionnaire asking if they rely on low-cost foods to feed their children. In other words, the additional food that treatment households received could have worsened food insecurity by creating a perception that the food was low cost and they were unable to afford more.
[11] Ni Mhurchu, C, D. Gorton, M. Turley, Y. Jiang, J. Michie, R. Maddison, J. Hattie (2012). Effects of a free school breakfast programme on children's attendance, academic achievement and short-term hunger: results from a stepped-wedge, cluster randomised controlled trial, Journal of Epidemiaol Community Health 2013, 67: 257-264.
[12] Bartfeld, JS & HM Ahn (2011). The School Breakfast Program Strengthens Household Food Security among Low-Income Households with Elementary School Children, The Journal of Nutrition, Volume 141, Issue 3, March 2011, Pages 470–475.
[13] Ibid, pg. 475.

THE NEW ZEALAND HEALTHY SCHOOL LUNCH PILOT | KA ORA, KA AKO, first announced in 2019, is a New Zealand Government initiative focused on reducing food insecurity among learners. The pilot is part of the Government's Child Youth and Wellbeing Strategy and is administered through the Ministry of Education (hereafter, the Ministry). Rather than targeting individual learners, it targets schools and kura with the highest concentrations of learners from disadvantaged backgrounds[14] and provides lunches to all of the learners within the school, free of cost and on a daily basis. The universal approach, rather than the targeted provision of lunches to specific learners, was intended to reduce the stigma associated with 'needing food' and ensure that those most in need took up the lunches.

Providing regular access to nutritious food is intended to reduce the risk of food insecurity, specifically by providing nutritious food every day to learners who may not otherwise have adequate quantities and/or nutritious food available at lunch. It was expected that this lunch will be of sufficient quality, quantity and variety to promote consumption (i.e. it needs to be appealing to those it's intended for), alleviating hunger and improving nutrition while promoting attendance at school. It was further expected that the provision of nutritious school lunches will lead to greater food security for learners as well as improved wellbeing.

As noted by Fram and Frongillo (2018; 2), however simple and intuitive food programmes may seem and however satisfying to the people who are involved in delivering them, programmes that provide food to children might not improve wellbeing for those they reach. It may be, for example, that the provided food does not improve the quality of their lunch or wellbeing, or the learners refuse to eat it (and simply go without) because of food variety or stigma. Such an outcome may have a detrimental effect on the hunger and wellbeing of learners.

THE EVALUATION was commissioned to help the Ministry assess the early impact of the Ka Ora, Ka Ako pilot on these prioritised outcomes (e.g. food availability, consumption and satiety) as well as subsequent outcomes (e.g. attendance and wellbeing). The evaluation, at this interim phase, focused on the initial roll out of the pilot[15], and this included the impacts realised within primary and intermediate schools across the Hawke's Bay and Bay of Plenty regions (the 'pilot') in the first few months.[16] The evaluation examined the net benefits for this population of young learners, which were expected to be positive but minimal; as well as the net benefits for those most disadvantaged learners (those 'most in need'), which were expected to be significant. These two 'most in need' groups of learners were those learners with:

[14] Disadvantaged is defined as being in the 25% of households that are most materially deprived when compared against a standard basket of goods and measured according to the Ministry of Education 'equity index'.
[15] The pilot was expanded during this initial period, and although this expansion was out of scope for this evaluation, the Ministry of Education plans to evaluate this expanded programme. The Ka Ora, Ka Ako Pilot Evaluation therefore should be considered alongside any future evaluations of the programme.
[16] There were 18 schools in Otago Southland regions involved in the initial roll out. These were excluded given the timing of the evaluation and programme commencement.

- **insufficient quantities of food** – defined here as the learners that were hungry after lunch for at least 50% of the days reported before the pilot[17]; and
- **mostly snacks and sweets** – defined here as the learners, before the pilot, that had snacks and sweets items make up 60% or more of their *available*[18] lunch items while vegetables and fresh fruit make up the remaining lunch items.[19]

Due to structural and systemic problems such as poverty and inequality, children from Māori households are known to be disproportionately affected by food insecurity.[20] Therefore it was also necessary to understand the effects of the pilot for Māori learners.

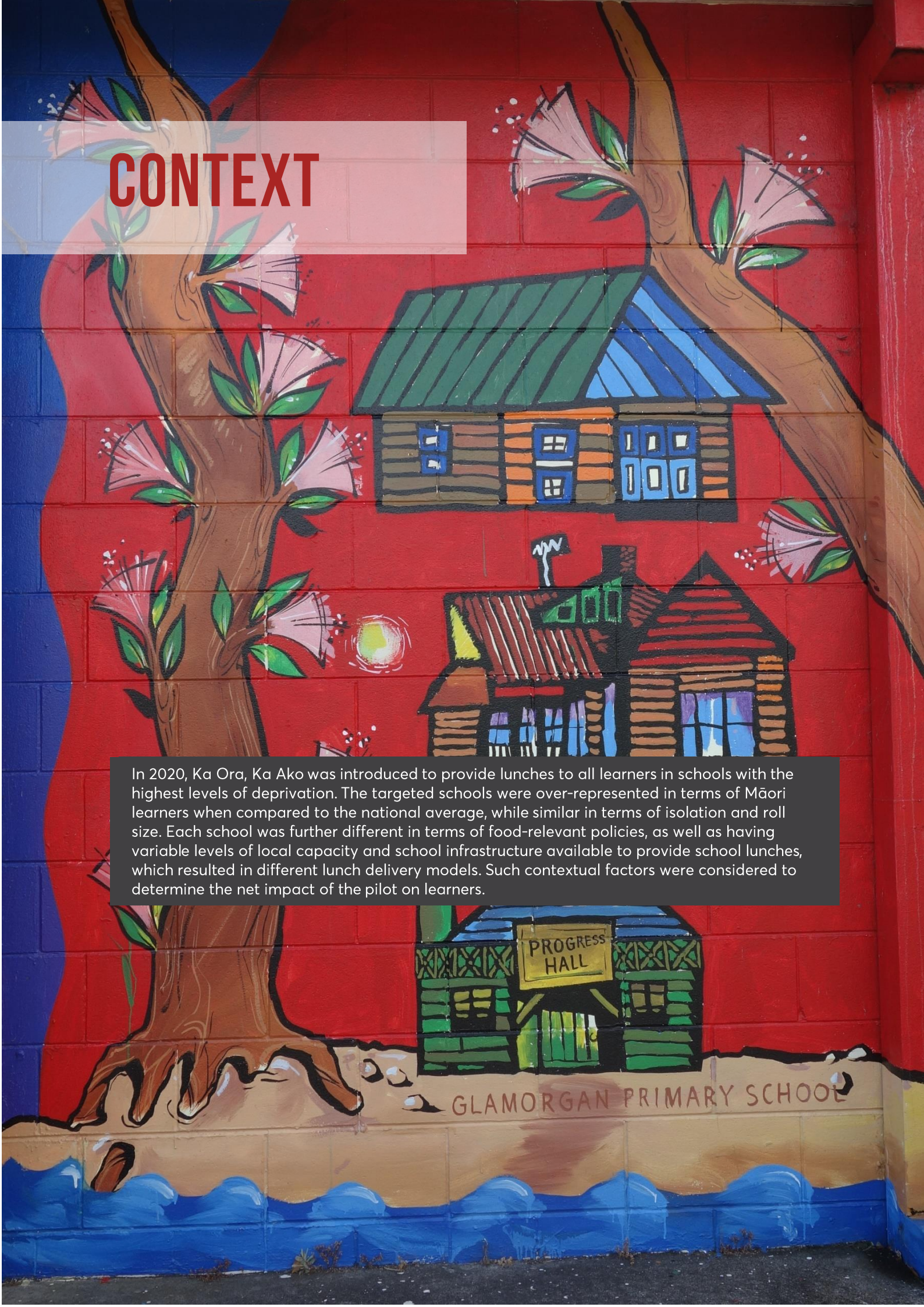
Key evaluation questions (KEQs)

To what extent has the Ka Ora, Ka Ako pilot contributed to the achievement of outcomes, and more specifically:

1. Has the pilot improved learner food security, attendance and wellbeing, in particular for Māori learners and those most in need?
2. What are the unintended, broader benefits for schools, their learners and whānau, and community?

[17] This subpopulation was approximately 19% of those learners in the pilot schools.
[18] Availability rather than consumption is being used to identify these children as we wanted to omit the potential influence of 'picky' eaters and select only those that did not have this food available.
[19] We constructed a basic food diversity measure based on the total number of snacks and sweet items (15 individual items assessed) as a proportion of total items (fruit, vegetables and snacks, n=35). While not reflecting the volumes or calories of the different items, it provides a reported indication of the variety of consumption across the food groups.
[20] Ministry of Health (2019). Household Food Insecurity Among Children: New Zealand Health Survey.

CONTEXT



In 2020, Ka Ora, Ka Ako was introduced to provide lunches to all learners in schools with the highest levels of deprivation. The targeted schools were over-represented in terms of Māori learners when compared to the national average, while similar in terms of isolation and roll size. Each school was further different in terms of food-relevant policies, as well as having variable levels of local capacity and school infrastructure available to provide school lunches, which resulted in different lunch delivery models. Such contextual factors were considered to determine the net impact of the pilot on learners.

THE CONTEXT OF NEW ZEALAND SCHOOLS

is that they are owned and funded by the state and, at least in state schools, deliver education to the New Zealand national curriculum. Governance of these schools, however, is a local responsibility bestowed onto the school's Board of Trustees. The localised decision-making means that schools decide which programmes, such as Ka Ora, Ka Ako, are relevant to their school and how they participate in these programmes.

New Zealand did not have a Government-funded school lunch programme prior to 2020. Nevertheless, government has historically funded targeted programmes to ensure learners have access to nutritious food. The funding has been provided, for example, through businesses (Fonterra and Sanitarium), charities (KidsCan)[21] or government agency bodies. Some of the food programmes available to schools in 2020 included the following:

- **Fruit in Schools**: a programme funded by the New Zealand Ministry of Health, providing fresh produce daily to learners at eligible primary schools. It began in 2005, and 561 schools were taking part in May 2021.[22]
- **Milk in Schools**: The New Zealand Government funded milk in schools for 30 years, up to 1967. From 2013 to 2020, long-life milk was provided to New Zealand primary schools by the New Zealand dairy cooperative Fonterra.[23]
- **Kickstart Breakfast**: A community partnership initiative, including support from Sanitarium, Fonterra and the New Zealand Ministry of Social Development, providing breakfast and guidance to more than 1,100 New Zealand schools.[24]
- **KidsCan**: The New Zealand Charity, KidsCan, provides 'essentials' including but not limited to long-life lunch items to low decile schools and low equity early childhood education centres. This has been at least partially funded by the New Zealand government.[25]

An initial survey of primary and intermediate schools in the Hawke's Bay and Bay of Plenty regions[26] showed that most of the Ka Ora, Ka Ako schools were opting into these different food programmes. More specifically, 8 in 10 of the pilot schools had been providing *Milk in Schools* (85% ± 7.5%[27]), 7 in 10 were providing *Fruit in Schools* (68% ± 7.5%), and 8 in 10 were receiving food from KidsCan (80% ± 7.5%). It is also likely that the schools were participating in other food education and nutrition promotion programmes.

[21] Wynd, D. & M. O'Brien (19 Dec 2014), Food in Schools: targeting versus the right to food, New Zealand Medical Journal, Vol 127, No 1407. https://assets-global.website-files.com/5e332a62c703f653182faf47/5e332a62c703f64da12fd6e0_content.pdf, downloaded 9 Feb 2021.
[22] as reported by the Ministry of Health (14 May 2021)
[23] https://nzhistory.govt.nz/end-of-free-school-milk
[24] https://www.kickstartbreakfast.co.nz/
[25] https://www.kidscan.org.nz/news/kidscan-government-funding-to-continue-for-12-months; accessed 3 March 2021; https://www.kidscan.org.nz/news/kidscan-welcomes-new-lunch-fund-for-year-1-8-students-but-job-far-from-done, accessed 3 March 2021.
[26] The initial survey of 129 schools primary and intermediate schools eligible for the pilot was undertaken to understand how the schools would be interested in contributing to the evaluation of the pilot. Of the 129 schools invited to take part in the questionnaire, 74 responded, providing an estimated margin of error of 7.5% to this relevant population.
[27] 95% confidence intervals are used here to show the likely range around the point estimate (the statistic derived from the sample of data, which here is 85%) where the true value of the population would be. In other words, we are 95% confident that the population parameter will sit between 77.5% and 92.5% (85% ± 7.5%)

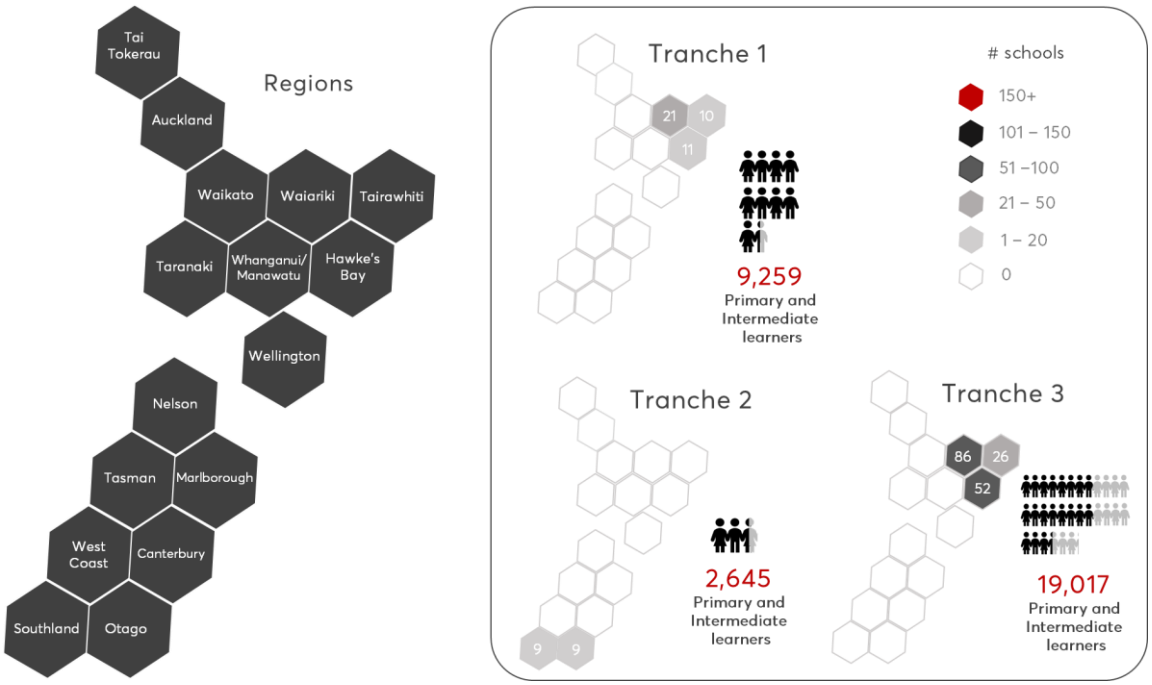
These food programmes were likely to be supplementing the food available to learners, given most New Zealand children are known to take food or drink to school from home (in 2008).[28] It is also likely that this additional food may also be alleviating hunger, as some New Zealand children never eat breakfast on school days.[29]

THE FOCUS OF KA ORA, KA AKO was initially on providing food to primary and intermediate aged learners (Years 1-8) in schools across three regions. New Zealand schools are structured to provide for learners at different year levels. Convenient for the pilot, many schools provide for primary years (Years 1-6) and intermediate years (Years 7-8), or a combination of both primary and intermediate years, 'full primary' (Years 1-8). However, this is not always the case. There are schools in New Zealand that provide for those eligible year levels as well as year levels outside of this targeted age group, for instance, some schools provide for intermediate and/or primary learners as well as secondary learners. This meant that although the focus of the pilot was on younger learners, it sometimes reached older learners in schools providing education to higher year levels (Years 9-13). These secondary learners were outside the scope of the evaluation.

The pilot was delivered throughout 2020 and released in three subsequent 'tranches'. In response to the COVID-19 pandemic, Ka Ora, Ka Ako was expanded to reach around 215,000 learners by the end of 2021, making school lunches available to secondary school learners as well as covering more regions in New Zealand. The third tranche began rolling out this expanded programme from Term 3 2020, and this expansion included schools that provided solely for secondary learners rather than schools that included at least some primary and intermediate learners. This further roll out is ongoing and the expansions are beyond the scope of this evaluation, which focuses on primary and intermediate schools within two of the initial target regions (Hawke's Bay and Bay of Plenty).

[28] National Research Bureau Ltd (June 2008), 2007 New Zealand Children's Food and Drinks Survey (P 115-117) noted that 93% of parents and caregivers said their children take food or drink to school from home (in 2008).
[29] National Research Bureau Ltd (June 2008), 2007 New Zealand Children's Food and Drinks Survey (P 11) noted that 6% parents and caregivers said their child(ren) never eat breakfast on school days.

Figure 1: Expansion of the pilot in 2020 by region and number of primary and intermediate learners enrolled in all participating schools (older children are shown below but not counted in the provided numbers).[30]



The selection of schools eligible for participating in the pilot is informed by the Ministry's Equity Index (EQI). The EQI combines and calculates a range of variables, including community characteristics and variables prevalent in children's lives such as family circumstances and income.[31] The higher EQI scores indicate greater disadvantage at the school.

The demographic makeup of the schools highlights the disproportionate representation of Māori in Ka Ora, Ka Ako schools. The pilot is expected to enable greater equity between Māori and non-Māori through targeting the disproportionate burden of poverty on Māori.[32] There are also more schools in more isolated areas than the national average.

[30] Ministry of Education statistics, using the July 2020 Roll Total and programme administrative data. The results do not include those 26 Tranche 3 schools that are a part of the programme but providing for secondary students only, nor does it include the 13,615 students in years 9 and above that are attending the schools as part of the programme.
[31] https://www.education.govt.nz/assets/Documents/Ministry/Information-releases/2019-releases/R-131-133-Redacted.pdf, downloaded 12 March 2021.
[32] Ministry of Health (2017) Māori health models: Te Whare Tapa Whā. Retrieved (19 Sept 2010): https://www.health.govt.nz/our-work/populations/maori-health/maori-health-models/maori-health-models-te-whare-tapa-wha

Figure 2: Size (based on school roll) and isolation (based on isolation index) of Tranche 1, 2 and 3 schools (red) compared to the New Zealand national average (grey).

