

Hochschule für Angewandte Wissenschaften Hamburg

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**Assessment of a lunch catering offer in New Zealand – a practical example:
Wairoa Primary School**

Bachelorarbeit

Studiengang Ökotrophologie

vorgelegt von

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Preface

The present thesis was developed to complete my studies in 'Nutrition and Home Economics' on the University of Applied Sciences, Hamburg.

When I first arrived in New Zealand, I have not been aware of the country's health issues with overweight and obesity. Over the last month, these issues have become part of my everyday life while working as a caregiver for people in need. Seeing people being strongly restricted by exceeding body weight encouraged me to get in touch with several health institutions, such as the District Health Board and the Wairoa Hospital, to attain more knowledge about Wairoa's health status, especially in child age. As discussions and interviews have shown, that there is no representative data available, I connected with several schools to find out more about the factual situation. This resulted in Wairoa Primary School asking for expert advice regarding their school canteen.

Research questions have been developed in cooperation with Richard Lambert, the primary school's principal, who I would like to thank for giving me the opportunity to assess and evaluate the canteen order on a professional base.

I would also like to thank all of the participants, who participated in the study and provided me with school-intern information.

I dedicate this thesis to my partner, who always supported me during my studies and kept me motivated until the end.

I hope you enjoy your reading.

Dorothea Ens

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1. Introduction

1.1. Initial position and problem formulation

With an adult obesity rate of 30.7% in 2015/16, New Zealand is the country with the third highest obesity rate in the OECD, just behind the United States and Mexico (OECD, 2017). Based on the New Zealand Health Survey (NZHS) outcomes of the recent years 2016/17, nearly 32% of people aged 15 and over, were obese, while a further 34% were overweight but not obese. These numbers point out, that more than 60% of New Zealand's adults are having excess weight issues (Ministry of Health, 2017b).

However, overweight and obesity not only occur in adulthood. Around 12% of children aged two to 14 years were obese in 2016/17, and a further 21% were overweight but not obese. Compared with health statistics from 2006/07, obesity rates have increased by more than 4%. In addition, outcomes of the NZHS 2016/17 have shown that nearly 50% of children aged two to 14 years did not meet the vegetable and fruit intake recommendations of two to three servings of vegetables and two or more servings of fruit per day, while consuming fizzy drinks and fast food regularly. Thus, the intake of saturated fats, added sugar and salt in children's diet is increased (Ministry of Health, 2017b).

The government, the Ministry of Health, regional and district health boards agree, that immediate action is necessary. To prevent and manage obesity in children and young people, the 'Childhood obesity plan' has been developed, focussed on nutrition and the environment of children, which includes communities, schools, families and whanau (Māori for 'family'). Part of that programme is an approach called 'Health Promoting Schools', where teaching institutions can join and work together with staff and community to address health and wellbeing of their students, by improving nutrition and physical activities (Ministry of Health, 2012b). Even though programmes and plans have been developed, schools report to have obstacles to improve their food and nutrition environment, mainly caused by resistance from parents and students or convenience of preparing ready-to-eat foods and beverages (University of Auckland, 2016).

1.2. Purpose

The aim of this thesis is a status quo analysis of Wairoa Primary School's canteen offer. This includes ascertaining nutritional values of offered dishes and snacks, pointing out work processes, time management, practical implementation and determining the student's satisfaction on the canteen.

Due to New Zealand's health issues with overweight and obesity, the results of this thesis shall

provide a base for future improvements for Wairoa Primary School as a Health Promoting School, relating to adequate child nutrition according to nutrition guidelines and recommendations for school children.

1.3. Research questions and hypotheses

After consultation with the school's principal, the following research questions arise

1. Research Question: Food selection and Nutritional value

What are the ingredients of the dishes offered in the canteen? What nutritional value do the dishes have? Is the food selection acceptable according to recommendations for school food?

2. Research Question: Feasibility

How many students buy food regularly in the canteen? Is the canteen offer feasible in view of canteen equipment, time management and grocery availability?

3. Research Question: Student's Satisfaction

Do students like the canteen offer in general? What do students like and dislike about the canteen? What are student's wishes for future improvements?

Three hypotheses will be assumed and examined in this thesis:

Hypothesis 1: The food supply does not comply with child nutrition and school food recommendations.

Hypothesis 2: The canteen offer is not feasible regarding canteen equipment, time management and grocery availability.

Hypothesis 3: Students are unsatisfied with the canteen offer.

1.4. Structure

After explaining problem and purpose of this thesis and a description of research questions and hypotheses, the theoretical background will be presented. This includes general school catering in New Zealand, focussing on school food recommendations and nutrition guidelines, as well as school food standards. An introduction to Wairoa Primary School as a setting for the practical example follows. The analysis methods describe the systematic procedure, to analyse the research questions and hypotheses. Outcomes are presented to answer the questions and prove or disprove the hypotheses. Finally, the results will be discussed, evaluated and concluded.

2. Theoretical Background

2.1. Child nutrition in school context

In the past, New Zealand's school food policy required to sell healthy food in schools. In 2009, the Government decided to pass the law of only selling healthy food, which has been strongly criticised by various sides (Newton, 2009). Since then, institutions don't have to comply with any food policies, except for hygiene guidelines as explained in the following.

2.1.1. School catering in New Zealand

New Zealand's standards for School Food Preparation are based on the Food Act 2014, which came into force 1st of March 2016. The law helps to ensure that every service or business (in this case: school canteen) that sells food, makes sure it's safe and consumable without any health risks. Depending on the type of food that is sold, the Food Act requires to operate under different food safety programmes, which will be described in the following (Ministry for Primary Industries, 2016).

No registration for any programme is required, if pre-packed, non-chilled (shelf-stable) foods such as bars, nuts or dried fruits are sold. These products are classified as very low risk foods and don't require special handling. However, food safety must still be ensured at all times (Ministry for Primary Industries, 2016; Ministry of Education, 2017a).

Pre-packaged food (hot pies, hot wraps, saveloy rolls, etc) is classified with a low to medium risk. Selling these foods in a school canteen requires to follow a national programme. That means to register with the local council, following good food safety practices, and getting checked regularly. Depending on the risk, there are three different levels of programmes, based on food safety risk. National Programme 1 includes low food safety risks, National Programme 2 low to medium, while National Programme 3 stands for medium risk food safety (Ministry for Primary Industries, 2016; Ministry of Education, 2017a).