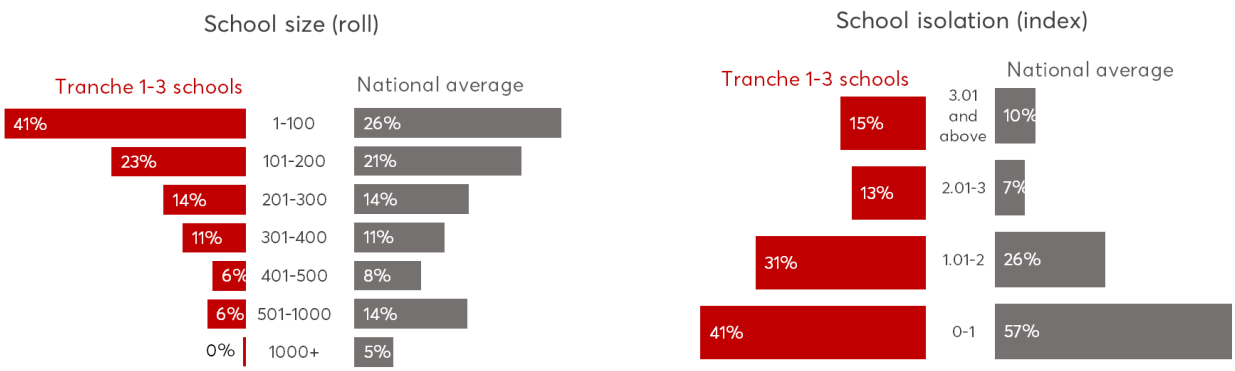
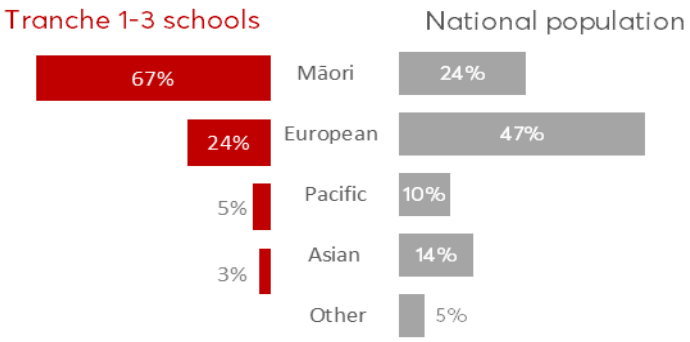


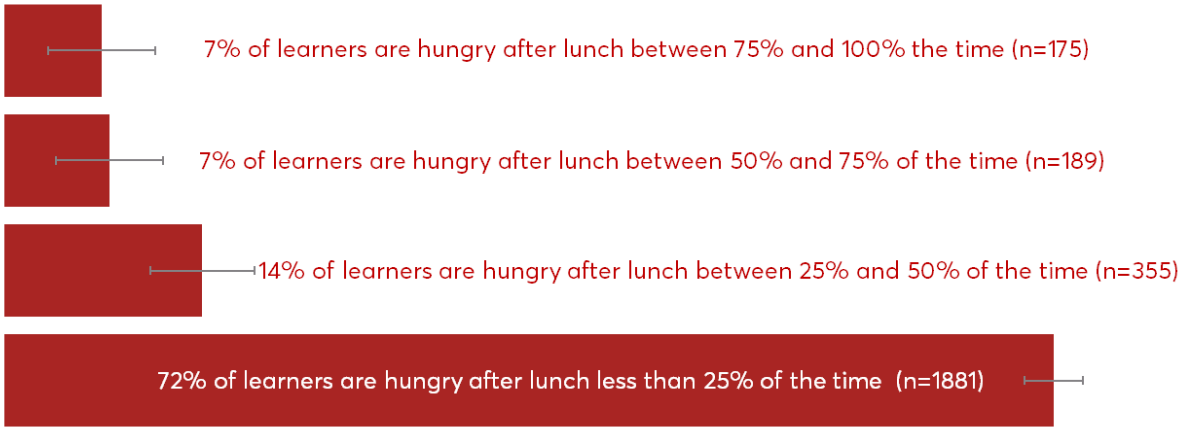
Figure 3: Population of learners enrolled in Tranche 1, 2 and 3 schools (red) by ethnicity, compared to the population of learners in New Zealand (grey).



Even though the schools were selected as those with the highest level of deprivation, learners within these schools are diverse in terms of food security and their specific needs. For instance, the baseline evidence showed that there is a cohort of learners who felt hungry after lunch regularly (c.f. Figure 4). When responding to a question about levels of satiety over a five-day period, 14% of learners were hungry more than half of the time while the other 86% were hungry less frequently.

This distribution of need within the targeted schools is shown below.

Figure 4: The proportion of learners according to how frequently they felt hungry after lunch over a five-day assessment period (before the pilot was introduced).



The baseline evidence also showed there was a more widespread need across schools when it came to food quality. In terms of food availability, 89% of the learners' lunches (87.6%-90.2%) had at least one snack or sweet item available. This compares to only 27% of learners' lunches having at least one vegetable available.

LOCAL CAPACITY, CAPABILITIES AND INFRASTRUCTURE

were not always readily available to schools to quickly undertake a school lunch programme. Infrastructure and the facilities relevant to food preparation, serving and/or seating varied widely at schools, with some schools known to have one or several commercial kitchens available while other schools had none. Regional capacity to prepare and provide food every day varied, meaning that some schools could call upon several organisations to prepare and deliver food to the required numbers of learners every day, while other schools lacked any feasible options. Such considerations determined how the lunch pilot could be provided at schools.

As noted by the Ministry[33] each school or kura might:

- choose to make all their own lunches
- outsource to an external supplier that prepares lunches at the school or prepares lunches offsite and delivers to the school
- make their own lunches on set days of the week and use a supplier on other days – in this case schools will follow both processes for providing their own lunches and selecting a supplier
- outsource to different suppliers for set days of the week.

To simplify the process for schools who chose to outsource food preparation and delivery, a panel of suppliers were selected through an open tender process. Schools and kura were then able to select from this panel of approved suppliers that demonstrated they met the minimum standards of food hygiene, waste management and food

[33] https://www.education.govt.nz/our-work/overall-strategies-and-policies/wellbeing-in-education/free-and-healthy-school-lunches/free-and-healthy-lunches-in-schools-faqs/#exapnsion_implementation, downloaded 12 Feb 2021.

preparation. As at Term 4 2020[34], the panel included 62 suppliers available to all Ka Ora, Ka Ako schools in the Bay of Plenty/Waiariki and Hawke's Bay/Tairāwhiti regions, and 12 suppliers available to the 18 schools in the Otago and Southland regions.

By the end of 2020, most Tranche 1-3 schools (76%) opted to use an external supplier(s) while a few schools (19%) chose to prepare their own lunches, hiring the requisite staff to deliver the pilot. Very few schools chose a combination of both external and internal models.[35]

As shown below, smaller schools were more likely to choose the internal model than larger schools, while isolation of the school didn't appear to make a difference to model selection.

Figure 5: Preference for internal (black) or external (grey) delivery models according to the size of schools.

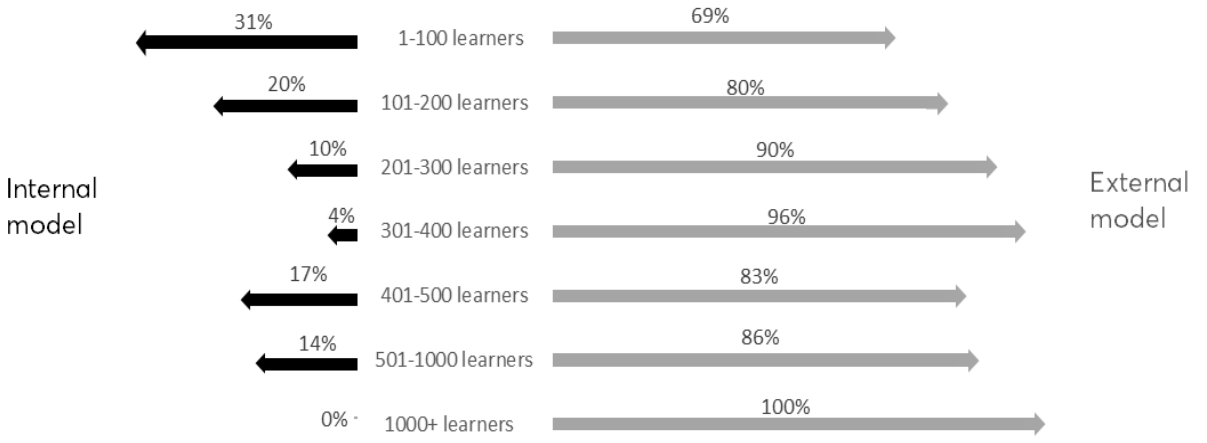
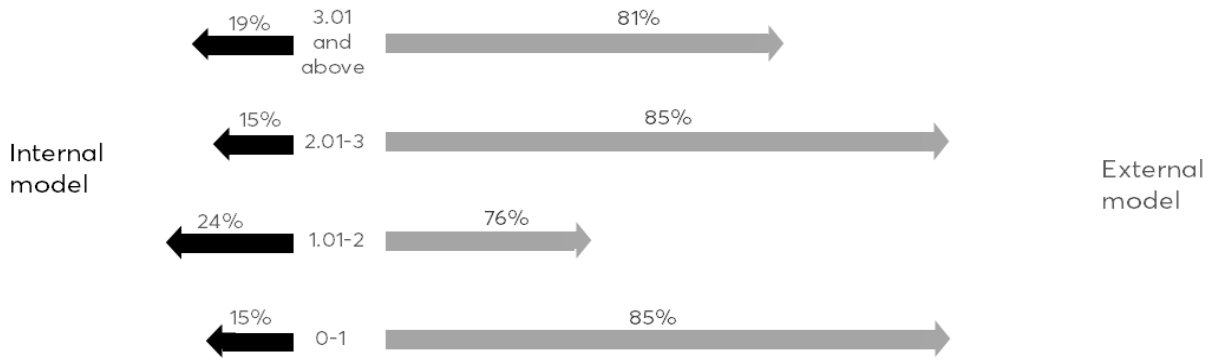


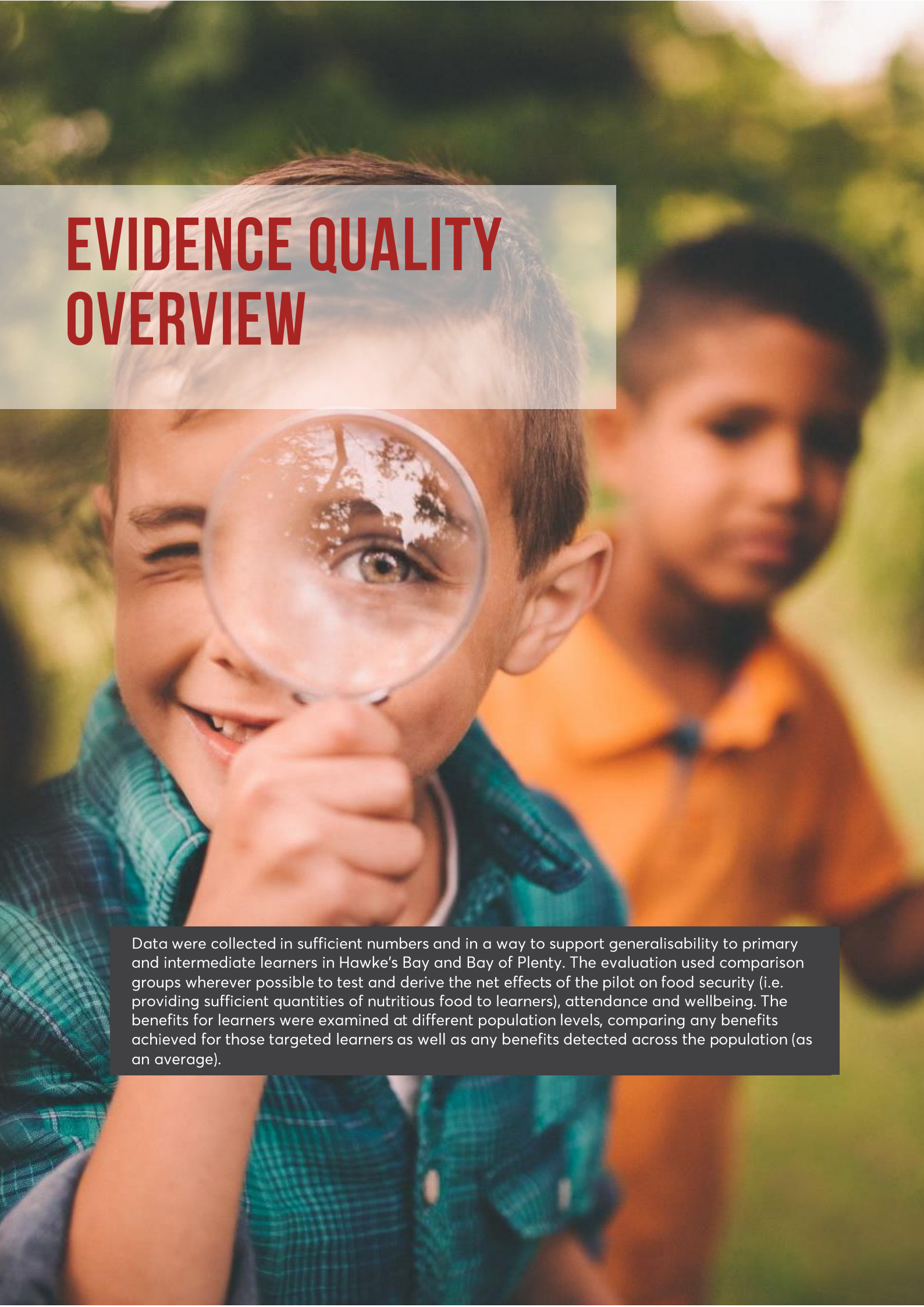
Figure 6: Preference for internal (black) or external (grey) delivery models according to the school's isolation (based on the isolation index, with higher index values representing greater isolation).



[34] Information provided by the Ministry of Education; data is relevant up to 17 December 2020.
[35] Monitoring data provided by the Ministry of Education (School Master Sheet, 1 March 2021)

CONTEXTUAL FACTORS, such as these described above, would likely influence the outcomes achieved by the pilot. It is for this reason the evaluation examined and controlled for such factors. The approach allowed us to examine the effects of the pilot above and beyond how the pilot was delivered at schools (e.g. whether it was delivered by the school as an internal or external model of delivery), or the factors relevant to the specific school (e.g. level of deprivation at the school or 'equity index', previous provision of food pilots and school policies) or the specific learners (e.g. age, sex, ethnicity).

EVIDENCE QUALITY OVERVIEW



Data were collected in sufficient numbers and in a way to support generalisability to primary and intermediate learners in Hawke's Bay and Bay of Plenty. The evaluation used comparison groups wherever possible to test and derive the net effects of the pilot on food security (i.e. providing sufficient quantities of nutritious food to learners), attendance and wellbeing. The benefits for learners were examined at different population levels, comparing any benefits achieved for those targeted learners as well as any benefits detected across the population (as an average).

THE INTERIM EVALUATION SERVES AN ACCOUNTABILITY FUNCTION, and informs the New Zealand Government (funders), the Ministry, and the New Zealand public about the value of the pilot for learners. The standard of evidence was therefore high, even in this early stage of implementation, as the evaluation may have broad implications for the New Zealand public in terms of continued provision of the school lunch programme.

As such, government required an evaluation providing generalisable results and comparing 'paired' schools. A randomised trial, whereby schools would have been randomly allocated a space in the pilot, was not possible in the given context of the desire to provide food to learners in all eligible schools as quickly as possible. Nevertheless, comparison groups were identified, and to answer the first evaluation question statistical techniques were used to estimate the 'net effects' of the pilot on learners. The net effects are the effects above and beyond what would have been achieved otherwise (without the pilot).

To answer KEQ 1, the evaluation evidence included:

- **Ministry of Education's school attendance data,** highlighting weekly unjustified absence rates across Terms 3 and 4, for both 2019 (before the pilot) and in 2020 (after the pilot). Statistical techniques[36] were used to estimate the relative 'net effects' of the pilot on school-level attendance.
- **longitudinal learner food diaries**, collected from learners over five days in September (before the pilot) and five days in November (after the pilot). Statistical techniques[37] were used to estimate the relative 'net effects' of the pilot on the availability and consumption of food types as well as satiety (our definition of 'food security'[38]), and learners' wellbeing.[39]
- **school lunch photos** and **school staff focus groups** complemented the data above, further testing the evidence and alternative factors contributing to any realised change. Although the results derived from these two methods (photos and focus groups) are not generalisable, they provide greater clarity and context to the findings from the learner food diaries and secondary data.

The focus groups were also used to answer the second evaluation question, which focused on the broader benefits for schools, their learners and whānau. Although

[36] Propensity Score Matching was used to identify a comparable set of schools, so that any change in attendance realised by the pilot schools can be tested against those not receiving the pilot, accounting for any changes occurring for reasons beyond the provision of food in schools.
[37] The approach controlled for factors that were expected to influence the success of the pilot, and accommodate the sampling approach and clustering nature of collecting information from classes of learners. More specifically, linear mixed modelling was used, with a random effect included to allow for the cluster design at the classroom level fitted using restricted maximum likelihood fitting.
[38] Food security, and the measurement of the concept, often focuses on food accessibility due to financial barriers (e.g. family/whānau ability to pay for food, or the instances of going 'without food' due to lack of finances). Our approach focused on accessibility of food for the learner at lunch, measuring the associated change in appetite sensations, or 'fullness' as an estimate of having access to *sufficient quantities* of food, and the availability and consumption of healthy and non-healthy food items as an estimate of having access to *nutritious foods.* Food security therefore is narrower in its definition than some other measures of food security, and it estimates the *accessibility of sufficient quantities of nutritious food at lunch.*
[39] Wellbeing is a broad concept, and here it encompasses the learners' overall health quality of life as a composition of the learners' physical, social, school and emotional functioning (PEDS-QL) and subjective psychological wellbeing (WHO-5).

systematic measurement of community and whānau impacts as well as economic benefits were out of scope here, broader benefits were briefly explored and noted through this qualitative approach.

The evidence are summarised against key evidence-quality standards (Table overleaf), and the detailed methods are provided as a technical report[40]. It should be noted that the evaluation was undertaken during the Covid-19 pandemic, and the findings should be considered in light of this.

THE VALUE OF KA ORA, KA AKO was determined according to the measured impacts among learners, and more aptly how widely these impacts were felt. As noted earlier, the pilot was delivered as a universal approach to reduce the stigma associated with receiving free food from the Government. As such, we expected those most in need of the pilot would benefit significantly while the whole population would benefit to a lesser extent. These expectations set out four levels of success for the pilot (shown below), and the data were triangulated to evidence the level of change and breadth of these benefits for primary and intermediate learners in the regions.

Figure 7: Four levels of measured impact rippling through the population (red), and the associated standards of success for the pilot after 2-3 months (grey).

[40] c.f. Appendix A

Table 1: Overview of the quality of evidence used in the interim evaluation.

	Secondary data	Learner food diary	Lunch photos	Focus group interviews with school staff
	87 schools (of 165 Tranche 1 and 3 schools with Years 1-8 learners)	2729 learners (of 19,017 learners)	102 school lunch photos (in 18 schools)	9 schools (of 129 Tranche 3 schools)
Are there sufficient numbers of data to compare groups and/or measure change (i.e. power)?	Yes (Tranche 3). Data are sufficient to address the specified purpose. Limited (Tranche 1) due to the small number of schools.	Yes. Data are sufficient to address the specified purpose in relation to learners in these two regions.	Data are limited, and should be used alongside complementary data.	Data are limited (lack of saturation), and should be used alongside complementary data.
Are the results balanced, with low-to-moderate risk of bias?	Yes. Data provide a balanced picture of attendance, albeit some risk to bias exists for attendance.	Yes. Data provide a balanced picture of the evaluand, although some low risk of bias exists.	Yes. Data provide a balanced picture of the evaluand, although some risk of bias exists.	Yes. Data provide a balanced picture of the evaluand, although some risk of bias exists.
Are the results likely generalisable to Hawke's Bay and Bay of Plenty primary and intermediate schools with the highest levels of deprivation?	Yes. Data are likely generalisable.	Yes. Data are likely generalisable.	No. Data are informative but not likely generalisable.	No. Data are informative but not likely generalisable.
Are relevant comparison groups used?	Yes. Data are reflected against comparable groups but may have other unknown factors influencing the results.	Yes. Data are reflected against comparable groups (treatment and control group schools) but may have unknown factors influencing the results.	No. Data are informative but no comparison groups were used, and should be viewed alongside complementary data.	Yes. Data reflected against comparable groups (treatment and control group schools) but may have unknown factors influencing the results.

CONCLUSIONS & DISCUSSIONS

The results suggest the pilot often achieved more than what was expected in the initial 2-3 months. The pilot contributed to a significant change towards healthy eating behaviour, and a slightly happier and healthier (average) primary and intermediate learner in the first few months. Those most disadvantaged learners benefitted even more than the average learner; most notably, learners who previously had insufficient food experienced greater food security and mental wellbeing improvements. The longer-term benefits are not yet known, but research suggests even minimal changes towards consuming healthier food can have broad health, cognition and wellbeing benefits for individuals.

Credibility of evaluative statements

It's important to understand how adequately the collective evidence can address each evaluation question at this stage. Using sufficient numbers of data and a mixture of methods and data sources provides ample opportunity to test theories, views, experiences and achievements, with each data source providing potentially unique realities relevant to the evaluand. Further triangulating different data sources and evidence promotes a balanced reflection of the evaluand and highlights the relative weight of evidence supporting (or contradicting) any evaluative statement.

Our assessment of the evidence used to answer the questions is outlined below, using our evidence quality standards as a guideline.

Table 2: Overview of the evidence quality used to answer the KEQs.

	KEQ 1 ***Has the pilot improved learner food security, attendance and wellbeing, in particular for Māori learners and those most in need?***	**KEQ 2** ***What are the unintended, broader benefits for schools, their learners and whānau, and community?***
Are the evidence sufficient to answer the evaluation questions and make judgements about the value of the evaluand (sufficient power across data, triangulation)?	The food security and wellbeing evidence are sufficient to answer the evaluation question. However, the attendance evidence were not sufficient to answer the question in relation to those most in need at this stage.	No. The question is exploratory and as such, no evaluative judgements are made. Although the evidence are informative, they would require further information to fully address the extent of the question.

How well did the pilot perform in the initial two-to-three months?

The interim evaluation makes judgements about performance of the pilot in relation to achievements for primary and intermediate learners in these two regions. The results suggest the pilot often achieved more than what was expected in the initial 2-3 months. In summary, the results represent excellent progress towards making nutritious food available and significantly improving lunchtime diets, with benefits realised across the population of primary and intermediate learners in the Hawke's Bay and Bay of Plenty. The findings also demonstrated very good progress towards addressing hunger and contributed to small but significant improvements to fullness among primary and intermediate learners, with even greater benefits for those learners most in need. The results further demonstrated progress towards improving wellbeing, again with even greater benefits for those most disadvantaged learners. Finally, while the pilot did not appear to contribute to improved attendance for the whole school, these interim evidence could not determine if attendance changed for those most in need of school lunches within these schools. This is likely where any changes to attendance will occur, if the school lunch programme contributes to any such changes.

Figure 8: The benefits of the pilot for learners in the Hawke's Bay and Bay of Plenty, highlighting if some positive (inner circle) or significant gains (middle circle) were realised for the most disadvantaged learners – those most in need; and if they were realised more broadly across the general population (outer circle).

What does this mean?

Those most disadvantaged learners benefitted more than the average learner; most notably, learners who previously had insufficient food experienced greater food security and mental wellbeing improvements in the short-term, and who will likely maximise on the associated longer-term benefits if the pilot continues to perform for them.

The pilot was developed as a universal approach to ensure those most in need accessed the provided food. This approach was chosen based on the understanding that the alternative (i.e. a targeted approach) providing food only for specific learners would hinder access due to the associated stigma of receiving 'free food'.

There were significant and even larger effects realised for the most disadvantaged learners (compared to the average learner) in the pilot in terms of consuming more vegetables items and fewer snacks and sweet items, further maximising all of the benefits relevant to diets (see discussion below). There were also larger effects realised in terms of improved feelings of fullness, notably those with insufficient food prior to the intervention reporting a 20% gain in fullness over those with sufficient food. Further, most disadvantaged learners showed small net gains across the individual wellbeing constructs, though few were statistically significant. However, there was a notable (6.2%) improvement in mental wellbeing for those with insufficient food at the outset, showing greater feelings of cheer, calm, vigour, restfulness and interest in activities.

These findings were not only important because of the size of the change but also for the cohort it's supporting. It demonstrates a particular success for the pilot in that those most in need of food – those that were typically hungry after lunch – are accessing and consuming the provided lunches, and these lunches are providing sufficient food for learners to see significant gains in terms of feeling full and mental wellbeing.

Research has associated hunger with lower levels of concentration,[41] and as stated above, both food insecurity and hunger have been linked to lower levels of concentration, cognitive functioning, attendance, engagement and school achievement[42] The benefits for disadvantaged learners, most notably those who did not have sufficient amounts of food prior to the pilot, would be even greater than the average young learner. However, there did not appear to be any additional benefits for Māori learners, at least not above those benefits achieved by others.

[41] Spencer, S et al. (2017). Food for thought. How nutrition impacts on cognition and emotion. NPJ Science of Food 1:7.
[42] Alaimo et al. (2001). Food Insufficiency and American School-Aged Children's Cognitive, Academic, and Psychosocial Development. PEDIATRICS, 108(3), 824–824. https://doi.org/10.1542/peds.108.3.824-a; Ni Mhurchu et al. (2013). Effects of a free school breakfast pilot on children's attendance, academic achievement and short-term hunger: Results from a stepped-wedge, cluster randomised controlled trial. Journal of Epidemiology and Community Health, 67(3), 257–264. https://doi.org/10.1136/jech-2012-201540; Ball, J. and Watts, C. (2015). External Evaluation of Fruit in Schools Final Report. Report prepared for 5+ A Day Charitable Trust; Quigley and Watts 2005.

Moreover, the pilot contributed to a large change towards healthy eating behaviour among the population of learners in the short-term, and research suggests that such changes (if sustained) may have longer-term health benefits for our children.

The pilot prioritised healthy and nutritious lunches, with the understanding that changing learners' diets – in particular among those learners that consumed largely processed food - and getting children to enjoy new foods can take time. Making these foods available is only the first step, while consumption of healthy food is the key marker of success for the pilot. The evaluation demonstrated significant and broad shifts in the foods available *and* consumed by learners, with an average increase in diversity of vegetables and decrease in diversity of snacks and sweet items consumed every lunchtime. Such a finding is notable given not only the availability of healthy food for learners, but more importantly that learners are consuming these healthier foods.

An increase in consumption of healthy foods, even minimal, has important benefits for young individuals. Research has suggested that the "consumption of fruits and vegetables high in polyphenolics can prevent and even reverse age-related cognitive deficits…"[43]. Conversely, consumption of snacks and sweet items can have long-term negative effects on individuals. In a landmark study that assessed wellbeing in young children aged 2-9 years, an association was found between adherence to healthy dietary guidelines and better psychological wellbeing over a 2-year period. Of particular note was the bidirectional relationship such that higher dietary quality at baseline also related to fewer emotional problems, better relationships with other children, and higher self-esteem 2 years later, independent of children's socioeconomic status and body weight.[44] A consistent trend for healthy eating patterns relating to better mental health in children and adolescents is also apparent when systematically reviewing the literature.[45] Specifically, young children (5-11 years) that consume more energy-dense and nutrient-poor foods such as sugary drinks, fries and fast food with few vegetables had lower mental health scores[46].

Research has also shown a positive association between ultra-processed food consumption, such as those snacks and sweets listed, with a greater risk of several health

[43] Spencer, S. et al. (2017). Food for thought: how nutrition impacts cognition and emotion, NPJ Science of Food1:7.
[44] Arvidsson, Louise, Gabriele Eiben, Monica Hunsberger, Ilse De Bourdeaudhuij, Denes Molnar, Hannah Jilani, Barbara Thumann, Toomas Veidebaum, Paola Russo, Michael Tornatitis, Alba M. Santaliestra-Pasías, Valeria Pala, Lauren Lissner & IDEFICS consortium (2017). Bidirectional associations between psychosocial well-being and adherence to healthy dietary guidelines in European children: prospective findings from the IDEFICS study. BMC Public Health volume 17: 926.
[45] O'Neil, Adrienne, Shae E Quirk, Siobhan Housden, Sharon L Brennan, Lana J Williams, Julie A Pasco, Michael Berk, Felice N Jacka (2014). Relationship between diet and mental health in children and adolescents: a systematic review. Am J Public Health 2014 Oct;104(10):31-42.
[46] Banta et al. 2015.

outcomes,[47] abdominal adiposity[48] and non-communicable diseases.[49] Although the results cannot be interpreted as an assessment of learners' overall diets, the shift is nonetheless reassuring – demonstrating consumption of such snacks and sweets in fewer of our learners' lunches. The result is important because changes to eating habits early in life from the consumption of unhealthy to healthy food may have longer-lasting effects. In particular, food availability is a fundamental driver for children's eating behaviour.[50] Consequently, providing children with free, accessible fruits and vegetables have been shown to influence long-term eating behaviour.[51] Thus the change in healthy eating habits may have longer-term health benefits for our children. It should also be noted that children need to consume a variety of foods to remain healthy. Therefore, the combined effect of increased fruits and vegetables along with healthy fats, protein and grains is a more robust marker of healthy eating behaviour.[52] Indeed, the shift from more processed carbohydrate foods and grains to higher fibre options in school lunches reinforces that healthy eating behaviour was achieved.

The pilot contributed to a slightly happier and healthier (average) primary and intermediate learner in these two regions, with other benefits being minimal for the average learner.

The pilot was established under the New Zealand Child and Youth Wellbeing government strategy, aiming to ensure children and young people have what they need, and are happy and healthy. In terms of having what they need, the average learner in the pilot made small but significant gains in terms of feelings of fullness. The average learner also made small but significant gains in emotional and physical functioning, and overall health quality of life. Collectively the results demonstrate a slightly happier and healthier (average) primary/intermediate-level learner in the Hawke's Bay and Bay of Plenty regions.

Much evidence exists demonstrating how physical exercise affects brain plasticity, influencing cognition and wellbeing.[53] The gains in emotional functioning are important given the evidence that positive emotion protects against poor health outcomes in later life[54]. Two recent reviews have documented a robust association between positive

[47] Chen, X. Zhang Zhang, Huijie Yang, Peishan Qiu, Haizhou Wang, Fan Wang, Qiu Zhao, Jun Fang & Jiayan Nie (2000). Consumption of ultra-processed foods and health outcomes: a systematic review of epidemiological studies, Nutrition Journal volume 19, Article number: 86
[48] Costa CS, Rauber F, Leffa PS, Sangalli CN, Campagnolo PDB, Vitolo MR. Ultra-processed food consumption and its effects on anthropometric and glucose profile: A longitudinal study during childhood. Nutr Metab Cardiovasc Dis. 2019 Feb;29(2):177-184. doi: 10.1016/j.numecd.2018.11.003. Epub 2018 Nov 22. PMID: 30660687.
[49] Machado, PP, EM Steele, RB Levy, Z Sui, A Rangan, J Woods, T Gill, G Scrinis CA Monteiro (2019). Ultra-processed foods and recommended intake levels of nutrients linked to non-communicable diseases in Australia: evidence from a nationally representative cross-sectional study, BMJ Open 2019 Aug 28;9(8):e029544. doi: 10.1136/bmjopen-2019-029544.
[50] Rasmussen, M., Rikke Krølner, Knut-Inge Klepp, Leslie Lytle, Johannes Brug, Elling Bere, Pernille Due (2006). Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part I: Quantitative studies, Int J Behav Nutr Phys Act. 2006 Aug 11;3:22. doi: 10.1186/1479-5868-3-22.
[51] DeCosta, P. Per Møller, M Bom Frøst, A. Olsen (2017). Changing children's eating behaviour - A review of experimental research, Appetite 113, DOI: 10.1016/j.appet.2017.03.004
[52] DeCosta et al. 2017
[53] Fernandes J., Arida R. M., Gomez-Pinilla F. (2017). Physical exercise as an epigenetic modulator of brain plasticity and cognition. Neurosci. Biobehav. Rev. 80, 443–456.
[54] Chida & Steptoe, 2008; Pressman & Cohen, 2005; as cited in Ong, AD, (2010) Pathways linking positive emotion and health in later life, Current Directions in Psychological Science 19(6): 358-362.

emotion and improved health (Chida & Steptoe, 2008; Pressman & Cohen, 2005). Across experimental and large-scale prospective studies, significant aspects of adult health predicted by positive emotion include self-reported health, physiological responses, physical functioning, disease severity, and mortality.

Although having food available to them appears to benefit the average learner physically and emotionally, the improvements were not noticeable in terms of school functioning (e.g. ability to remember, pay attention and keep up in school, and the frequency of being present or away from school for health reasons) and social functioning (e.g. ability to get along with others and keep up with other learners when playing; also acceptance among peers). This result was somewhat surprising given that research has shown that inadequate diets can have serious and long-lasting negative effects on physical or cognitive functioning, while food insecurity and hunger have been reliably linked to lower levels of concentration, cognitive functioning, attendance, engagement and school achievement[55] as well as impaired social skills development and reading development.[56+57] The results will likely be demonstrating the short-term nature of the evaluation – notably 2 to 3 months – highlighting the extent of time was insufficient to achieve such progress. Other reasons may include having insufficient data to detect such small changes, or programmatically, school lunches are insufficient to progress the average learner in terms of school or social functioning, as they already had food available.

Free and healthy school lunches may also be insufficient to attract the average learner to school and improve overall attendance, possibly explaining why there was little overall difference between those schools receiving the free lunches and those schools not receiving the lunches. Given food insecurity and hunger have been linked to lower levels of attendance,[58] it may be reasonable to expect that attendance would improve only for those without food. We also may not have detected change at the school level if the relative numbers of these individuals is small. However, the attendance data used here would not allow us to test the benefits of the pilot among those most in need of the lunches, nor would the sample size enable testing for such small effects at this early stage.

What's next for the evaluation?

The evidence is sufficient to answer the key evaluation questions in relation to primary and intermediate learners in the Hawke's Bay and Bay of Plenty schools with the greatest

[55] Alaimo et al. (2001). Food Insufficiency and American School-Aged Children's Cognitive, Academic, and Psychosocial Development. PEDIATRICS, 108(3), 824–824. https://doi.org/10.1542/peds.108.3.824-a; Ni Mhurchu et al. (2013). Effects of a free school breakfast pilot on children's attendance, academic achievement and short-term hunger: Results from a stepped-wedge, cluster randomised controlled trial. Journal of Epidemiology and Community Health, 67(3), 257–264. https://doi.org/10.1136/jech-2012-201540; Ball, J. and Watts, C. (2015). External Evaluation of Fruit in Schools Final Report. Report prepared for 5+ A Day Charitable Trust; Quigley and Watts 2005.

[56] Jyoti DF, Frongillo EA, Jones SJ. Food insecurity affects school children's academic performance, weight gain, and social skills. J Nutr.2005;135:2831–9.

[57] Winicki J, Jemison K. Food insecurity and hunger in the kindergarten classroom: its effect on learning and growth. Contemp Econ Policy. 2003; 21:145–57.

[58] Alaimo et al. (2001). Food Insufficiency and American School-Aged Children's Cognitive, Academic, and Psychosocial Development. PEDIATRICS, 108(3), 824–824. https://doi.org/10.1542/peds.108.3.824-a; Ni Mhurchu et al. (2013). Effects of a free school breakfast pilot on children's attendance, academic achievement and short-term hunger: Results from a stepped-wedge, cluster randomised controlled trial. Journal of Epidemiology and Community Health, 67(3), 257–264. https://doi.org/10.1136/jech-2012-201540; Ball, J. and Watts, C. (2015). External Evaluation of Fruit in Schools Final Report. Report prepared for 5+ A Day Charitable Trust; Quigley and Watts 2005.