Selling self-prepared food in a canteen requires registration with the local council and acting under a Food Control Plan to manage food-safety, as cooked or prepared meals are classified as high-risk foods. Using a written plan, including daily records is necessary to legally prepare and sell fresh food (Ministry for Primary Industries, 2016; Ministry of Education, 2017a).

2.1.2. Nutrition guidelines for school children

As school food policies have been repealed by the government, schools have to look after themselves. Due to high prevalence of childhood obesity, several national institutions such as Heart Foundation New Zealand, the Ministry of Education or the Ministry of Health provide

different programmes, supporting schools to promote healthy eating. In this context, programmes are based on New Zealand’s nutrition guidelines and recommendations, which can be found in the ‘Nutrient Reference Values for Australia and New Zealand’, published by the Australian Government (Department of Health and Ageing) and New Zealand’s Ministry of Health. As this thesis is focussed on school children aged five to 11, ‘Food and Nutrition Guidelines for Healthy Children and Young People (Aged 2-18 years)’, published by the Ministry of Health, will be relevant. In the following, key aspects will be outlined.

For children and young people, the Ministry of Health recommends three main meals and two to three smaller snacks at regular times during the day. Therefore, the main sources of energy are macronutrients; carbohydrates, fat and protein. Table 2-1 shows the recommended percentage of macronutrient intake according to daily energy sources (Ministry of Health, 2003; University of Otago and Ministry of Health, 2011).

MACRONUTRIENT	% OF ENERGY
Carbohydrates	48-54%
Total fat	33-35%
Protein	14-16%

Table 2-1: Sources of energy in a child’s diet (own representation)

Estimated energy requirements for children aged five to 11 range from 2300kJ/day (five-year old girl) to 3400kJ/day (11-year old boy) (Appendix A). Energy is mainly needed for basal metabolism processes, such as cell synthesis, metabolism of enzymes and hormones, maintenance of body temperature, functioning of all organs, especially heart and brain. Energy requirements vary with age, gender, body size and activity. Males usually have higher energy requirements as females; children have lower energy intake requirements as adults; high activity requires higher energy intakes (Australian Government Department of Health and Ageing & New Zealand Ministry of Health, 2017).

As key foods with an adequate energy source, the Ministry of Health describes four main groups, which are

- (1) vegetables and fruits
- (2) breads and cereals
- (3) milk and milk products and
- (4) meat, fish, poultry, eggs, nuts and legumes.

(1) Vegetables and fruits

Recommended is a minimum intake of two portions of fruit, and three portions of vegetables every day (5+ a day), mainly for energy, carbohydrate, fibre and vitamin intake. Therefore, a variety of fruit and vegetables of different colours (red, green, yellow, brown/white) should be chosen, to ensure a wide range of nutrient intake. Fresh, frozen or canned options should be favoured. Dried products often contain high amounts of sugar and shall only be consumed on occasion (Ministry of Health, 2012a).

(2) Breads and cereals

This food group includes all kind of breads, cereals, rice and pasta made from grain. These foods are an important source of carbohydrates and energy. Care should be taken of choosing wholegrain options (whole wheat/flower, wheat flakes, wholegrain oats, brown rice, etc.), which provide great amounts of fibre, vitamins and minerals. The Ministry of Health recommends at least five servings of breads and cereals each day for children aged two to 12 (Ministry of Health, 2012a).

(3) Milk and milk products

For growth and bone health, children need a special intake of calcium. Milk and milk products, such as yoghurt and cheese, provide great amounts of calcium, but also protein, vitamins and fats. It is recommended to consume at least three servings of milk and/or milk products each day, choosing reduced or low-fat milk including less-saturated fats (Ministry of Health, 2012a).

(4) Lean meat, poultry, seafood, eggs, legumes, nuts and seeds

This food group includes mainly protein-rich foods, such as beef, lamb, chicken, fish, legumes, nuts and seeds. Processed meat (e.g. salami, bacon, sausages) should be reduced to a minimum, as it is often high in saturated fats and salt. Legumes, nuts and seeds are a good option for vegetarians, providing less protein, but great amounts of vitamins and minerals. Children aged two to 12 should include at least one to two servings in their diet per day; vegetarians at least two (Ministry of Health, 2012a).

Recommended is to eat a variety of foods from each of the four food groups every day. Serving size examples can be found in chart 2-2 below.

Food Group	Food examples	Servings per day (children aged 2-12)	Serving size example
Vegetables and fruit	All vegetables and fruit including potatoes, kumara, taro	At least 2 servings of fruit & 3 servings of vegetables	<ul style="list-style-type: none"> • ½ cup cooked vegetables (broccoli, peas, corn, spinach, puha) • 1 apple, pear, banana • 1 carrot, tomato • ½ cup salad • 2 small apricots or plums • ½ avocado
Breads and cereals	All breads, cereals, rice and pasta	At least 5 servings	<ul style="list-style-type: none"> • 1 slice of bread • 1 roll • ½ cup muesli • ½ cup porridge • 1 cup pasta/rice • 1 cup plain popcorn • 4 grainy crackers
Milk and milk products	Milk, cheese and yoghurt	At least 2-3 servings	<ul style="list-style-type: none"> • 1 glass of milk (or calcium-fortified milk alternative) • Pottle of yoghurt • 2 slices of cheese
Lean meat, poultry, seafood, eggs, legumes, nuts and seeds	Lean meat, poultry, eggs, legumes (peas, beans, lentils), nuts and seeds	At least 1-2 servings, vegetarians 2 servings	<ul style="list-style-type: none"> • 2 slices of cooked meat • 1 medium fish fillet • 1 chicken leg • 1 egg • ¾ cup dried cooked beans, peas or lentils • 1/3 cup nuts or seeds

Table 2-2: Food Groups, Food examples, Servings per day and Serving size examples for children aged 2-12 (Ministry of Health, 2012a; own representation)

According to the Ministry of Health, high fat (especially saturated fat), sugar and salt foods should be avoided in a child's diet, as they usually don't provide essential nutrients and often contribute to overweight when regularly consumed. As snacks are often high in fat, sugar and salt, it is recommended to choose alternative options such as roasted chickpeas, nuts or plain popcorn instead of prepacked snacks (e.g. chocolate bars, buttery and salted popcorn, chips, muffins) (Ministry of Health, 2012a).

To summarise nutrition recommendations, the Ministry of Health developed nine guideline statements as key recommendations for healthy young people to prevent nutritional deficiencies, overweight/obesity or diet-related diseases in children.

1. Eat a variety of foods from each of the four major food groups.
2. *Eat enough for activity, growth and to maintain a healthy body size*, which means eating regular meals and including snacks in between.
3. *Prepare foods or choose pre-prepared foods, snacks and drinks*, that are low in saturated fat, sugar and salt.
4. *Drink plenty of water during the day. Include reduced or low-fat milk every day.*
5. *Alcohol is not recommended for children or young people.*
6. *Eat meals with family or whanau as often as possible.*
7. *Encourage children and young people to be involved in shopping, growing and cooking family meals.*
8. *Purchase, prepare, cook and store food in ways to ensure food safety.*
9. *Be physically active.* (Ministry of Health, 2012a)

These guidelines should also be included in everyday school-life. Lunch plays a special role in children's diet as it contributes to daily energy and nutrient intake, especially when energy levels may decrease. As most children have lunch at school between 12 and 2pm, schools are an important setting for promoting healthy and nutritious food (Ministry of Health, 2012a).

2.1.3. School food classifications and recommendations

In the previous subchapter, New Zealand's child nutrition guidelines and recommendations have been introduced. In the following, it is intended to illustrate the practical implementation of these guidelines on everyday school life, based on the 'Food and Beverage Classification System for Years 1-13' which has been developed from the above described nutrition guidelines. The system advises on how to select and classify food groups/drinks and provides canteen samples.

As already mentioned before, high numbers of children in New Zealand consume fast food and fizzy drinks regularly, while decreasing their fruit and vegetable intake. According to the National Children's Nutrition Survey in 2002, the school environment has a significant impact on children's habits and behaviour (Ministry of Health, 2003). To support schools in choosing the right food for their students, the Food and Beverage Classification System classifies three categories; everyday foods, which are 'appropriate for everyday consumption'; sometimes foods, which are 'for restricted provision' and occasional foods, which should not be provided in schools at all (Ministry of Health, 2007).

Everyday foods are described as being the healthiest food choices with a rich source of

nutrients, such as vitamins and minerals, less saturated fat, sugar and salt. Basically, this means providing foods from the four main food groups, described in subchapter 2.1.2. Most of the foods offered in school canteens should be items included in this category. Encouraging children to consume 'everyday foods' and promoting them in the canteen is recommended, to underline that everyday foods are essential in a diet.

Sometimes foods are restricted items, mostly processed and often containing moderate levels of saturated fat, salt and added sugar and providing high levels of energy. These options should be offered less often, in small serving sizes, not dominating the menu (Ministry of Health, 2007).

Occasional foods are not recommended for schools, as they are high in saturated fat, salt and/or added sugar. Additionally, they have a low nutritional value and contribute to high energy levels. Occasional foods often include deep-fried foods (chips, deep-fried fish), sweets, chocolate and sweetened drinks (Ministry of Health, 2007). To assess school foods and classify potential occasional food, the Food and Beverage Classification system contains nutrient criteria for occasional food with food groups and practical examples (Appendix B).

School Food recommendations mainly point out to reduce foods high in saturated fat, salt and added sugar. Whereas options from the four food groups, including high fibre items should be offered daily. Processed food is often less nutritious and contains more saturated fat and/or salt and added sugar than fresh prepared food. Choosing processed options means to ensure they fall in the category of 'everyday foods' (Ministry of Health, 2007).

2.2. The Setting: Wairoa Primary School

According to the Ministry of Education New Zealand, every child aged six to 16 must attend school. Most of New Zealand's children start school when they turn five. Primary Schools are divided into Full Primary Schools catering students from Year one to eight, and Contributing Primary Schools, which are completed after Year six (Ministry of Education, 2018).

Wairoa Primary School is a state authorised contributing school, that caters students from Year one to six, from age five to 11. As a co-educational school, male and female students are taught together.

In the following chapter the school and its environment will be introduced to get an overview of the setting and to understand processes and approaches.

2.2.1. School Environment

Wairoa Primary School is located in Wairoa (Wairoa District), Hawke's Bay, New Zealand. As the town was originally a Māori settlement, a majority of its inhabitants is still Māori descent with a strong sense of traditions and culture. With approximately 4,050 citizens, Wairoa is the largest settlement in the District, and can be described as a rural area. The township includes a Hospital plus Health Centre, a historical museum, a community centre, one supermarket and numerous little shops, including several fast food restaurants. Three primary schools, one composite Māori School, and a College are based in town, as well as several kindergartens (Statistics New Zealand, 2018).

The two largest employers in Wairoa are AFFCO, one of NZ's largest meat processors, and QRS (Quality Roding and Services) (Wairoa District Council, 2017). Apart from these two companies, there seem to be a lack of business, employment and career opportunities. According to the Wairoa Business Survey in 2012, there is a need in improving infrastructure and economy growth, amenities and safety (Wairoa District Council, 2012).

In 2013, Wairoa town had the highest deprivation score of 10 (1=least deprived, 10=most deprived). The deprivation score measures the socio-economic status and disadvantages of communities, by using variables such as communication, income, employment and qualifications, owned home, support, living space and transport. The index showed, that Wairoa has a high unemployment rate (13.6%), several citizens without any qualifications and numerous families and/or singles receiving social benefits (Healthspace, 2018; Statistics New Zealand, 2018). The median income in the whole District for people aged 15 and over was \$22,000 per annum, which is significantly lower than the average in New Zealand (Statistics New Zealand, 2013). According to the 2003/04 Household Economic Survey, families receiving low income often see food prices as a burden to eat healthy (Ministry of Health, 2006).

By summing up data from the New Zealand Health Survey 2014-2017, focussed on Hawke's Bay with an estimated number of 10,000 children aged two to 14, considering all sociodemographic data and concentrating on "body size", an overweight rate of 22.4% and an obesity rate of 13.2% arises. That means approximately 35.7% of children aged two to 14 are overweight or obese, based on an adult BMI of 25 or greater (cf. table 2-3).