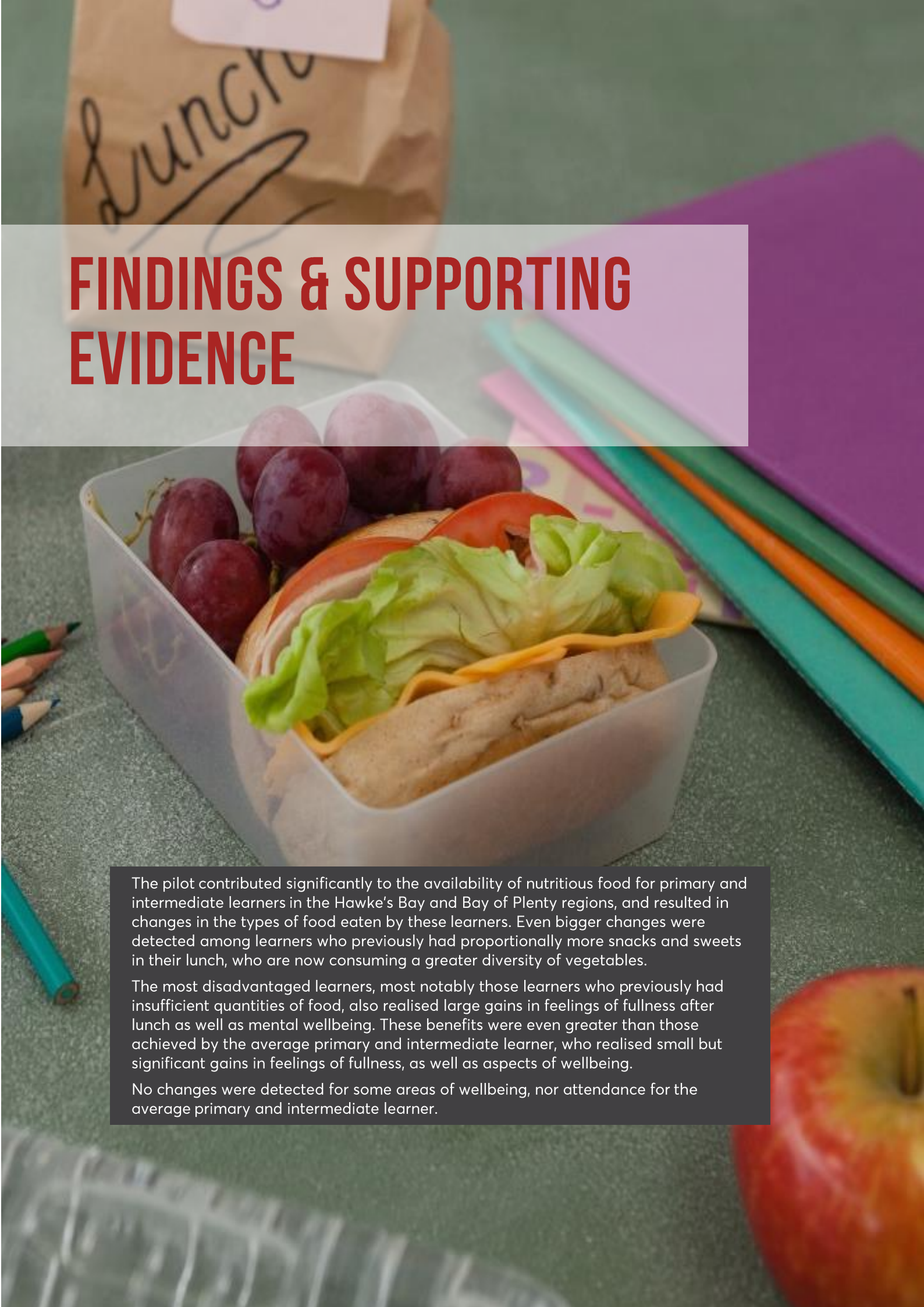
disadvantage. The results are not generalisable to other age groups included in the expansion of the programme (e.g. secondary school learners), nor are they reflective of the impacts to learners in other regions relevant to the expansion. Further evidence would be required in order to estimate the impacts of the expanded programme; the Ministry of Education plans to deliver this broader evaluation as its next step, fulfilling the accountability requirements for the expanded programme. This broader evaluation is especially important given the different contextual factors relevant to these schools, such as providing for older children and having different existing school programmes, are known to influence the intended outcomes.

Nevertheless, the interim evidence provides a balanced picture of the Ka Ora, Ka Ako pilot and is generalisable to this specific population of learners. There are limitations in what impacts could be detected among the smaller groups within this population, most notably those for most disadvantaged learners. Increasing the sample size with a specific focus on these smaller sized groups would allow for estimating smaller benefits.

There are also gaps in the evidence insofar as we could not track these most disadvantaged learners with the provided attendance data. The evaluation results consistently identified greater benefits for learners most in need. As such, it's certainly worthwhile to consider how these most disadvantaged learners could be identified within existing data so the true benefits of the programme on attendance can be estimated, and ideally over a longer period of time (12-24 months).

At the same time as the evaluation was being delivered, Ka Ora, Ka Ako developed associated materials (e.g. guides, pathway to nutrition) and a monitoring system to promote continuous improvement throughout delivery. The programme is regularly collecting information relevant to the school lunches (e.g. nutrition), school experiences and perceptions. Given the evaluation findings, it will also be important to monitor food waste and learners' satiety, and use these monitoring data in future evaluations.

The next steps should also consider the wider benefits of the programme more systematically, particularly as the programme timeframe has been extended. This would likely include evidence in relation to the local economies, as well as whānau and iwi voices.



FINDINGS & SUPPORTING EVIDENCE

The pilot contributed significantly to the availability of nutritious food for primary and intermediate learners in the Hawke's Bay and Bay of Plenty regions, and resulted in changes in the types of food eaten by these learners. Even bigger changes were detected among learners who previously had proportionally more snacks and sweets in their lunch, who are now consuming a greater diversity of vegetables.

The most disadvantaged learners, most notably those learners who previously had insufficient quantities of food, also realised large gains in feelings of fullness after lunch as well as mental wellbeing. These benefits were even greater than those achieved by the average primary and intermediate learner, who realised small but significant gains in feelings of fullness, as well as aspects of wellbeing.

No changes were detected for some areas of wellbeing, nor attendance for the average primary and intermediate learner.

THE KEY EVALUATION QUESTIONS (KEQ) guided the methods and analytical approach, and as such, the findings section is organised according to the KEQs. This section is structured first, as answers to each KEQ (section headings), and second, as findings and supporting evidence under these answers. The KEQs are provided below.

To what extent has the Ka Ora, Ka Ako pilot contributed to the achievement of outcomes, and more specifically:

1. Has the pilot improved learner food security (c.f. KEQ1.1 & KEQ1.2), attendance (c.f. KEQ1.4) and wellbeing (c.f. KEQ1.3), in particular for Māori learners and those most in need?
2. What are the unintended, broader benefits for schools, their learners and whānau, and community (c.f. KEQ2)?

KEQ1.1: The pilot contributed to food security, making nutritious food available and significantly improving the lunchtime diets of primary and intermediate learners in the Hawke's Bay and Bay of Plenty.

Before the pilot was introduced[59], snacks and sweet items,[60] and select fresh fruits[61] were regularly available in the majority of lunches, with nearly every learner lunch (88.6%) having at least one of the ten assessed snack or sweet items in it. However, more than half of learners (72.5%) didn't have any vegetables[62] available for lunch at school at any time over the four-day period.

After the pilot was introduced, there was a significant increase in the availability and consumption of healthy food items and a significant decrease in processed snacks and sweets at lunch. The evidence was consistent across all data sources, and the results represent **excellent** progress towards addressing food security, with benefits realised among those most disadvantaged learners and across this population of primary and intermediate learners in the Hawke's Bay and Bay of Plenty.

The evidence to support this assessment is provided below.

1.1.1. There was a significant change in the types of food available to learners within the pilot schools.

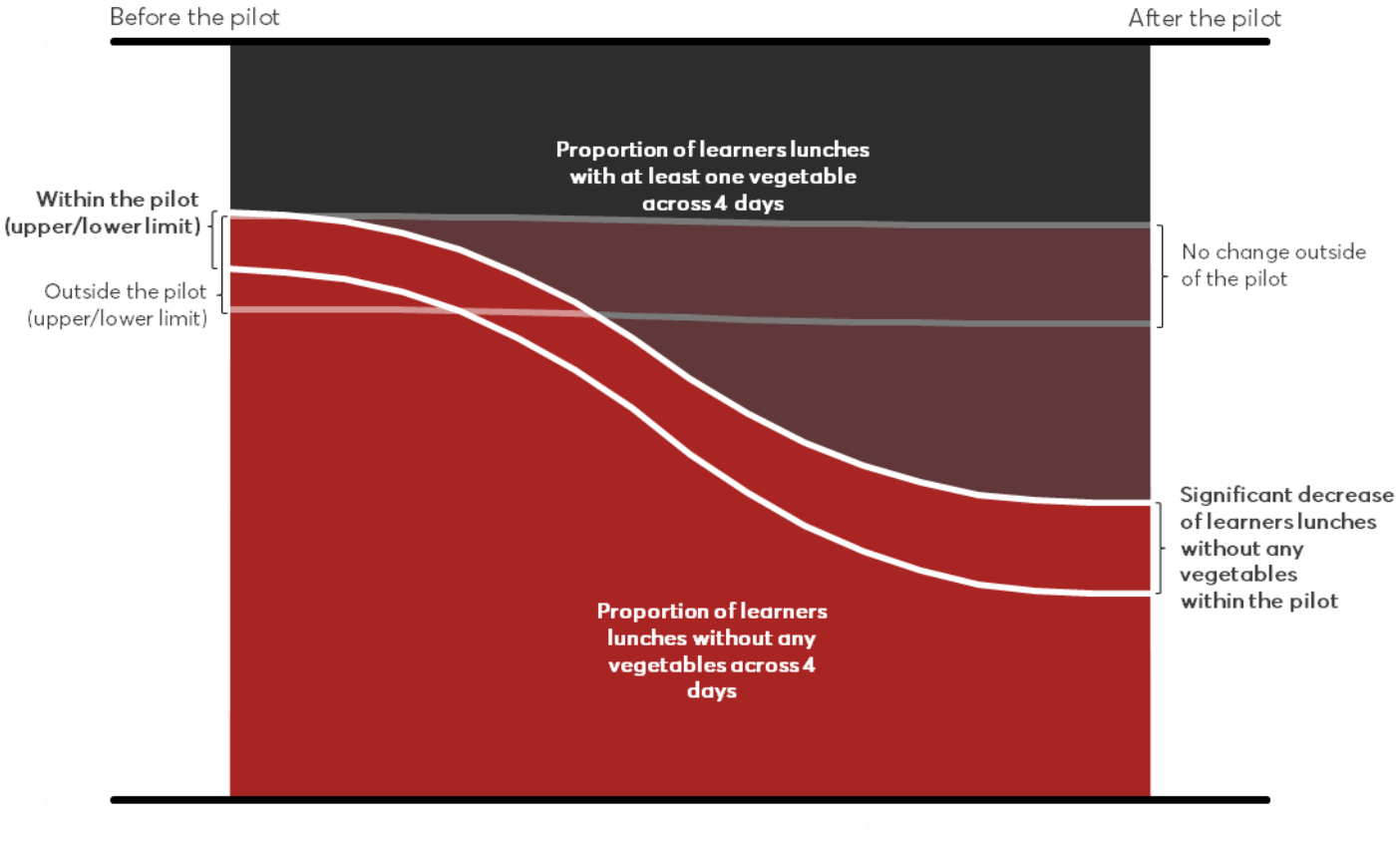
The learner food diaries were used to determine the prevalence of learners' lunches without any vegetables available to them, over two four-day periods in September (before the pilot) and again in November. For each learner, the diaries assessed food availability and consumption of 15 different vegetables, 10 snacks and sweet items, and 10 different fresh fruits[63] over the four days. The learners were also given the option for 'other' vegetables, snacks and sweet items and fresh fruits.

Given our focus on vegetables, we first examined the prevalence of learner lunches without any vegetables over the four-day periods, and how this changed for primary and intermediate learners in these two regions. The results showed a very large increase in the proportion of learners' lunches with at least one vegetable available, but only for those lunches in the pilot. More specifically, the proportion of those lunches with at least

[59] As reported in the Healthy School Lunch programme baseline (interim) evaluation report.
[60] Potato crisps, chippies; Fruit or musli bars, or bliss balls; Cookies or sweet biscuits; Crackers; Corn chips; Lollies or gummies; Cake or muffin; Popcorn; Chocolate; Chocolate-or-sugar coated snacks
[61] Apple; Orange, mandarin or tangelo; Banana; Berries; Kiwifruit; Grapes; Stonefruit, like peaches or plums; Pear Pineapple; Watermelon or melon
[62] Carrot; Lettuce; Cucumber; Tomato; Potato; Cabbage; Corn; Capsicum; Peas; Green leafy vegetables, like spinach; Kumara; Broccoli; Beans; Pumpkin; Cauliflower
[63] The evaluation focussed on these three food types (rather than all potential food types) to reduce the burden on teachers facilitating the task, and make it easier for young learners to complete the questionnaire. It was expected that vegetable availability would increase, snacks and sweets would decrease, and fresh fruits would stay the same.

one vegetable available increased by 40.6% among schools receiving the pilot, from 26.2% (95% CI: ±3.8%[64]) to 66.8% (± 6.0%), while this proportion only increased by 1.6% in schools not receiving the pilot, from 29.1% (±6.2%) to 30.7% (± 6.5%).

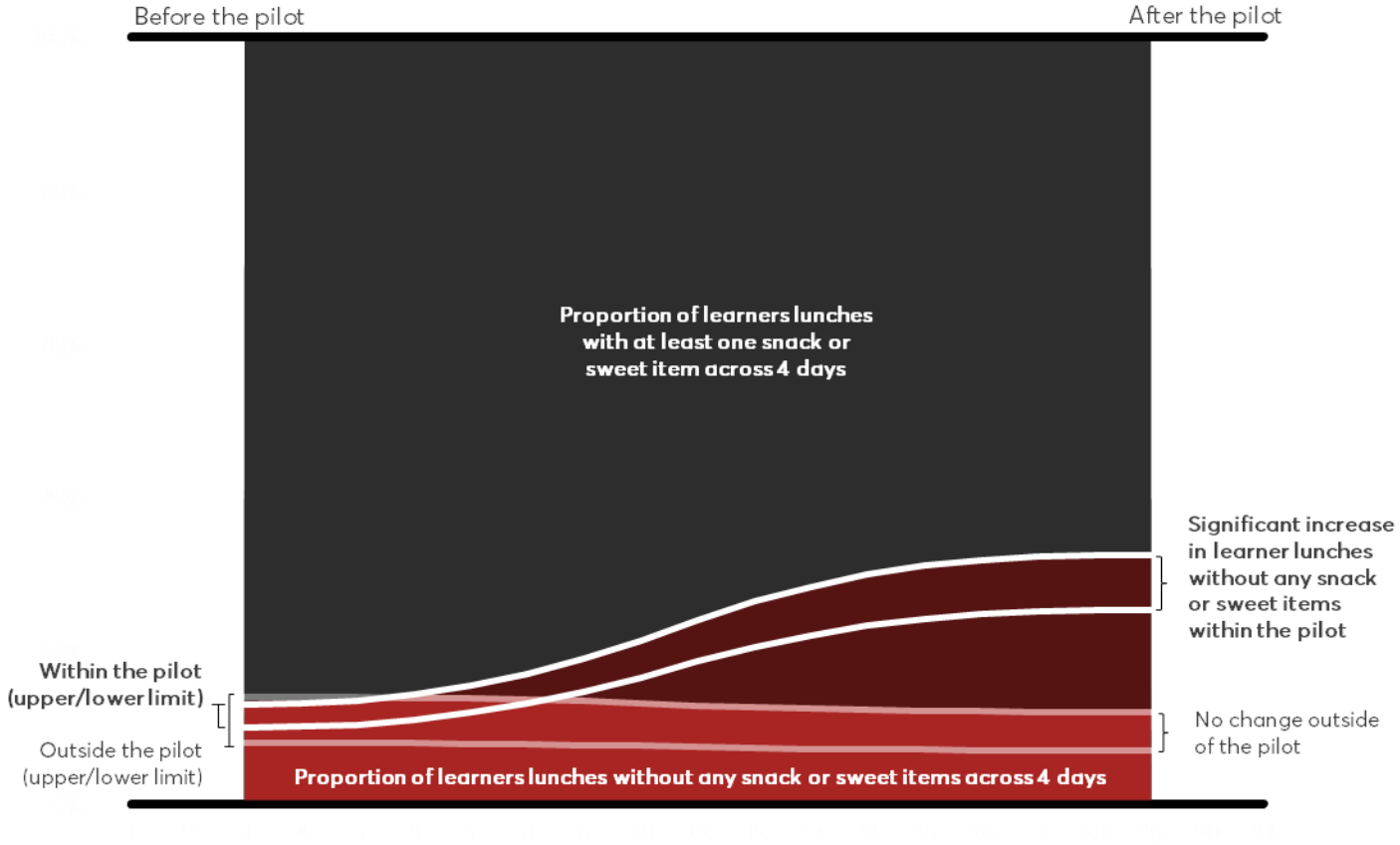
Figure 9: Weighted prevalence of learner's lunches without any vegetables, showing the proportion of these lunches over a 4-day period in September (left side) and a 4-day period in November (right side), and comparing the change (upper and lower confidence intervals) among those receiving the pilot in November (black and red) with those not receiving the pilot (background).



The prevalence of snack and sweet items was also examined. The results showed an increase in the proportion of lunches without any snack and sweet items available, at least for those learners' lunches within the pilot schools. More specifically, the proportion of those lunches without any snack or sweet items available increased by 14.7% among schools receiving the pilot, from 11.5% (± 1.5%) to 26.2% (± 3.2%), while this proportion decreased by 1.1% in schools not in the pilot, from 11% (±3.1%) to 9.9% (± 2.8%) between the same two periods.