Indicator	Unadjusted data prevalence (%)				Test of significance (between Hawke's Bay and New Zealand) p-value
	Hawke's Bay		New Zealand		
	%	(95% CI)	%	(95% CI)	
Thin	3.3	(1.8-5.7)	4.3	(3.7-4.9)	0.29
Healthy weight	61.0	(56.4-65.4)	63.1	(61.9-64.4)	0.38
Overweight (but not obese)	22.4	(18.5-26.9)	21.3	(20.3-22.3)	0.61
Obese	13.2	(10.6-16.5)	11.3	(10.5-12.1)	0.22
Obese class 1	8.5	(6.2-11.5)	6.6	(6.1-7.3)	0.16
Obese class 2 or 3	4.8	(3.2-6.9)	4.6	(4.2-5.2)	0.83
Overweight or obese	35.7	(31.1-40.6)	32.6	(31.4-33.8)	0.21
Waist to height ratio \geq 0.5	28.8	(23.5-34.9)	23.9	(22.6-25.3)	0.10

Table 2-3: Prevalence for overweight and obesity in Hawke's Bay in children aged two to 14 (https://min-healthnz.shinyapps.io/nz-health-survey-2014-17-regional-update/_w_6a5826ea/_w_c75785d4/#!/compare-indicators)

Age related data shows that overweight and/or obesity prevalence is lower at an age of five to nine (27.8% boys, 25.9% girls), while children between 10-14 are more often affected (46.9% boys, 29.7% girls). Boys are more likely overweight or obese than girls (cf. table 2-2).

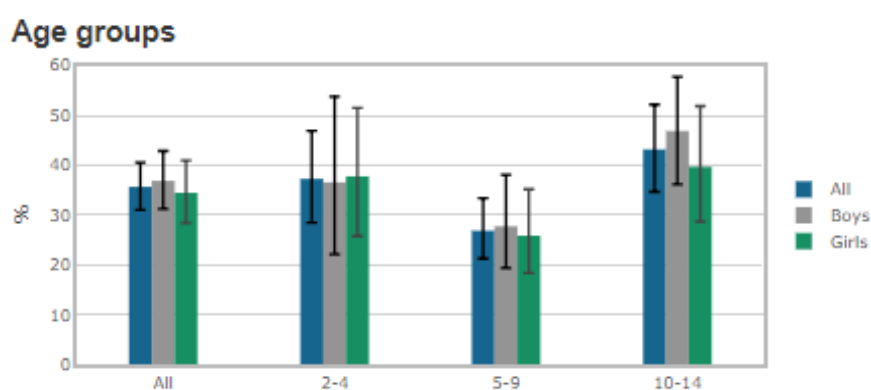


Figure 2-1: Prevalence for overweight and obesity in Hawke's Bay focussed on different age groups (https://min-healthnz.shinyapps.io/nz-health-survey-2014-17-regional-update/_w_6a5826ea/_w_c75785d4/#!/subgroup-results)

Moreover, outcomes have shown a great overweight and/or obesity prevalence in Māori, Pacific and Asian descent children. While 42.7% of Māori children aged two to 14 (43.6% boys, 41.9% girls) are overweight or obese in Hawke's Bay, 66.2% (75.5% boys, 56.1% girls) of children with Pacific ethnic background are affected. 41.2 % of Asian children, who represent only a small proportion of 1,000 from 10,000 children, are overweight or obese (Ministry of Health, 2017b).

Presented data prove high numbers of excess weight issues in children, which means an overweight and/or obesity prevalence will be shown in Primary schools in Hawke's Bay. As no data is available for Wairoa in particular, no precise information can be given to evidence actual

issues. However, due to national and regional data, it can be assumed that Wairoa’s schools catering a majority of Māori descent students, are affected by overweight and/or obesity as well.

Summed up, it can be said that Wairoa as the school’s environment is a small, rural town, being home of a cohesive community with a strong sense of culture. Due to its remoteness and its weak economy, the socio-economic status can be described as low, characterised by low household incomes and rare career opportunities. Studies have been shown that the District, especially its Māori, Pacific and Asian descent citizens, are affected by overweight and obesity.

2.2.2. Facts and Figures

With a Māori descent population of approximately 61%, Wairoa is one of New Zealand’s towns with the highest Māori ethnicity percentage of the whole country (Statistics New Zealand, 2018). This is also reflected in the Wairoa Primary School’s student numbers. In July 2017, when the last Education Review (ERO) has been implemented, 224 from 231 enrolled students were Māori descent (92 female, 132 male). Only five boys with European background, one Asian girl and one pacific boy were visiting the school. Currently, the school caters 215 students, almost exclusively children with Māori roots (Education Counts, 2018).

Wairoa Primary School is directed by Richard Lambert - as the school’s principal - and employs one deputy principal, 11 teaching staff, 15 teacher aides, one caretaker, and two learning support teachers. At present, 10 classes from Year one to six are taught in the learning areas English, Arts, Health and Physical Education, Mathematics and Statistics, Science, Social Sciences and Technology. The lessons start at 8.50am and finish at 2.40pm (cf. table 2-4).

Time	Action
8.50 am	School Start
10.30-10.50am	Morning Play
12.30-1.15pm	Lunch & Play
2.40pm	Home Time

Table 2-4: Daily Routine Wairoa Primary School (own representation)

2.2.3. Guiding Principles and Priorities

Wairoa Primary School’s priorities and values are focused strongly on the individuality of every student and the “unique position of Māori Culture” (Wairoa Primary School, 2017, Appendix C). The school’s Charter (Appendix C) emphasises, that values which are important to whānau

(māori for 'family') and the community, as well as governmental and school beliefs provide a basis for the school's aims and priorities.

Therefore, the Primary school's mission is *"to provide the highest quality learning in a safe, caring environment which values diversity and prepares children for the future"* (Wairoa Primary School, 2017; Appendix C). Accompanied by respect, responsibility and safety, this mission should be represented by all participants. As mentioned above, the cultural background of Wairoa's students plays a major role in everyday school life. Core values such as whanaungatanga (māori for 'kinship' or 'sense of family connection'), community partnership, cultural diversity, the child as an individual, maoritanga (māori for 'explanation') and pride in self and identity are upheld. Health and wellbeing for staff, students and whanau is meant to be integrated in all teaching and learning processes.

Successful education and learning are seen as an integrated responsibility of the individual, school staff, whānau and community. Supporting Wairoa's tamariki (māori for 'young people') to grow up to confident, culture sensitive, active and lifelong learners, can be seen as a major goal.

Wairoa Primary School's vision summarises its priorities as

'E Tu E Tu Tamariki Ma; Ko au te akonga, ko te akonga ko au.

Our tamariki stand tall and are proud of who they are, where they have come from and where they are going. We are all learning together.'

(Wairoa Primary School, 2017)

Since 2016, Wairoa Primary School is part of the initiative *Health Promoting Schools*, according to the motto "Health and wellbeing for learning". To support student's health, the school banned fizzy drinks recently, which means children are not allowed to bring flavoured, carbonated beverages to school and are motivated to drink water. In addition, the classes are having a milk break every morning, where the school provides a 250mL reduced fat milk carton for each student.

2.2.4. School Canteen

A school canteen provides Wairoa Primary School's students with lunch from Tuesday to Friday. It's a non-profit canteen, adjusted to a small budget of \$2-\$3 per main dish, to ensure every family can afford buying their children a meal. Ordering in the canteen is optional, students can either bring their own lunch or buy food in school.

The canteen is conducted by one employer, who receives orders, prepares food and manages finances. She is also responsible to place orders from a third-party provider and to buy groceries for freshly prepared canteen-meals. Including a stove plus oven, a sink, fridge and freezer, some storage cabinets and a heated counter, the kitchen is designed with essential equipment, but not organised for great supply.

The lunch offer includes three permanent main meals and two irregularly offered dishes. Students are also able to buy snacks/treats and drinks. In table 2-5, Wairoa Primary School’s canteen offer is listed. Dishes in brackets (‘Vegetable Soup’ and ‘Hot Saveloy Roll’) are only available on selected days.

Main dishes	\$	Snacks	\$	Drinks	\$
Butter Chicken Wrap	3.00	Chocolate Muffin	1.60	Bottled Water	1.50
Chicken/Beef Noodles	2.50	Chocolate Chip Cookie	1.60	Flavoured milk	2.00
Filled Roll	2.50	Juicies	0.60		
(Vegetable Soup)	2.00	Popcorn	0.60		
(Hot Saveloy Roll)	2.50				

Table 2-5: Wairoa Primary School Canteen offer (own representation)

Most of the dishes the canteen offers are pre-cooked, pre-packed and delivered once a week by a provider from Gisborne, which is located 100km north of Wairoa. The ‘Filled Roll’, ‘Hot Saveloy Roll’ and the ‘Vegetable Soup’ are the only dishes, that are freshly prepared. It should be noted, that the soup does not get cooked in the school kitchen, but in private facilities. The soup and the saveloy roll are only available on selected days, not offered regularly.

The ‘Butter Chicken Wrap’ and ‘Chicken/Beef Noodles’, as well as the ‘Chocolate Muffin’, ‘Chocolate Chip Cookie’ and flavoured milk are delivered from Gisborne, while the ‘Juicies’, ‘Popcorn’ and water are bought in the supermarket. Groceries are usually bought from day to day. Table 2-6 summarises the canteen’s meal acquisition.

Delivered from provider	Self-prepared in canteen kitchen	Bought in supermarket
Butter Chicken Wrap	Filled Roll	Bottled Water
Long Rolls	(Vegetable Soup)	Juicies
Chicken/Beef Noodles	(Hot Saveloy Roll)	Popcorn
Chocolate Chip Cookie		(Long Rolls)
Chocolate Muffin		
Flavoured Milk		

Table 2-6: Wairoa Primary School meal acquisition (own representation)

To guarantee smooth operation, children order lunch in the morning by filling in Canteen Order Forms (Appendix D), collect money into boxes with classroom numbers and drop off forms and money in the canteen. The canteen employer counts revenues and orders and does the shopping in case she is short on groceries. When food is prepared, it gets packed into class-baskets, which are getting picked up by different students from each class every day. Lunch gets eaten in classrooms, class separated.

More detailed information about food compositions of the different meals will be given in 3.1.

3. Method: Lunch catering assessment according to selected criteria

After the theoretical background has been demonstrated, the methods to investigate the research questions will be described in the following chapter.

3.1. Food selection and Nutritional value of offered dishes and snacks

In order to be able to assess if the canteen offer is acceptable according to school food recommendations, it is necessary to analyse food compositions and to calculate the nutritional value of offered dishes. As foods provided by the canteen are either 'pre-packed' or 'self-prepared', available information about ingredients and nutrition information vary. While packages of pre-packed foods already provide food-related information, data for self-prepared dishes must be newly collected. Therefore, data collection slightly differs.

3.1.1. Pre-packed Food

To assess the composition and value of the pre-packed food offered in the canteen, the food label of each product will be used, as it provides a wide range of information. The focus will be on ingredient lists and nutritional information panels.

Ingredient List

An Ingredient List provides information about components and ingredients of a product. It

shall enable customers to compare foods and ensure food transparency. Food Standards Australia and New Zealand require a listing of ingredients in descending order, which means the ingredient listed first makes up the greatest amount, the last ingredient contributes the least. Added water must be listed according to its weight.

If compound ingredients are used (such as chocolate chips), it is also necessary to list the single ingredients the compound ingredient is made up (in this case e.g. sugar, cocoa mass, milk solids, flavours). Listing is not required if the compound ingredient composes less than 5% of the final product (Food Standards Australia & New Zealand, 2015).

Foods containing special characterising components, such as cocoa in chocolate milk, or peanuts in peanut butter, must be listed showing the percentage of the characterising ingredient (Food Standards Australia & New Zealand, 2015).

Figure 3-1 shows the ingredient list of Anchor chocolate flavoured milk with 'low fat milk' contributing the greatest amount, and Vitamin D as its minor component. Cocoa as characterising component is listed with 0.8% of the final product (cf. figure 3-1).

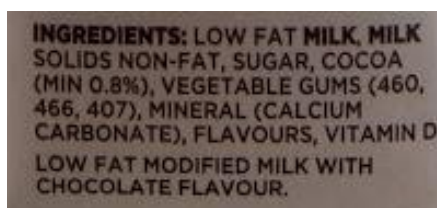


Figure 3-1: Ingredient List of Chocolate Milk (food label; own picture)

Ingredient Lists of each product will be collected to assess the food composition and ingredients of each dish.

Nutrition Information Panel (NIP)

Nutrition Information Panels inform customers about selected average amounts of nutrients. Mandatory information are amounts of energy (in kilojoules and/or kilocalories), protein, fat plus saturated fat, carbohydrates and sugars, dietary fibre and sodium. In addition, amounts must be declared per serve and per 100g (or 100mL). If a product is claimed with a special substance or nutrient, such as soymilk substituted with an additional amount of calcium, the content of the claimed nutrient must be listed as well. With the exception of herbs and spices, water, tea and coffee, unpacked food and food packaged at the point of sale, every food product with a package larger than 100mm squared must include a NIP (Food Standards Australia & New Zealand, 2015).