[64] Throughout the report, results are reported as the sample mean or proportion estimate ± distance to 95% confidence intervals. Unless otherwise stated, prevalence estimates and 95% CIs are reported using robust estimates with a cluster sample design at the classroom level and incorporating post-stratification weights by learner age. R package: *twang* (authors: G. Ridgeway, D. McCaffrey, A. Morral, B.A. Griffin, L. Burgette and M. Cefalu).

Figure 10: Weighted prevalence of learner's lunches without any snack or sweet items available across a 4-day period in September (left side) and November (right side), comparing the change (upper and lower confidence intervals) among those receiving the pilot in November (black and red) with those not receiving the pilot (background).



No noticeable change in availability of fresh fruit was observed. More specifically, the proportion of those lunches without any fruit items available increased by 1.7% among learners within pilot schools, from 27.5% (± 2.9%) to 28.9% (± 3.6%), while this proportion decreased by 2% among learners within schools not yet receiving the pilot, from 27.7% (±3.7%) to 25.7% (± 5.0%).

These results were also reflected in the focus groups, comparing those changes within schools receiving the pilot (n=6) and those not yet receiving the pilot (n=3). The school staff involved in discussions and at schools within the pilot consistently noted that the food quality had shifted from packaged food to healthier food (FG01, FG02, FG04, FG05, FG09).[65] For those not receiving the pilot, school staff noted either no change or *an increase* in processed food being brought into the school (FG03, FG07, FG08). There was a belief that convenience and/or exhaustion in the home was driving this increase in packaged snacks and sweet items, which are considered as poor nutritional quality food items (FG03, FG07).

These assertions were also echoed in the school lunch photos provided by school staff for classes at 18 schools. More specifically, two independent raters looked at the 187 school lunches provided in September while estimating the proportional makeup of fresh

[65] "FG" designates the Focus Group method, and the number following this abbreviation is the anonymised code for a specific group discussion.

fruit and vegetables within these lunches. The raters found a relatively large proportion of lunches with **no vegetables** (90%) or **no fresh fruit** (43%), while few lunches **didn't have any snacks or sweet items** (16%) before the pilot was introduced. Conversely, snacks and sweet items made up more than half of the lunch in nearly half of lunch photos (47%).

The school lunch photos showed a different picture two months later. More specifically, the estimated proportion of pilot lunches with **no vegetables** was 32%[66] (rather than 90% in September) and **no fresh fruit** was 47% (rather than 43% in September). Learners' lunches with **no snacks and sweet items** was 32% (rather than 16% in September).

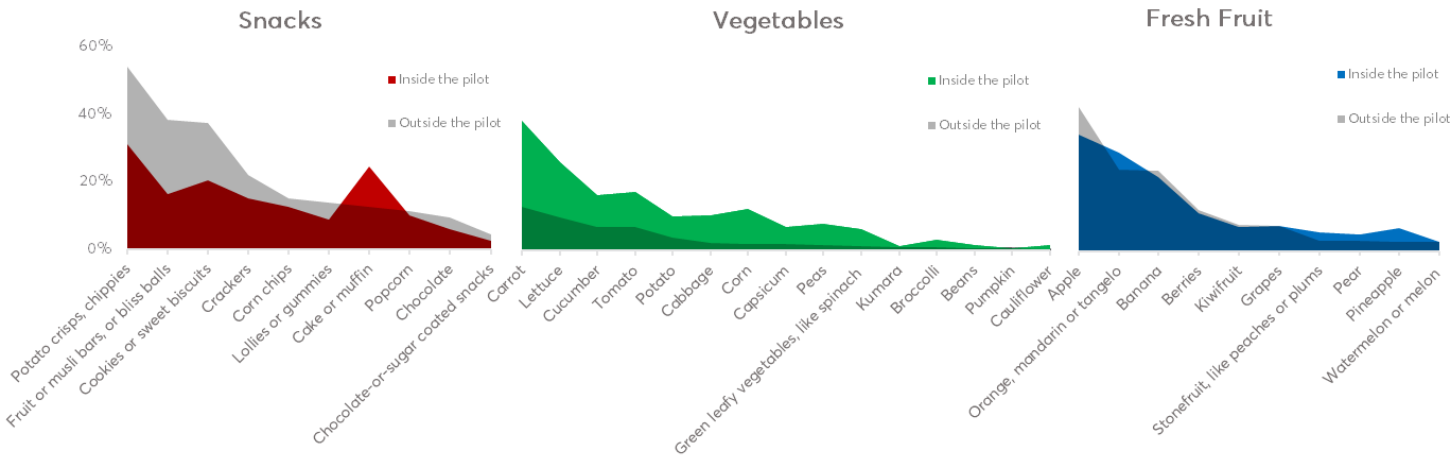
1.1.2. Beyond availability of healthy food, learners within the pilot are consuming more types of vegetables and fewer snacks and sweet items at lunch.

Beyond making healthy food options available to learners, as discussed above, it was expected that the pilot would promote consumption of these healthy food options and influence what learners consumed at lunch. The learner food diaries were used to examine changes in the types of food consumed by learners.[67]

The figure below shows the markedly different foods consumed by learners receiving the pilot from those not receiving the pilot in November. What is clear is that 9 of the ten assessed snacks and sweet items were consumed in proportionally more learners' lunches outside of the pilot than those learners' lunches inside the pilot. There was one exception to this trend – cakes or muffins were consumed in double the number of pilot lunches (24.5% ± 4.5%) than non-pilot lunches (12.5% ± 3.1%); this is noteworthy but is not outside Ministry of Health guidelines, which allow for two servings of such items per week. The reverse is true for vegetables items, all of the 15 vegetable items were consumed in proportionally more pilot learners' lunches than those outside of the pilot. The fruit items showed similar consumption across the different schools. Given the Fruit in Schools programme provides fresh fruit in most of these schools daily, this result was largely expected.

[66] Notably fewer school lunch photos were submitted in November (n=72) than in September. This was largely expected, given learners were given more standardised lunches within the pilot (November) than what families/whānau provided these same learners (September).
[67] c.f. Appendix B, Tables 9 and 11

Figure 5: The average proportion of specific food types in learners' lunches (n=8757) consumed over four days in November, contrasting Ka Ora, Ka Ako schools (coloured area) with other schools (grey/darker shade areas).



The rate of consumption should also be noted, showing how many learners consume what is provided to them (as a proportion). When comparing consumption rates, snacks and sweet items were largely consumed at the same rate irrespective of whether the learner was in (~95%) or out (~94%) of the pilot in November. This result highlights the clear benefits of having fewer such food items available, as learners appear to consume these items when provided, irrespective of how many items are available.

Conversely, vegetables were consumed at higher rate *outside of the pilot* (~97%) than in the pilot (~87%) in November. This lower rate of consumption within the pilot, and likely subsequent waste, may be due to the provision of 'new' or 'uncommon' food to learners, or the provision of standardised items across the schools while families/whānau provide bespoke lunches to their child(ren) according to their known tastes. It should not be understated, however, that although there is likely greater vegetable waste in the pilot when compared to food provided from home, learners in the pilot are still consuming significantly more types of vegetables than their counterparts outside of the programme (c.f. Figure 11).

The consumption rate of fresh fruit was similar to vegetables in that the rate was higher among learners *outside of the pilot* (~94%) than those inside the pilot (~89%) in November. The result is interesting insofar as the availability of fresh fruit items are similar across pilot and non-pilot schools in November[68], but the consumption rates are lower in the pilot schools. The result suggests that there may be too much fresh fruit in the pilot schools, as the instrument didn't measure amount but rather variety of these foods available and consumed. It may be, for example, that the pilot is providing too much fruit, or more likely, that families/whānau or other food programmes existing within the school (e.g. Fruit in Schools programme) are providing the same fruit as that provided by the pilot – any of which may lead to greater waste of fresh fruit.

[68] c.f. Appendix B, Table 9

1.1.3. Moreover, learners that had relatively few vegetables and fresh fruit available to them prior to the pilot are increasing the diversity of vegetables consumed…[69]

We examined any changes and benefits for those most disadvantaged learners, specifically to identify the *additional* benefit for these individuals in relation to their classmates also in the pilot. The results therefore show benefits for these specific learners 'over and above' the benefits realised among the average primary and intermediate learner.

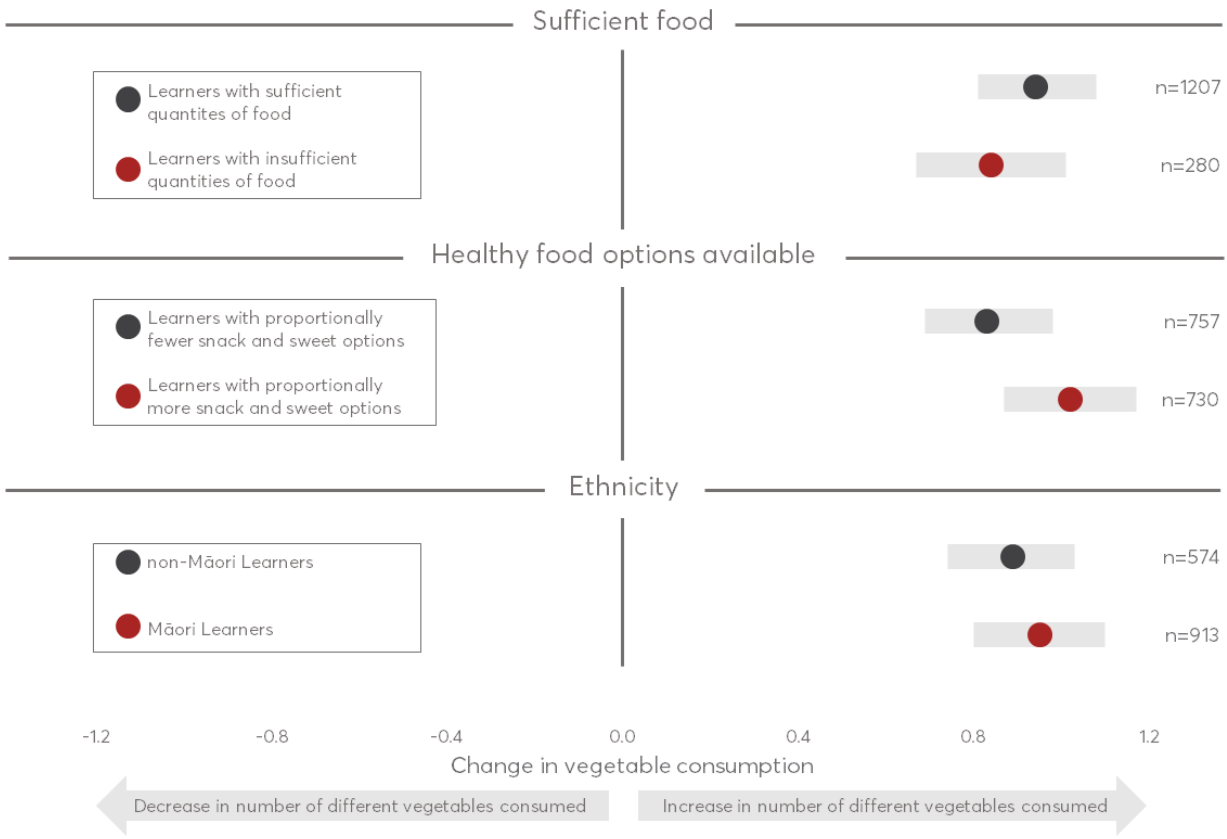
Learners who seemed to particularly benefit in terms of increased vegetable consumption were those that had proportionally more snacks and sweets options available to them before the introduction of the pilot (c.f. Figure 13). More specifically, these learners went from consuming almost no vegetables in their lunches daily to consuming more than one vegetable item daily, representing an increase in consumption of 1.02 (± 0.15) vegetable items consumed daily. Those learners with fewer snacks and sweets items available to them in September also showed an increase from 0.64 vegetables consumed in a lunch in September to 1.48 vegetables consumed in a lunch in November, representing an increase of 0.83 (± 0.15) vegetables in a lunch daily. This means learners that had more snack and sweet items available to them prior to the pilot had a statistically significant net gain of 0.18 (± 0.15) vegetables over those with sufficiently healthy options.Error! Bookmark not defined.

Those who were hungry at least 50% of the days after lunch (before the pilot) showed a similar increase in vegetable consumption (0.84 ± 0.17) than those who were full for at least 50% of the days after lunch (0.94 ± 0.14). The difference was not statistically significant.[70]

The benefits for Māori were essentially the same as for non-Māori. More specifically, the average Māori learner in the pilot increased their consumption of vegetable items by 0.95 (± 0.15), which was close to the increase for non-Māori learners (0.89 ± 0.15).[71]

[69] The net gain of those with fewer fruit and vegetables compared to those with sufficient fruit and vegetables was 0.18 ± 0.13 (β = 0.18, p = 0.007, n = 1487).
[70] The net gain in vegetable consumption of those who were mainly full prior to the pilot was 0.11 ± 0.15 greater than those who were hungry for at least 50% of the time (β = 0.11, p = 0.15, n = 1487).
[71] The net gain in vegetable consumption for Māori was 0.06 ± 0.13 greater than non-Māori (β = 0.06, p = 0.35, n = 1487).

Figure 12: Increase in different vegetables items consumed by those most disadvantaged learners from September to November within the pilot schools.



1.1.4. …while the net effect of the pilot is that learners (on average) are consuming 0.88 (± 0.24) more vegetable items and 0.52 (± 0.28) fewer snacks and sweet items at lunch every day.

Beyond examining the changes made among those most disadvantaged learners, we wanted to estimate the net effects of the pilot on the consumption of vegetables overall. To obtain this net effect, it was first necessary to control for the other factors found to influence consumption. In terms of average number of vegetable items consumed in a lunch, the influencing factors included[72]:

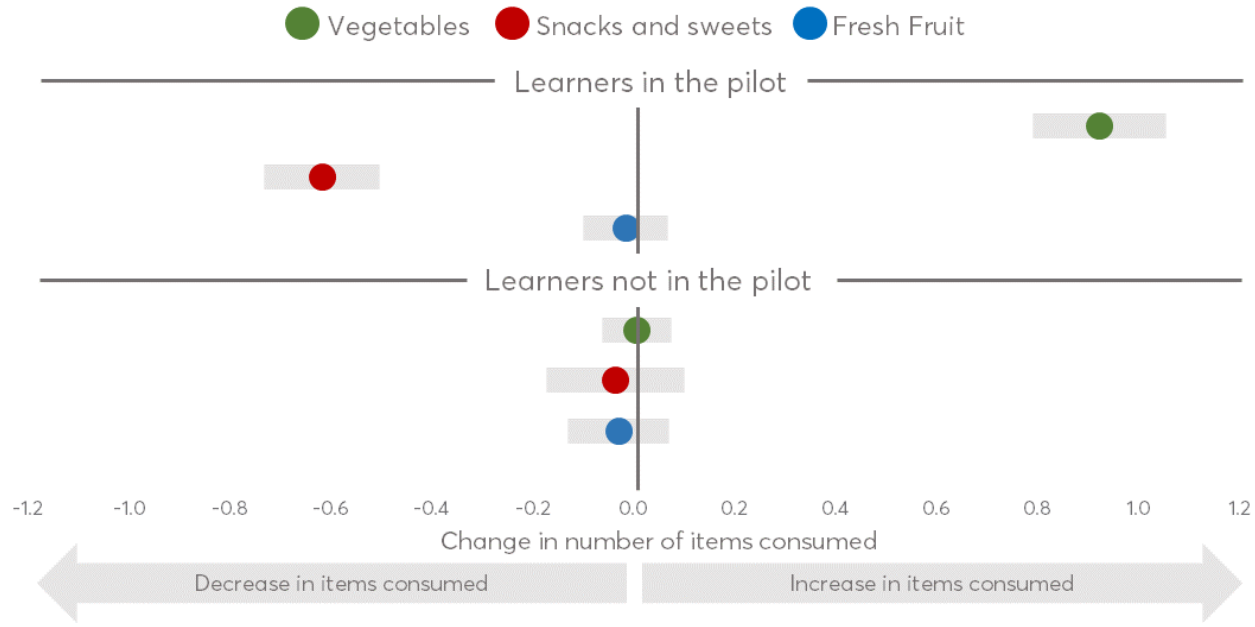
- **school equity index**, showing learners in schools with greater deprivation realising greater gains in the average number of vegetables consumed than learners in schools with less deprivation
- **learner age**, showing younger children making greater gains in vegetable consumption than older children

[72] c.f. Appendix C, Table 18

- **school food policy**, showing schools with food policies realising greater gains in average numbers of vegetables consumed than those without any food policy.[73]

When controlling for the influencing factors[74], we found the increase in the average numbers of vegetable items consumed over the four-day period was statistically significant and large, and a similarly large and significant decrease in snacks and sweet items consumed over the same period. Learners in the pilot were, on average, consuming one additional vegetable item (on average) at lunch (+0.88 ± 0.24)[75] and consuming 0.5 fewer snacks and sweet items (-0.52 ± 0.27)[76] than those learners not in the pilot schools, which showed little change from September to November. There was no evidence of a statistically significant change in the consumption of fresh fruit (+0.06 ± 0.18)[77]. What this means is that the Ka Ora, Ka Ako pilot had significant effects on the variety of food learners were consuming, at least as far as vegetables, and snacks and sweet items.

Figure 13: The average change (dot), and robust confidence intervals (grey bar), in average vegetable items (green), snacks and sweet items (red) and fresh fruit items (blue) consumed in lunches daily from September to November.



[73] The effect of school food policy is related to a greater likelihood for schools with a food policy to use an internal model of food provision. It should further be noted that the internal food model was related to an increased level of vegetable consumption and average satiety over the external model.
[74] We further included ethnicity (Māori) to accommodate the theory of the programme, although this was not found to influence the model.
[75] Th net increase in vegetable consumption for learners in pilot schools beyond that of schools not in the pilot was 0.88 ± 0.24 ($\beta = 0.88$, $p < 0.001$, $n = 1944$, $R^2_{cond} = 0.37$).
[76] The net reduction in snack consumption for learners in pilot schools beyond that of schools not in the pilot was -0.52 ± 0.27 ($\beta = -0.52$, $p < 0.001$, $n = 1944$, $R^2_{cond} = 0.17$).
[77] The net increase in fruit consumption for learners in pilot schools beyond that of schools not in the pilot was 0.06 ± 0.18 ($\beta = 0.06$, $p = 0.54$, $n = 1944$, $R^2_{cond} = 0.12$).