Figure 3-2 shows a Nutrition Information Panel of Anchor Chocolate CalciYum Milk enriched

with Calcium and Vitamin D. All mandatory information and additional data about Calcium and Vitamin D content can be found in the chart (cf. figure 3-2).

NUTRITION INFORMATION		
SERVINGS PER PACKAGE: 1		
SERVING SIZE: 250 mL		
AVG QUANTITY	PER SERVING	PER 100 mL
ENERGY	630 kJ (150 Cal)	252 kJ (60 Cal)
PROTEIN	8.5 g	3.4 g
FAT, TOTAL	3.5 g	1.4 g
- SATURATED	2.0 g	0.8 g
CARBOHYDRATE	20.5 g	8.2 g
- SUGARS	20.0 g	8.0 g
SODIUM	105 mg	42 mg
CALCIUM	263 mg (33% RDI†)	105 mg
VITAMIN D	1.3 µg (13% RDI†)	0.5 µg
† RECOMMENDED DIETARY INTAKE		

Figure 3-2: Nutrition Information Panel of Chocolate Milk enriched with Calcium and Vitamin D (food label; own picture)

Based on the food labels, the percentage energy distribution of macronutrients (carbohydrate, fat and protein) will be calculated. According to FAO, WHO and UNU, the average amount of energy released is determined with approximately 16.7 kJ/g for carbohydrates or protein and 37.7 kJ/g for fats (FAO,WHO & UNU, 2004). The following calculation will be used for the energy distribution of each macronutrient:

Energy distribution for Protein:
$$\frac{P \text{ in g} \times 16.7 \text{ kJ/g}}{E \text{ in kJ} \times 100} \quad (\text{Calc. 1})$$

Where

P = protein content of food item

E = total energy of food item

Energy distribution for Carbohydrates:
$$\frac{C \text{ in g} \times 16.7 \text{ kJ/g}}{E \text{ in kJ} \times 100} \quad (\text{Calc. 2})$$

Where

C = carbohydrate content of food item

E = total energy of food item

Energy distribution for Fat:
$$\frac{F \text{ in g} \times 37.7 \text{ kJ/g}}{E \text{ in kJ} \times 100} \quad (\text{Calc. 3})$$

Where

F = fat content of food item

E = total energy of food item

Additionally, amounts of sugar and saturated fat can be calculated using Calc. 2 and 3. Overall, the results will provide information about calorie distribution and shall underpin the classification of foods.

Labels can only be found on pre-packed food. Therefore, the food package of each product will be collected and assessed to answer the first research question, which ingredients the offered dishes consist of and what nutritional value they have.

The following offers are pre-packed and will be assessed by their Ingredient List and their Nutrition Information Panel:

- Butter Chicken Wrap
- Chicken/Beef Noodles
- Chocolate Muffin
- Chocolate Chip Cookie Jumbo
- Flavoured Milk
- Juicies Apple
- Popcorn
- Long Roll (Filled Roll; Hot Saveloy Roll)
- Saveloy (Hot Saveloy Roll)

3.1.2. Self-prepared Food

Nutrition Information Panels and Ingredient Lists are not available for food freshly prepared in the canteen kitchen. To access this information, the dishes listed below will be separated in their individual components, weighed and entered in *Ebispro*:

- Filled Rolls
- Vegetable Soup
- Hot Saveloy Roll

Weighing components

Filled Rolls & Hot Saveloy Rolls

As the long rolls that are used for both dishes are pre-packed, food label including NPI and Ingredient List will be used to assess nutritional information.

The filling of the Filled Roll will be assessed by weighing every component before it gets filled into the roll. Therefore, the canteen lady prepares the whole dish as usual without being involved in the weighing process to avoid indirect interference.

After the data acquisition, a recipe will be created to be entered in *Ebispro*, a software for nutrition calculations. The software will calculate the amounts of Energy, Protein, Fat and saturated fat, Carbohydrate and sugar, and Sodium, which will be the base for developing a Nutrition Information Panel. Data for the filling will be added to the nutritional information of the long roll. Subsequently, a Nutrition Information Panel and an Ingredient list can be created according to Food Standards Australia and New Zealand.

For assessing nutritional information of the Hot Saveloy Roll, ingredients will be weighted, food packages of each component will be collected and calculated due to the contents in grams the Hot Saveloy Roll contains. Afterwards, data can be summed up to develop a new Nutrition Information Panel including all components.

Vegetable Soup

As the food composition of the vegetable soup varies, depending on seasonality and availability in the supermarket, a recipe including groceries that are usually used to prepare the soup is utilised. Outcomes can vary, due to minor variations in the recipe.

The ingredients that will be used for a two-litre pot of vegetable soup will be prepared and weighed. Data will be entered in *Ebispro* and a recipe for the vegetable soup will be created. To calculate the serving size, the already finished soup will be divided and weighed into soup containers used by the canteen as serving dish. Subsequently, the serving size will be entered in *Ebispro*, using the created recipe for the canteen's vegetable soup to calculate mandatory information for a Nutrition Information Panel per serving.

After ingredients, nutritional and caloric values of every dish have been assessed, they will be compared to school food recommendations and child nutrition, presented in subchapter 2.1.2

and 2.1.3. It will be proved if the offered main dishes contain foods from the four main food groups, which have been determined by the Ministry of Health. According to the 'Food and Beverage Classification System for Years 1-13', dishes will be classified as 'Everyday Foods', 'Sometimes Foods' or 'Occasional Foods'. Special focus will be placed on exposing foods high in saturated fat, and added sugar, as the regular consumption of such products is held responsible for the national health issues with overweight and obesity.

3.2. Feasibility

Providing food for a school community requires effective management, even if it's only operated in a small frame. Work processes, such as managing orders and food preparation, should be well structured and implemented (Department of Education and Training Victoria, 2018). The assessment of facilities and equipment, time management and availability of groceries shall enable to estimate the feasibility of the canteen offer.

Condition for a feasibility assessment is to determine an average number of orders each day. Therefore, 'Canteen Order Forms' from the 31st of January 2018 until the 31st of May 2018 have been collected. Data will be entered in *Excel* to calculate the amount of orders per item and per day.

3.2.1. Facilities and Equipment

An assessment of canteen facilities and equipment will be performed by an on-site inspection. The main focus will be placed on

- basic equipment,
- cooking utensils,
- and food preparation counters.