KEQ1.2: The pilot contributed to food security, significantly improving satiety among those learners most in need.

Not only is the consumption of healthy foods important for learners, but as research suggests, having sufficient quantities of food is necessary to promote focus and concentration, engagement and school achievement.[78]

Before the pilot was introduced in schools, learners' lunches provided insufficient food to satiate them, with approximately 21% (± 1.6%) of learners hungry after lunch. After the pilot was introduced, the evidence across the learner lunch diaries and focus groups demonstrated significant and large gains made by those most disadvantaged learners, and showed mixed results regarding the overall prevalence of hunger across primary and intermediate learners in these regions. The results represent greater gains than anticipated at this stage, and demonstrate **very good progress** towards addressing food security in this initial period.

The evidence to support this assessment is provided below.

1.2.1. Those learners that previously didn't have sufficient food realised significant and large benefits from the pilot, increasing feelings of fullness by 20% (± 3.3%) over and above their more advantaged peers.

As part of the learner food diary, administered over one week in September and one week in November, learners were asked about how full they felt using a standardised 'Teddy-the-Bear' satiety scale. There were five possible responses, ranging first from two levels of '**hungry**' (i.e. *"I am really hungry! My belly feels very empty and is rumbling!"*, and *"I am quite hungry and my belly feels a little empty."*) to three subsequent levels of feeling **satiated** (*"I feel just right, not too hungry and not too full."*, *"I am quite full, but there is still a little room in my belly."*, and *"I am not hungry at all! My belly feels very full and I cannot eat any more food."*).

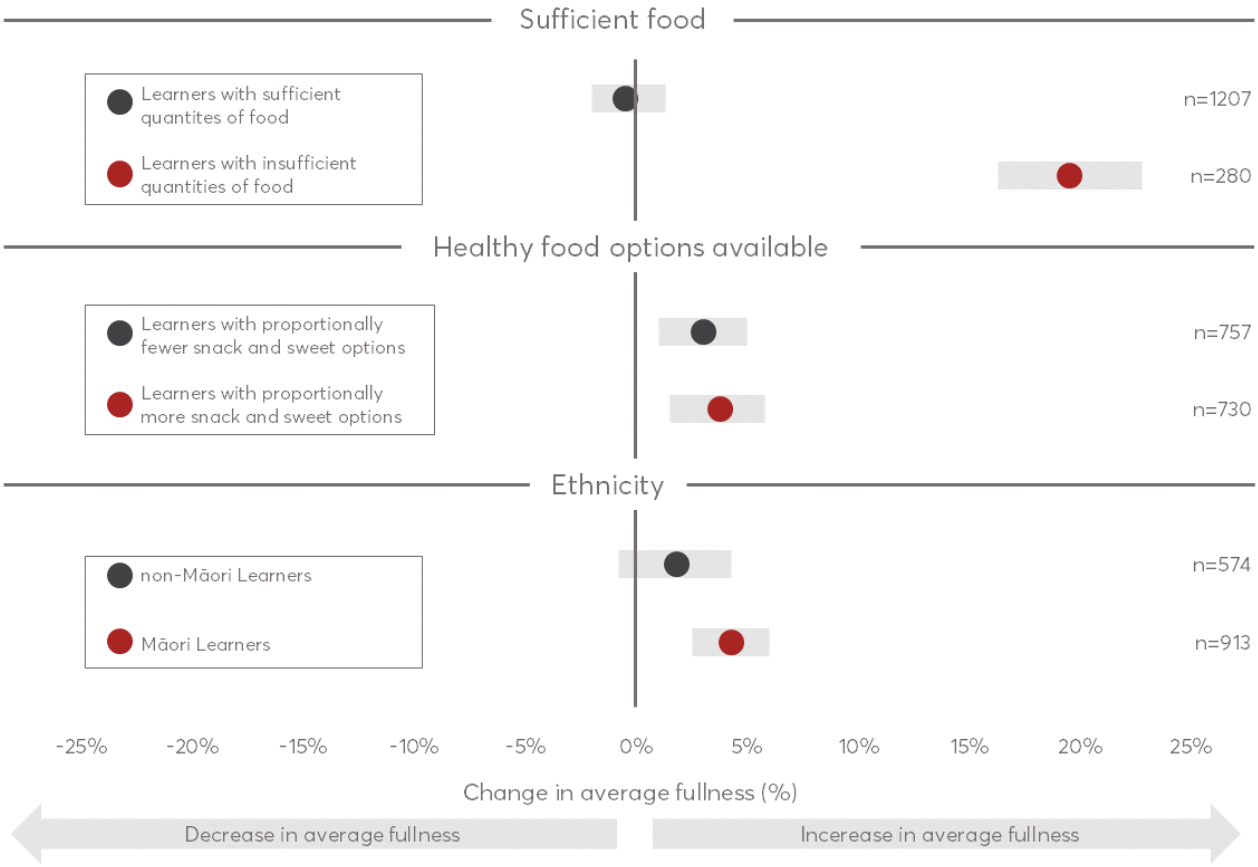
Among the most disadvantaged learners, we found that those with insufficient food prior to the pilot achieved a statistically significant average increase in fullness of 20% beyond those that had sufficient food at the outset (+20% ± 3.3%).[79] The result is noteworthy and represents a large improvement in feelings of fullness for those with insufficient food prior to the pilot.

[78] Alaimo et al. (2001). Food Insufficiency and American School-Aged Children's Cognitive, Academic, and Psychosocial Development. PEDIATRICS, 108(3), 824–824. https://doi.org/10.1542/peds.108.3.824-a; Ni Mhurchu et al. (2013). Effects of a free school breakfast pilot on children's attendance, academic achievement and short-term hunger: Results from a stepped-wedge, cluster randomised controlled trial. Journal of Epidemiology and Community Health, 67(3), 257–264. https://doi.org/10.1136/jech-2012-201540; Ball, J. and Watts, C. (2015). External Evaluation of Fruit in Schools Final Report. Report prepared for 5+ A Day Charitable Trust; Quigley and Watts 2005.

[79] The net gain in fullness for learners with insufficient quantities of food before the pilot over those with sufficient food was 20% ± 3.3% (β = 20%, p = 0.003, n=1487).

Those with proportionally more snacks and sweets items available demonstrated an increase of +0.7% (± 2.6%) in fullness above those that had more healthy food options while Māori learners achieved an additional benefit in fullness of +2.4% (± 2.8%) over and above non-Māori learners; however, neither of these later two results were statistically significant. [80] [81]

Figure 14: Average change in fullness (from September to November) among those most disadvantaged learners in pilot schools.



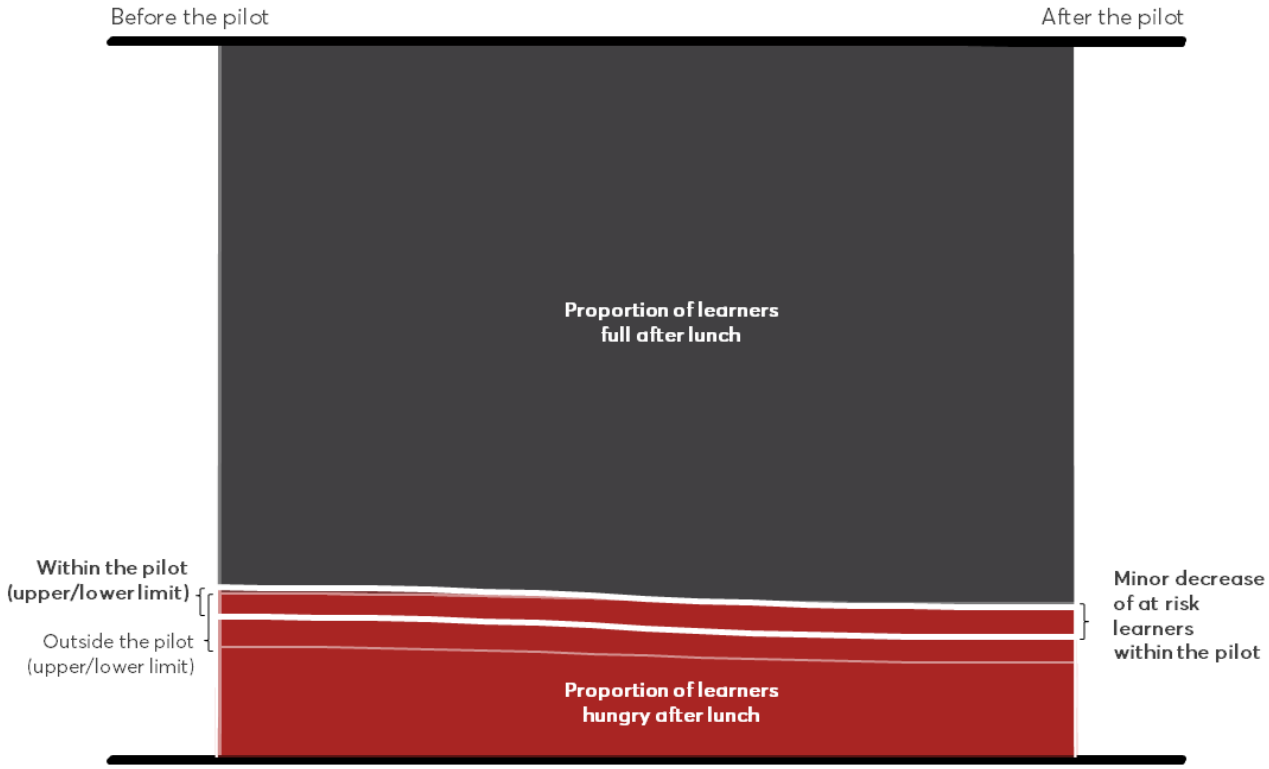
1.2.2. Although hunger was not eradicated among primary and intermediate learners in the initial 2-3 months, there is evidence the overall prevalence of hunger is trending down while progress is likely being hindered by several factors.

For the overall prevalence statistics, the responses to the *Teddy-the-Bear* satiety scale were grouped according to feelings of hunger vs. satiated (as described above). We examined the prevalence of 'hungry' children, comparing the responses from learners in

[80]The net gain in fullness for learners with proportionally more snack and sweet options over those with more healthy options was 0.7% ± 2.6% (β = 0.7%, p = 0.60, n=1487).
[81] The net gain in fullness for Māori learners compared to non-Māori was 2.4% ± 2.8% (β = 2.4%, p = 0.09, n=1487).

pilot schools and outside these schools. The proportion of hungry learners decreased from September to November for everyone, but in particular within schools receiving the pilot. More specifically, the overall proportion of those hungry after lunch dropped by 2.6% in schools receiving the pilot, from 22.0% (± 2.0%) to 19.4% (± 2.1%). Conversely, the proportion of hungry learners dropped by 1.8% in schools outside of the pilot, from 19.3% (± 3.7%) to 17.5% (± 4.1%). Although the results represent an average drop in prevalence of hungry learners, the overall change was not statistically significant between pilot schools and schools outside of the pilot.[82]

Figure 15: Weighted prevalence of hungry learners after lunch between September (left side) and November (right side), comparing the change among those receiving the pilot in November (black and red) with those not receiving the pilot (background shift down).



Focus groups with school staff were used to explore the changes in hunger among learners over the preceding three months, comparing those changes within schools receiving the pilot (n=6) and those not yet receiving the pilot (n=3).[83] Staff in schools not yet receiving the pilot noted no change (FG03) or hungrier students (FG07, FG08) from September to November; this result was expected, given the lack of additional food for these learners.

However, staff within the pilot schools reported mixed recognition of change, with some staff recognising no difference to hunger at the school (FG01), as their school had been

[82] The net reduction in prevalence of hunger for pilot learners beyond that for non-pilot learners was -0.8% ± 3.0% (β = -0.8%, p = 0.69, n=22134, n=number of reported days across all students).
[83] The comparative analysis allows us to test if any realised change may have occurred for reasons beyond the pilot, as well as test the different contributing factors to any changes.

providing food to their learners prior to the pilot. Other staff said the students had more food available than they had a few months prior (FG02, FG09), while other staff suggested there was a decrease in the amount of food available to their learners after the pilot was introduced (FG06). There were some views that learners may be hungrier now because the pilot providers are providing standardised lunches and identical portion sizes across year levels, or that some learners simply require greater energy (FG05, FG06). Beyond portion sizes and relative energy needs, there was a belief that food preferences would be driving ongoing hunger in the pilot schools, with some learners rejecting the food provided to them (FG05).

1.2.3. The net effect of the pilot is that learners (on average) are feeling 3.8% fuller (± 3.4%) than those who were not receiving the school lunches.

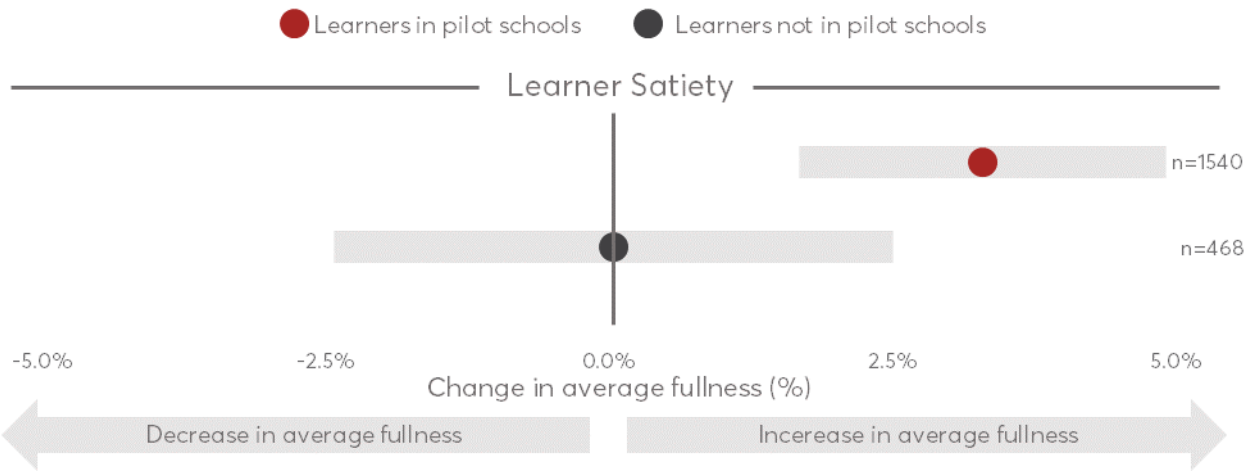
Beyond comparing the broad-brush differences between those learners in and out of the pilot, we wanted to track individual learners and estimate the net effects of the pilot on satiety. To obtain this net effect, it was first necessary to control for the other factors found to influence this outcome. In terms of average increase in fullness, the influencing factors included[84]:

- **school equity index**, with learners in schools with greater deprivation realising greater gains in satiety than learners in schools with less deprivation.
- the absence of **other food programmes**, with learners having other food programmes at the school during baseline achieving smaller gains in satiety than those learners in schools not having any existing food programmes.
- **learner age**, with older children tending to make greater gains in satiety than younger children.

Controlling for these factors[85], learners in the pilot achieved a small but statistically significant ($p<0.05$) increase of 3.8% (± 3.4%) in average satiety over and above those not receiving the pilot.[86]

[84] c.f. Appendix C, Table 24
[85] We further included ethnicity (Māori) to accommodate the theory of the programme, although this was not found to influence the model.
[86] The net gain in average satiety for learners in the pilot over and above those not in the pilot was 3.8% ± 3.4% (β = 3.8%, p = 0.03, n=2008, R^2_{cond} = 0.06).

Figure 16: Average percentage change in fullness from September to November, comparing learners in pilot schools and learners not in pilot schools.



KEQ1.3: The pilot contributed to aspects of wellbeing.

Before the pilot began, we know 52.0% (± 3.5%) of the primary and intermediate learners in these two regions could be designated 'at risk' of impairment for the total Health Quality of Life, according to the thresholds identified for young people in the USA.

The evidence across the learner lunch diaries and focus groups demonstrated mixed results, identifying some small but statistically significant benefits on aspects of wellbeing, while other areas showed no significant change. This is unsurprising given the early stage of the initiative, and as such represents **adequate progress** towards improving wellbeing.

The evidence to support this assessment is provided below.

1.3.1. Large gains were achieved by those most disadvantaged learners, with those who previously had insufficient quantities of food regularly making significant gains in mental wellbeing.

As part of the learner food diary, learners aged 8-12 years old were asked once in September and once again in November about the frequency of problems they experienced over the previous month using the standardised PedsQL™ instrument (Pediatric Quality of Life Inventory, Generic Core scale, Version 4.0 – Australian English). There were 23 items measuring Quality of Life, each estimating the frequency of a

problem for the young person, ranging from '*Never*' to '*Almost always*'. The total Healthy Quality of Life (HQoL) score was derived from these responses.

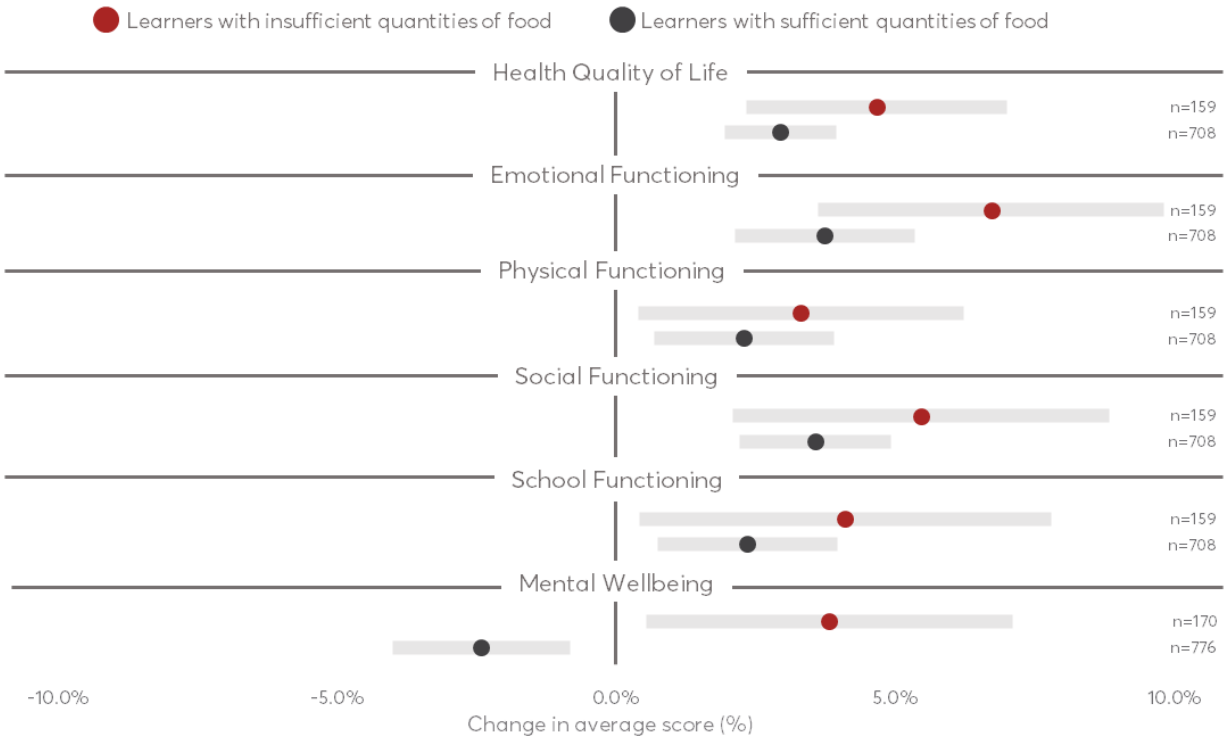
At these same points in time, learners were also asked to answer five additional questions as a measure of mental wellbeing. More specifically, the World Health Organisation Five Wellbeing Index (WHO-5) was used to estimate learners' (aged 9 and up) feelings of cheer, calm, vigour, restfulness and interest over the preceding two weeks.

Using the results from these measures, learners who seemed to particularly benefit from the pilot in terms of mental wellbeing were those with insufficient quantities of food at the outset. Notably, there was a statistically significant increase in mental wellbeing of 6.2% (± 3.7%) for those learners with previously insufficient quantities of food over and above that for learners with sufficient quantities of food.[87]

Similarly, when considering the quality of life constructs (Peds-QL), those learners with insufficient quantities of food at the outset made more than double the gains in emotional functioning (6.7% ± 3.1% for learners with insufficient food vs 3.7% ± 1.6% for those with sufficient food)[88] and greater gains in social functioning (5.5% ± 3.4% for learners with insufficient food vs 3.6% ± 1.4% for those with sufficient food).[89] Although these greater gains in emotional and social functioning are sizeable, they were not statistically significant.

[87] The net gain in mental wellbeing for leaners with **insufficient quantities of food** learners at the outset over those with sufficient food was 6.2% ± 3.7% (β = 6.2%, p = 0.001, n=946).
[88] The net gain in emotional functioning for hungry learners was 3.0% ± 3.4% (β = 3.0, p = 0.08, n = 867).
[89] The net gain in social functioning for hungry learners was 1.9% ± 3.8% (β = 1.9, p = 0.33, n = 867).

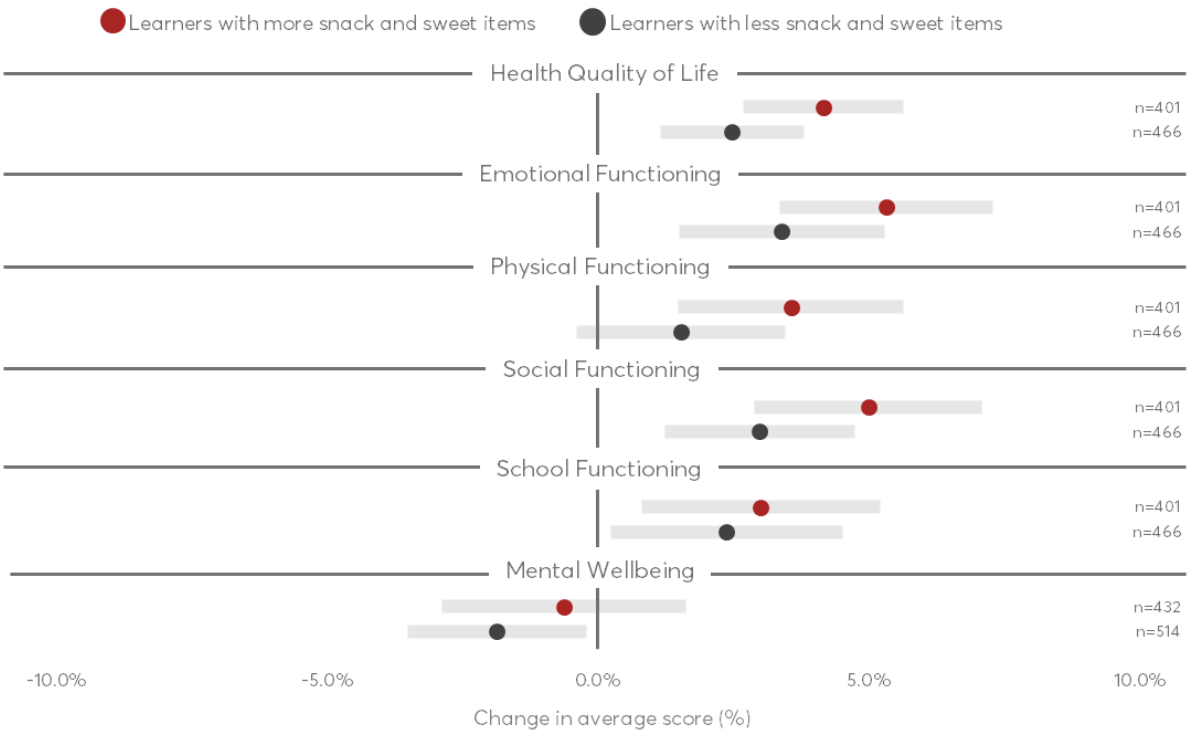
Figure 17: Average change in mental wellbeing (WHO-5) and health quality of life (Peds-QL score) for learners between September and November within the pilot schools, comparing those who were hungry more than 50% of the time after lunch at baseline and learners who were hungry less than 50% of the time at baseline.



Those with proportionally more snack and sweet options showed relatively smaller gains, and they did not show any notable difference in mental wellbeing over learners with more healthy options available (1.2% ± 2.7%).[90] Though again not statistically significant, those learners with proportionally more snack and sweet options available in September had greater gains over those with more healthy lunch options, in particular for social functioning (5.0% ± 2.1% for those with proportionally more snacks and sweet lunch options vs 3.0% ± 1.8% for those with more healthy lunch options)[91], emotional functioning (5.3% ± 2.0% for those with proportionally more snacks and sweets vs 3.4% ± 1.9% for those with more healthy lunch options)[92], and physical functioning (3.6% ± 2.1% for those with more snacks and sweet options vs 1.5% ± 1.9% for those with more healthy lunch options).[93]

[90] The net gain in mental wellbeing for learners with proportionally more snack and sweet options over those with more healthy options was 1.2% ± 2.7% (β = 1.2%, p = 0.37, n=946).
[91] The net gain in social functioning for learners with few healthy lunch options was 2.0% ± 3.0% (β = 2.0, p = 0.19, n = 867).
[92] The net gain in emotional functioning for those with few healthy lunch options was 1.9% ± 2.5% (β = 1.9, p = 0.13, n = 867).
[93] The net gain in physical functioning for those with few healthy lunch options was 2.0% ± 2.8% (β = 2.0, p = 0.15, n = 867).

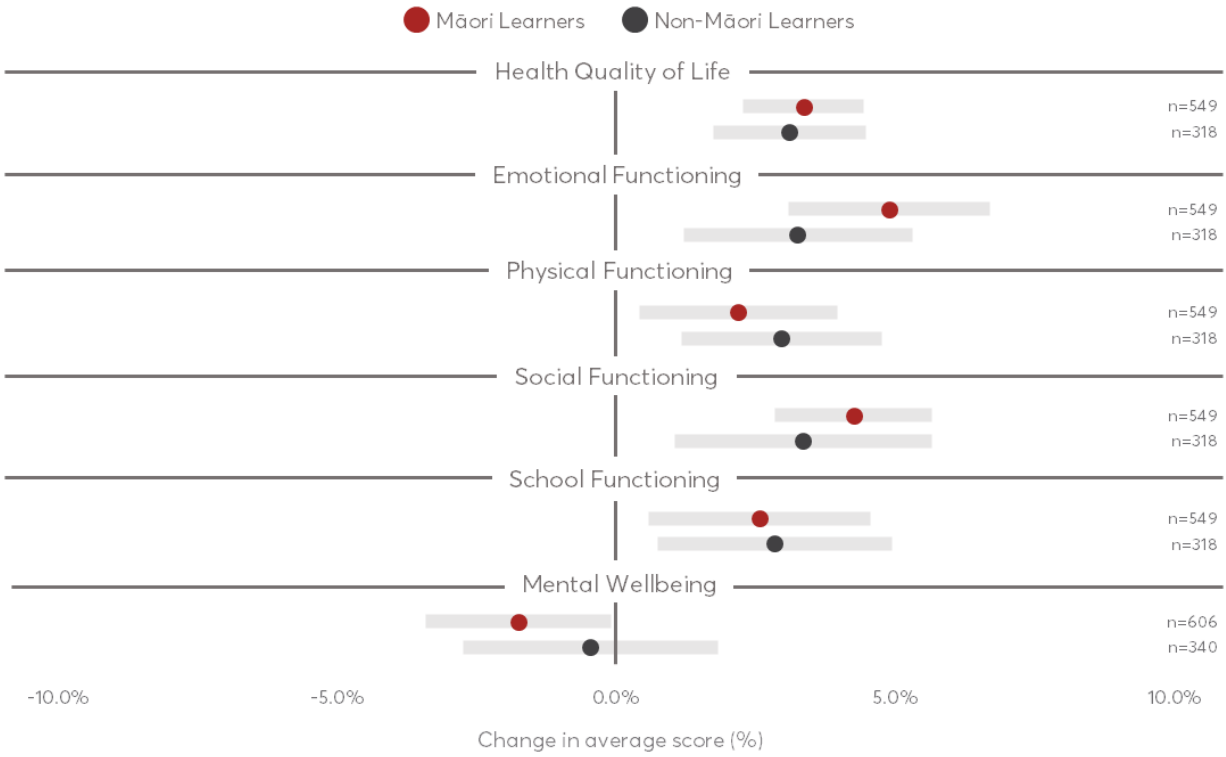
Figure 18: Average change in Health Quality of Life (Peds-QL score) and mental wellbeing (WHO-5) for learners between September and November within the pilot schools, comparing those had 60% or more of their available lunch at baseline being snacks or sweets vs. learners who had greater than 60% of their available lunch at baseline being vegetables and fresh.



Māori learners also did not show any significant differences over non-Māori in terms of mental wellbeing.[94] However, Māori learners realised greater gains than non-Māori for emotional functioning (4.9% ± 1.8% for Māori learners vs 3.3% ± 2.0% for non-Māori learners),[95] but had equivalent or reduced gains for physical, social and school functioning.

[94] The net change in mental wellbeing for Māori learners compared to non-Māori was -1.3% ± 2.6% (β = -1.3%, p = 0.34, n=946).
[95] The net gain in emotional functioning for Māori learners over non-Māori was +1.6% ± 2.6% ($\beta = 1.6$, $p = 0.21$, n = 867).

Figure 19: Average change in Health Quality of Life (Peds-QL) and mental wellbeing (WHO-5) between September and November within the pilot schools, comparing Māori and non-Māori learners.



The results suggest that we could expect larger gains for those most disadvantaged learners. Tracking a larger sample of these specific learners, and over a longer period of time, may reveal effects that were either too small or too early to detect in this interim evidence, which is particularly relevant given the short timeframe between the pre (September) and post (November) assessments here.

1.3.2. Overall, there was a significant decrease in the prevalence of learners with low health quality of life within Ka Ora, Ka Ako primary and intermediate schools.

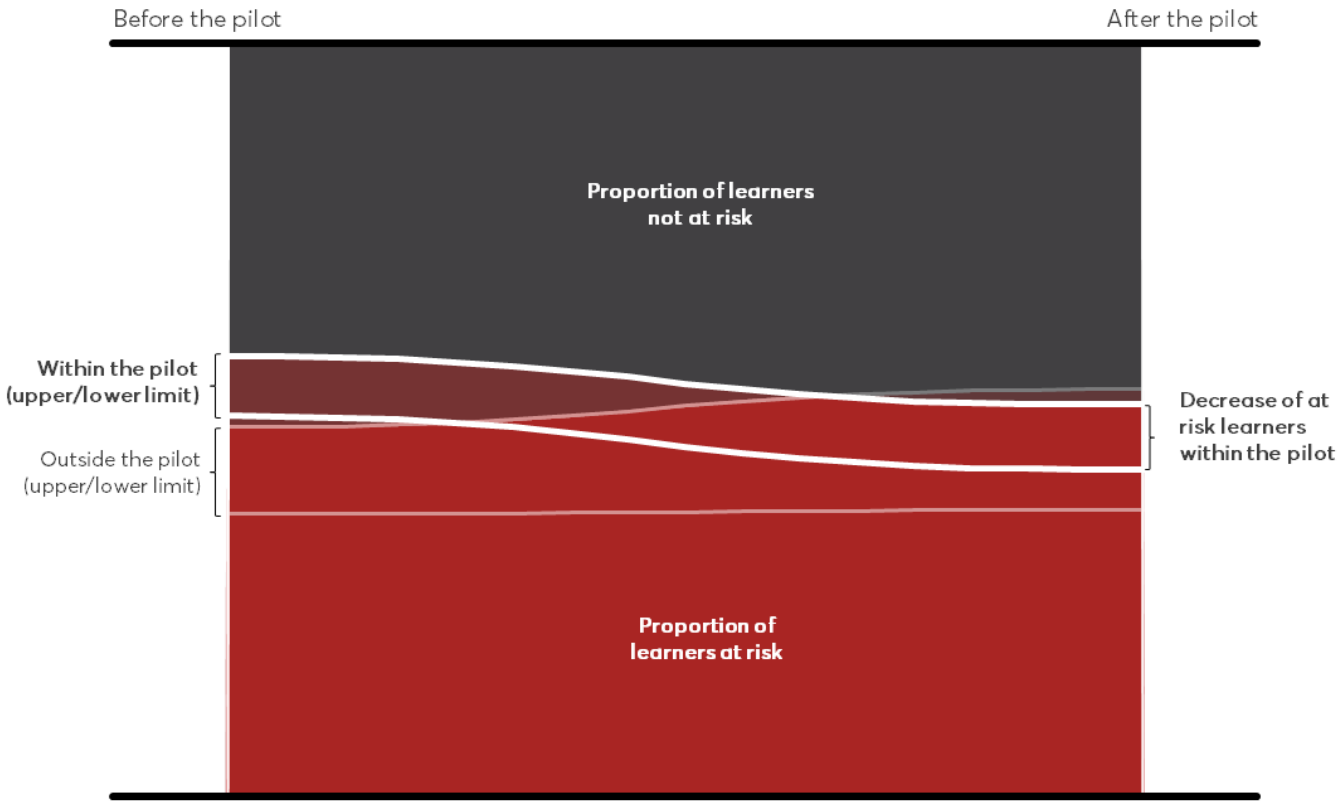
The total Healthy Quality of Life (HQoL) score was derived from the responses to the PedsQL™ instrument, and for the prevalence statistics, these scores were grouped according to above or below the thresholds designating an 'at risk' status for impaired HQoL for children and adolescents in the USA. Although this threshold is from a different population (USA), the groups provide useful guidance on how the pilot population compares.[96]

The PedsQL™ results showed the proportion of those at risk dropped by 8.0% among schools receiving the pilot, from 53.7% (± 4.0%) to 45.7% (± 4.5%), while this proportion increased by 1.0% in schools not receiving the pilot, from 42.9% (±5.8%) to 43.9% (±

[96] At risk levels were defined for the Health Quality of Life Total Score as ≤ 69.71 (PedsQL Generic Core Scales) for children and adolescents in the USA, according to 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.

8.1%). This result represents a statistically significant net reduction of 9.0% (± 5.0%) in the prevalence of at-risk learners for those in the pilot against those not in pilot.[97]

Figure 20: Weighted proportion of learners 'at risk' of impaired health quality of life between September (left side) and November (right side), comparing the prevalence among those receiving the pilot in November (black and red) with those not receiving the pilot (background shift up).



1.3.3. Mixed results among school staff highlight the variable experiences at this early stage, as well as the different factors contributing to wellbeing.

Focus groups with school staff were used to explore any recognised changes in wellbeing among learners over the preceding months. In one group discussion, some staff at pilot schools noted that learners had greater focus and attention on the learning activity, and/or improved behaviour in the classroom (FG01, FG05). However, they attributed such changes to not only having sufficient quantities of food available but also having additional teacher aides coming in to support learners (FG01). In a separate pilot school, staff believed that learners are more restless now given they are receiving less food than was otherwise in their lunch boxes (FG05).

[97] The net reduction in prevalence for pilot learners at risk of impaired health quality of life against those not in the pilot was 9.0 ± 5.0% (β = -9.0, p = 0.004, n = 1959).

For those schools not yet receiving the pilot, two of the three schools' staff noted an increase in learner wellbeing over this same period. They attributed this progress to other activities underway at the school (FG03, FG08), such as a martial arts programme as well as food-relevant policies already embedded at the school (e.g. water only, non-lollies).

For staff at another school not yet receiving the pilot, they recognised an increase in the number of learners presenting with anxiety and self-harm over this period. The impact of the COVID-19 pandemic in terms of financial stress and unemployment was believed to be a key contributing factor. It was noted that for this regional school there were broad negative employment effects on local families due to the pandemic.

These assertions, notably that broader factors affect wellbeing, were supported by the learner food diaries in that the modelling showed the recorded learner characteristics (e.g. age, sex, ethnicity) tended to explain only a small percentage of the overall variance in outcomes, indicating that other characteristics not captured by the food diaries (e.g. family situation, sport participation) are clearly relevant to learner wellbeing.[98]

1.3.4. The net effect of the pilot is that learners (on average) are experiencing small but significant improvements in overall health quality of life as well as physical and emotional functioning.