Amenities will be recorded and listed. A room planner programme will be used to create a floor plan of the canteen to get an overview of the kitchen design and facilities.

Via observation of food preparation, a list of equipment which is necessary for preparing the offered dishes will be created.

Subsequently, it will be considered if facilities, availability of equipment and food preparation counters are reasonable to prepare the offered dishes.

3.2.2. Time management

For time management assessment, it is necessary to define work tasks and processes, including time schedules. This information will be based on on-site observations, followed by an

implementation of a face-to-face interview with the canteen staff. As the canteen is one-man operated, the interview sample size will be $n=1$. The establishment of the interview follows the design of a problem-centred interview, a qualitative survey method to analyse experiences and perceptions of probands to specific topics (Naderer & Balzer, 2007).

The main objective of the interview is to ascertain the staff's satisfaction with the time management and to analyse difficulties. Interview questions will be formulated open and flexible, prepared and questioned by the interviewer. Answers will be recorded in written form. The implementation will occur in canteen facilities.

Additionally, a 'daily-task'-list will be developed in cooperation with canteen staff. This list will include appropriate time schedules per task, based on experience reports.

Collected data will be analysed and evaluated to prove the second research question if the canteen offer is feasible regarding to time management.

3.2.3. Availability of groceries

When assessing the availability of groceries, a distinction must be made between 'food delivered by a food provider' and 'food purchased from the supermarket'. To measure the reliability of the food provider and available offer in supermarket, foods will be separated into 'delivered' and 'self-purchased'.

Some school food is being supplied by a food provider from Gisborne. Food is getting dropped off once a week, usually on Tuesday or Thursday.

Ingredients for freshly prepared foods are purchased in the local supermarket in Wairoa.

According to information from the Canteen Order Sheets (31st of January 2018 until 31st of May 2018), it will be tracked how often food has been delivered and/or has not been delivered. In this way, reliability and delivery issues can be determined.

The availability of groceries purchased from the supermarket will be assessed by a self-implemented on-shelf study. Therefore, a list of groceries the canteen purchases from the shop will be developed. Within a timeframe of one month, the availability of listed groceries will be checked and recorded via Checklist (Appendix E). As the canteen is only operating Tuesday to Friday and shopping times are determined, the supermarket check will be implemented on those days at equal times.

After data has been collected, it will be analysed how often dishes could not be offered, due to a lack of groceries and/or delivery issues.

3.3. Survey: Student's satisfaction and requests

3.3.1. Purpose

Wairoa Primary School's canteen is operated to provide lunch for its students on four days a week. Buying lunch is optional; students can either bring their own food or order in the canteen. As stated by the principal Richard Lambert, '*...[m]any kids do not get proper meals at home because their parents are short on money. That is why we'd like to provide affordable, healthy meals that the kids enjoy*' (Richard Lambert, School's Principal).

A survey concerning the canteen will be carried out to understand student's satisfaction with the dishes offered. The aim is to ascertain, if student's like/do not like food offered by the canteen and what potentially influence their satisfaction.

3.3.2. Design

The target group of the satisfaction survey is all students of Wairoa Primary School. To receive representative results, it is aimed to poll every student the school caters (n= 215).

The first part of the study includes a standardised questionnaire with six main statements, which can only be answered with 'yes' or 'no' (similar to 'I agree' or 'I don't agree'). Statements are formulated clear and simple as children aged five to 11 must be able to understand and answer the survey.

The six main questions, the survey is designed after, are formulated as follows:

1. Do you like eating in the canteen?
2. Do you like the variety of food offered in the canteen?
3. Would you eat in the canteen more often, if there would be more options?
4. Do you prefer eating a hot dish for lunch in school?
5. How often do you eat in the canteen?
6. What do you order in the canteen?

Based on these questions, statements with answering options will be given (cf. Appendix F).

The second part of the survey is called 'Open Round' and should enable the students to say specifically what they like and dislike about the canteen. Answers are open and unrestricted. Therefore, every student writes two sentences starting with 'I like about the canteen...' and 'I

don't like about the canteen...'. The answers shall give an overview about the canteen's strength and weaknesses and potential influences on children's satisfaction with the offer.

Additionally, the canteen order forms that have been collected from January to May, will be used to calculate the average order per dish per day during the timeframe of 59 days. Data will show the buying behaviour of school students and reflects a trend of preferred and refused dishes.

3.3.3. Implementation

The study will be implemented in class by a teacher. A short introduction and explanation will be given before to ensure the study will be implemented equally in each class.

Before starting the survey, the teacher must record the class and number of students presented. The students should be given a short introduction into topic and procedure of the study. As Year 1 and 2-children are not able to read yet, the questionnaire will be in the form of a game. Statements will be read out loud one by one and students will be asked to stand up from their chair and hold both hands up to the sky if they agree with a statement, and to keep sitting on their chair in case they disagree. The teacher counts the students standing up for each statement (answer 'yes' or 'I agree') and writes the number in the field provided on the questionnaire sheet. After each 'round' (statement), the children need to sit down again.

The 'Open Round' will be implemented afterwards. Depending on the student's writing skills, they should write down their own sentences starting with 'I like about the canteen...' and 'I don't like about the canteen...'. In classes where children are not able to read and write yet, it is the teacher's responsibility to record the children's sentences.

Study outcomes will be collected and evaluated by using Excel.

4. Outcomes

In the following chapter, the assessment outcomes of Wairoa Primary School's canteen offer will be presented. Results of the applied methods described in the previous chapter will be focussed on the selected criteria.

4.1. Food Selection and Nutritional Value

Packages of pre-packed foods have been collected; weighing individual components of unpacked dishes have been occurred. To simplify the presentation of results, outcomes will be presented individually, starting with main dishes and continuing with snacks and drinks.

4.1.1. Main dishes

Butter Chicken Wrap

The ingredient list of this meal is divided into 'Wrap' and 'Filling'.

While the wrap mainly consists of wheat flour, water, vegetable oil, salt and several food additives, the filling includes 13% chicken breast, 9% long grain rice, tomatoes, peppers and onions as vegetable components, and seasonings (herbs and spices) (cf. figure 4-2).