The above findings demonstrated the need to control for at least some of these influencing factors to estimate the net effect of the pilot on learners. In terms of average increase in wellbeing, the influencing factors included:[99]

- **learner age**, with 9-10 year olds tending to make greater gains in wellbeing than other ages
- **learner sex**, with females tending to make greater gains in wellbeing than males
- **learner ethnicity**, with Pākehā showing greater gains in wellbeing than others.

Controlling for these factors,[100] the evaluation found that the pilot had a small but statistically significant net effect on the overall health quality of life. More specifically, learners in the pilot schools showed a 3.0% (± 2.0%) increase over and above those learners who were not in the pilot schools.[101]

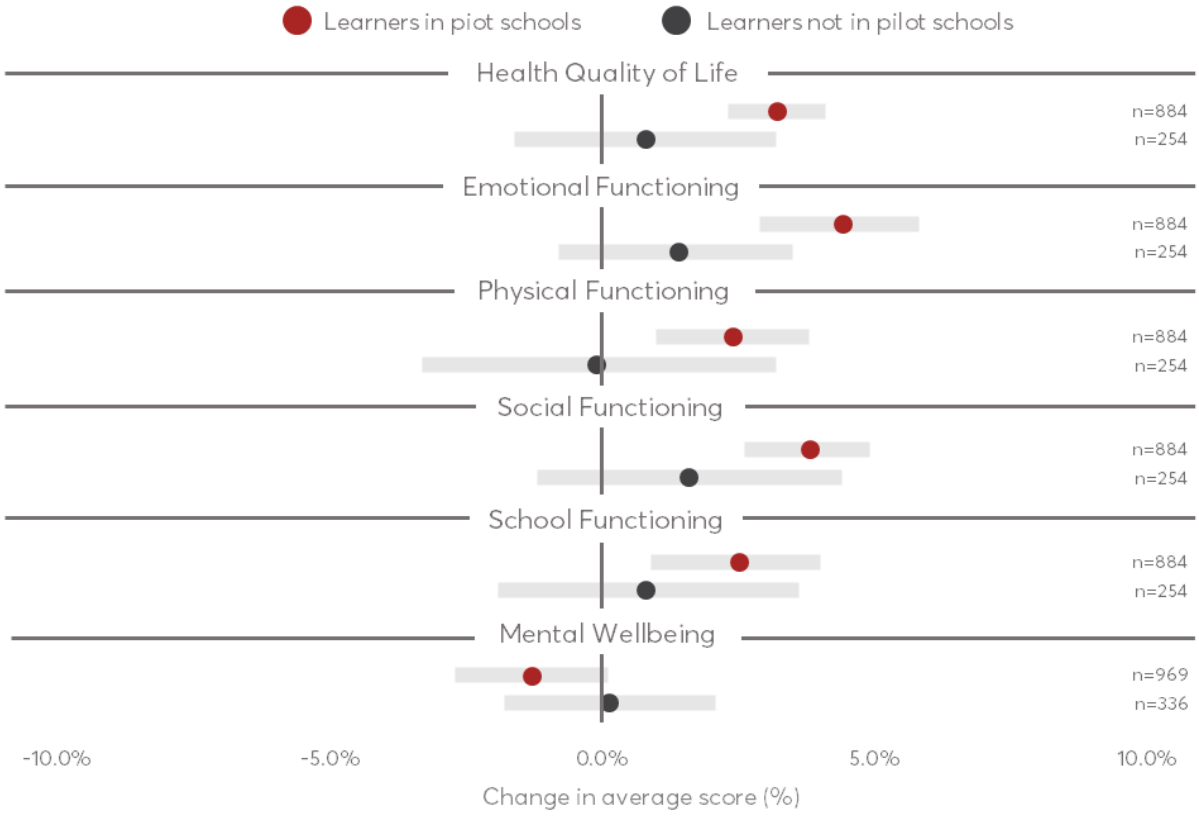
[98] This was reflected in a low percentage of variation explained by variables in the model (R-squared). In other words, there are many different reasons why wellbeing would change in addition to the pilot and the other factors identified in the food diary. Inferences about average changes in wellbeing across the pilot group are still possible, however.
[99] c.f. Appendix C, Table 26. For individual constructs additional confounders were: Emotional (Pasifika, background food programmes); School (background food programmes). We further included ethnicity (Māori) to accommodate the theory of the programme, although this was not found to influence the models.
[100] The model controlled for the background factors of learner age and Pākehā ethnicity as potential confounders. We further included ethnicity (Māori) to accommodate the theory of the programme, although this was not found to influence the model. Net effects were estimated using mixed modelling by including a classroom level random effect.
[101] The net gain in total health quality of life for learners in the pilot beyond that for learners not in the pilot was 3.0% ± 2.0% (β = 3.0, p = 0.007, n = 1157, R^2_{cond} = 0.04).

Further, small positive effects were found for learners' physical functioning, with a 3.7% (± 3.0%) net positive effect for learners in pilot schools.[102] What this means is that there were measured improvements, albeit small, in the frequency in which they experienced problems with physical activities, measured as their ability to walk, run, play sport, help around the house and shower without help, and in their energy levels.

There were similarly small but statistically significant improvements in the learners' reported frequency of feelings of fear, worry, anger and sadness (emotional functioning), demonstrating a 3.5% (± 3.0%) increase over and above the learners in schools not receiving the pilot.[103]

[102] The net gain in physical functioning for learners in the pilot beyond that for learners not in the pilot was 3.7% ± 3.0% (β = 3.7, p = 0.02, n = 1157, R^2_{cond} = 0.06).
[103] The net gain in emotional functioning for learners in the pilot beyond that for learners not in the pilot was 3.5% ± 3.0% (β = 3.5, p = 0.03, n = 1157, R^2_{cond} = 0.02).

Figure 21: Average change in mental wellbeing (WHO-5) and health quality of life (Peds-QL score), comparing September and November for learners in pilot schools and learners not in pilot schools.



1.3.5. Positive net gains for those in the pilot were also detected in school or social functioning although these were not statistically significant.

There was a positive, but not statistically significant, net gain in the school functioning measure of 2.3% (± 3.1%) for learners in pilot schools over and above those not in the pilot.[104] This measure examined the reported change in frequency in problems with learners' ability to remember, pay attention and keep up in school, and being present at school (i.e. attendance). Similarly, there was a net gain in the social functioning measure of 2.3% (± 2.7%)[105], but against this was not statistically significant. Social functioning assesses the reported frequency of getting along with others and keeping up with other learners when playing, and acceptance among peers.

While the individual items in each construct are not intended to be used as specific wellbeing measures, it is interesting to see which of the items contributed the most to the

[104] The net gain in school functioning for learners in the pilot beyond that for learners not in the pilot was 2.3% ± 3.1% (β = 2.3, p = 0.17, n = 1157, R^2_{cond} = 0.04).
[105] The net gain in social functioning for learners in the pilot beyond that for learners not in the pilot was 2.3% ± 2.7% (β = 2.3, p = 0.10, n = 1157, R^2 = 0.01).

overall score. For the school functioning measure, the two largest gains from baseline to follow-up were for the items asking about 'paying attention' and 'doing schoolwork'. This aligns to the assertions made by staff at two schools, which recognised some change in learners' focus. These assertions, however, would need to be tested further, likely using an instrument directed at measuring change in 'focus', increasing the sample size, and/or delaying the follow-up assessment to detect any possible lag effects.

The other wellbeing measure was the mental wellbeing score (WHO-5), which estimated learners' (aged 9 and up) feelings of cheer, calm, vigour, restfulness and interest over the preceding two weeks. There were no significant differences between the September and November assessments for learners, whether in the pilot schools or not, with minimal changes across both groups (a net difference of -0.9% ± 2.8 was seen for the pilot schools).[106]

KEQ1.4: The pilot did not contribute to attendance at the classroom or school level.

Before the pilot began[107], the baseline assessment showed pilot schools had systematically higher unjustified absences across Term 3 and Term 4 in 2019. The average difference was between +2 to +7 percentage points higher in pilot schools than at schools not in the pilot.

The evidence across Ministry attendance data, classroom level attendance data collected from teachers, and the focus group discussions were consistent, demonstrating ***no change*** in relation to attendance.

The evidence to support this assessment is provided below.

1.4.1. There was no change in attendance at the school level.

We expected that providing food to learners would result in a drop in unjustified absences, and conversely, an increase in attendance, and this result would be recognised early by school staff and identifiable within attendance data.

We explored perceptions of changes in attendance with school staff in the focus group discussions. Learner attendance had reportedly changed in three of the nine schools involved in the focus groups. What is interesting is that these changes were only realised in those schools not yet receiving the pilot, with one school noting an apparent decrease in learner attendance over the last three months (FG07) believing that the habits of lockdown meant learners did not feel they needed to come to school to learn. The other two schools not yet receiving the pilot believed their attendance had improved over the

[106] The net difference in mental wellbeing for learners in the pilot beyond that for learners not in the pilot was -0.9% ± 2.8 (β = -0.9%, p = 0.54, n = 1305).
[107] As reported in the Healthy School Lunch programme baseline (interim) evaluation report.

same period (FG03, FG08) due to other programmes being underway, and a reduced anxiety among parents about COVID-19 health-related concerns.

Conversely, those receiving the pilot either didn't believe attendance had changed (FG02, FG04, FG06, FG09), or couldn't comment given they had not yet completed the analysis (FG01).

These results were supported by the class-level data, whereby teachers were asked to confirm their class-level enrolments and attendance daily over two five-day periods (baseline and follow-up) as part of the facilitation of the learner food diaries. These data showed a marginal (non-significant[108]) drop in class attendance after lunch between September and November from 84.4% (±2.4%) to 82.2% (±2.1%), and no statistically meaningful difference between attendance in classes within vs. outside the pilot in November 81.8% (±2.7%) versus 83.1% (±3.7%) respectively[109].

The results from the class-level data were similar to that found in the Ministry of Education attendance data. Using the Ministry data, we tracked the attendance patterns of Year 1 to 8 learners between Term 2 2019 and Term 4 2020 at schools delivering the pilot and potential comparison schools that did not deliver the pilot. More specifically, the pilot schools were matched[110] to comparable schools based on school-level data including historical Term 2 attendance patterns, behavioural measures (e.g. numbers of standdowns and suspensions), school decile and other characteristics (e.g. proportion of Maori students). We then estimated the impact of the pilot over subsequent 4-weekly periods following the commencement of the pilot and on the proportion of time spent classified as: present, justified absence, and unjustified absence. Given the similar results, we present the results for the unjustified absences below for simplicity while all three results are summarised in the appendix[111].

For a beneficial impact due to the pilot, we would expect the proportion of time spent as unjustified to have a negative impact estimate (less unjustified absences for pilot schools than matched schools). However, there was a very small, albeit higher level of unjustified absences within Tranche 3 pilot schools in comparison to other matched schools across the first eight weeks (0.05%). More specifically, the proportion of time spent classified as unjustified absence for matched comparison schools in the 4 weeks following the start was 7.3% compared to 7.0% for Tranche 3 schools[112], i.e. a slightly positive impact due to the pilot of – 0.3 percentage points – albeit not statistically significant (c.f. Table 1). However, the subsequent four weeks saw a reversal, showing pilot schools with slightly higher levels of unjustified absences - 0.8 percentage points – than the comparable schools; again this result is not statistically significant. In the same table, we also present the average proportion of time spent as unjustified in the 4 months leading up to the start of the pilot to give some assurance that there were no pre-existing differences between the tranche 3 schools and the matched comparison schools. Further details are available in the Appendix.

[108] T-test between baseline and follow-up attendance (t(190)=1.13, p=0.189)
[109] T-test of attendance in schools within and outside the pilot in November (t(38.4)=-0.55, p=0.586)
[110] Propensity Score Matching was used, and the matching was undertaken prior to a school delivering the pilot to ensure that there were no pre-existing differences in school-level characteristics (that we were able to measure).
[111] c.f. Appendix A, Table 7.
[112] Tranche 3 schools began delivery after the second term in 2020. Given the scope of this evaluation, and to allow comparability, we included only schools providing for primary and Intermediate learners in the Hawke's Bay and Bay of Plenty regions. We also included those schools that had commenced delivery by 9 November (week 46).

Table 3: Net effect on attendance outcomes for Tranche 3 schools (n=61) and matched comparison schools (n=223)

Proportion of time as Unjustified Absence	Mean Comparison	Mean Tranche 3	Net effect	95% confidence intervals	
Week 0 to Week 3 after start	7.3%	7.0%	**-0.3%**	**-1.6%**	**1.0%**
Week 4 to Week 7 after start	8.5%	9.3%	**0.8%**	**-1.0%**	**2.6%**
Proportion of time as Unjustified Absence PRIOR TO START	**Mean Comparison**	**Mean Tranche 3**	**P value (test of difference in means)**		
Weeks -4 to -1	8%	8%	0.59		
Weeks -8 to -5	7%	7%	0.68		
Weeks -12 to -9	7%	6%	0.44		
Weeks -16 to -13	8%	8%	0.77		

1.4.2. Although no statistically significant change was detected, the evidence showed small but consistent differences in unjustified absences. This will require further examination over time, specifically tracking attendance among those learners most in need rather than attendance for the whole school.

The secondary data results above reflect Tranche 3 schools, notably those schools that started late in 2020 and with few weeks available in the data in which to assess any change in attendance. Tranche 1 schools commenced in early 2020, and as such, have greater data and longer periods after they commenced the pilot to impact on learner attendance.

The impact analysis results for these Tranche 1 schools[113] are presented in the Table below. These results are intended to be illustrative of longer-term impacts rather than impact estimates because the sample size of 26 Tranche 1 schools is small. We show these results here in order to motivate a future follow-up of the *larger* group of schools. We found no significant differences found between the pilot schools and the comparison schools, even up to 43 weeks following the start of delivery of the pilot (although confidence intervals are large due to small number of schools). Interestingly, however, the proportion of time spent as unjustified absence was consistently lower for these pilot schools than the matched comparison schools by about 1 to 3 percentage points across the 11-month follow-up period, with an average net effect being 1.89% lower than comparable schools (+/-1.6%). The differences in unjustified absences between the two groups of schools did not grow with elapsed time but they did not disappear either, even nearly a year later. Given this, it would be worth tracking a larger group of schools, and

[113] Tranche 1 included the first schools to deliver the pilot early in 2020, which included schools providing for primary and intermediate learners in the Hawke's Bay and Bay of Plenty regions.

as such reducing the standard errors, across longer follow-up periods to see whether there is a statistically significant longer-term impact on attendance outcomes.

Table 4: Illustrative results showing the net effect on proportion of time as unjustified absence for Tranche 1 schools (n=26)[114] and matched comparison schools (n=134).

Averaged 4-week attendance outcomes following the start of pilot delivery	Mean Comparison	Mean Tranche 1	Net effect	95% confidence intervals	
Week 0 to Week 3 after start	7.9%	6.4%	**-1.5%**	-4.2%	1.2%
Week 4 to Week 7 after start	8.1%	8.0%	**-0.1%**	-5.0%	4.8%
Week 16 to Week 19 after start	13.4%	10.5%	**-2.9%**	-8.2%	2.4%
Week 20 to Week 23 after start	12.2%	10.1%	**-2.1%**	-7.0%	2.8%
Week 24 to Week 27 after start	10.3%	8.7%	**-1.6%**	-5.5%	2.3%
Week 28 to Week 31 after start	11.4%	9.5%	**-1.9%**	-5.8%	2.0%
Week 36 to Week 39 after start	11.2%	8.9%	**-2.4%**	-5.7%	0.9%
Week 40 to Week 43 after start	13.3%	10.6%	**-2.6%**	-5.9%	0.7%

Further, these non-significant school-level results do not mean there was no impact on the attendance patterns of individual students in participating pilot schools or even on attendance patterns for specific classes or year levels. If we had more nuanced participation information, e.g. if we knew which students were a particular interest for the pilot within this dataset, then we could have undertaken a more focused impact estimate rather than averaging across all Year 1 to 8 learners at a school.

KEQ2: The pilot *may* have broader benefits for schools, whānau and communities, but the systematic nature and extent of these benefits would need to be further explored.

Some benefits (beyond those discussed above) were noted by those engaged in focus groups. However, the most common feedback was that the pilot was relatively immature and such benefits would take time to achieve. Further, the focus group discussions focused on the school staff and providers, and did not engage directly with learners and whānau and the wider community. These were deemed out of scope for the current evaluation, which focused on learners and schools. The exploratory nature of this question highlights the goal to document noted experiences rather than to systematically assess these benefits, and therefore there were no 'levels of success' established for this question.

[114] Consequently, there was a small sample of schools, and as such the standard errors associated with the impact estimates were higher than for Tranche 3.

2.1. The pilot does not yet appear to be clearly contributing to academic achievement…

Focus group interviews provided the evidence in relation to the contribution of the pilot towards improving learner academic achievement, with only two schools noting any change in academic performance (FG02, FG03) at this early stage. One school believed there was an improvement in reading and writing skills, but that this was largely a greater ability to focus in the afternoons because the leaners were eating healthy food. Another school not yet receiving the pilot indicated that the improvement was a result of the school's greater focus on improving teacher practices.

2.2. …although other small effects are being recognised by some.

For those schools receiving the pilot, staff are seeing better 'eating etiquette' among their learners. The staff noted the children are now sitting together, using utensils and socialising during lunch whereas prior to the pilot they didn't do this as a group.

Another school staff member in a school receiving the pilot noticed that learners' worries were still present, but the topic of concern had shifted from the availability of food to other family concerns.

Family health was also a noted change over the past three months, at least in a school not yet benefiting from the school lunch pilot. Rheumatic fever is present in the community, which appears to be getting worse because of the weather as well as the increasing overcrowding in houses due to job losses.

In a school receiving the pilot, the ability of the school to provide leftover food for families was seen as a significant support to household food security. This was also viewed as benefiting the relationship between the school and the community, because the pilot alleviated some financial pressure for the households.

These relationships were seen as stronger for four of the schools (FG02, FG05, FG03, FG08), with three noting that the pilot was a significant contributor to this strengthened relationship, and for the other school families were appreciating teachers more because of their home-learning experiences from the COVID-19 lockdown.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