Figure 4-1: Food Package of Butter Chicken Wrap (<https://goodtime.co.nz/metro-schools-range/>)

Ingredients

Wrap: Wheat flour, water, vegetable oil, salt, emulsifier (471), raising agents (450, 500), firming agent (516), anti-caking agent (341), preservatives (281, 200,223), food acid (297), dough conditioner (920)

Filling: diced chicken breast (13%), long grain rice (9%), chopped tomatoes, tomato paste, soy protein, seasonings, modified maize starch (1414), peppers, onions, spices, herbs

Figure 4-2: Ingredient List Butter Chicken Wrap (food label)

The serving size of the Butter Chicken Wrap is 170g, which provides 1220 kJ. One serve contains 44.8g carbohydrates including 2.1g of sugar, 14.2g protein and 5.3g fat. Sodium is listed with 658mg per serve (cf. table 4-1).

	Per Serving	Per 100g
Energy	1220 kJ	720kJ
Protein	14.2g	8.4g
Fat, total	5.3g	3.1g
-saturated	1.2g	0.7g
Carbohydrate, total	44.8g	26.4g
-sugars	2.1g	1.3g
Dietary Fiber	1.5g	1.0g
Sodium	658mg	388mg

Table 4-1: Nutrition Information Panel Butter Chicken Wrap (food label)

Energy distribution calculations have shown an allocation of 19.4% Protein, 61.3% Carbohydrates and 16.4% Fat, which means 19.4% (237.14 kJ) of the total energy (1220 kJ) is supplied by Protein, 61.3% (748.16 kJ) by Carbohydrates, and 16.4% (199.81 kJ) by Fat. Sugar and saturated fats only present with a minor percentage of 2.9% (sugar) and 3.7% (saturated fat) of total energy (cf. table 4-2).

TOTAL ENERGY: 1220 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	14.2	237.14	19.4
CARBOHYDRATE	44.8	748.16	61.3
- SUGAR	2.1	35.07	2.9
FAT	5.3	199.81	16.4
- SATURATED	1.2	45.24	3.7

Table 4-2: Energy distribution Butter Chicken Wrap (own representation)

Focused on the four main food groups for healthy child nutrition, the Butter Chicken Wrap contains ingredients that can be assigned to three of them. Pertained to food group 'Breads and Cereals' (2), the wrap and rice components are carbohydrate sources. The chicken breast can be considered as poultry, which is included in food group four, whereas tomatoes, peppers and onions can be classified as foods from food group one 'Vegetables and Fruit'. In the Food and Beverage classification system, the Butter Chicken Wrap is allocated in Product Group 6 (Mixed meal dishes) and are classified as occasional food if

Energy > 1200 kJ/100 g or > 1500 kJ/serve;

Saturated fat > 7.5 g/serve;

Sodium > 750 mg/100 g (Ministry of Health, 2007; Appendix B).

As all values of the Butter Chicken Wrap are below the values defined by the programme, the meal can be classified as 'everyday food', containing several foods from the four main food groups, less saturated fat and added sugar.

Chicken/Beef Noodles

This dish mainly consists of instant noodles and seasonings. Before it gets sold, it needs to be filled up with boiling water to cook the meal.

Main components of the dish are soft wheat flour, palm oil, water and salt. Numerous food additives and flavours are added. Even if the meal is sold as Chicken/Beef Noodles, it contains no chicken or beef component, but added beef or chicken flavour (cf. figure 4-4).



Figure 4-3: Food package Chicken/Beef Noodles (<https://www.focusdistribution.co.nz/snacks/roka-instant-noodles/>)

Ingredients

Noodles: soft wheat flour (gluten), vegetable oil: palm (contains antioxidant (E306)), water, salt
Seasoning: salt, soft wheat flour (gluten), dried vegetables (carrots, peas, chives), sugar flavour enhancers (E621, E631, E627), maltodextrin, beef flavour/chicken flavour, colour (E150a), yeast extract, onion powder, vegetable oil: palm, anti-caking agent (E551), pepper powder

Figure 4-4: Ingredient List Chicken/Beef Noodles (food package)

With a serving size of 65g (water not included), the dish provides 1249 kJ of energy (cf. table 4-3). Carbohydrates are listed with 38.3g, fat with 12.7g and protein with 6.5g. 1057mg of sodium are present in one serving.

	Per Serving	Per 100g
Energy	1249kJ	1921kJ
Fat	12.7g	19.6g
-saturated	6.5g	10.0g
Carbohydrates	38.3g	58.9g
-sugars	0.8g	1.2g
Fibre	1.8g	2.7g
Protein	6.5g	10.0g
Salt	2.72g	4.19g
Sodium	1057mg	1626mg

Table 4-3: Nutrition Information Panel Chicken/Beef Noodles (food label)

Caloric value calculations show that more than 50% of the energy the dish provides, is supplied by carbohydrates, 38.3% by fat - whereas 19.6% is supplied by saturated fat - and 8.7% by protein (cf. table 4-4).

TOTAL ENERGY: 1249 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	6.5	108.55	8.7
CARBOHYDRATE	38.3	639.61	51.2
- SUGAR	0.8	13.36	1.1
FAT	12.7	478.79	38.3
- SATURATED	6.5	245.05	19.6

Table 4-4: Energy distribution Chicken/Beef Noodles (own representation)

The main component, which is soft wheat flour can be assigned to food group two 'Breads and Cereals', as it's made from grain. As dried vegetables are listed behind salt in the ingredient list, they're content must be less than 2.72g, thus they will not be seen as major food

component and will not be classified as food group one.

Summarised, the Chicken/Beef Noodles only provide foods from the first food group.

The Ministry of Health classifies 'noodle cups/instant noodles' as occasional food, if

Energy › 1000 kJ/100 g

Saturated fat › 1.5 g/100 g

Sodium › 450 mg/100 g (Ministry of Health, 2007; Appendix B).

Roka Instant Noodles with Chicken/Beef Flavour contain

Energy › 1921 kJ/100 g

Saturated fat › 10 g/100 g

Sodium › 1626 mg/100 g.

All three values of the canteen offered Instant noodles are significantly higher than acceptable as 'everyday' or 'sometimes foods'. As a result, the offered Chicken/Beef Noodles can be classified as occasional food, regarding to the Food and Beverage Classification System.

Filled Roll

The Filled Rolls are freshly prepared in the school kitchen. One serve consists of a pre-packed baked long roll, sauces, vegetables and cooked chicken.

Ingredients are listed in Figure 4-6 below. It should be noted that individual components of sauces, such as mayonnaise, butter, mustard and jam have not been included, due to the variable usage of products and brands, depending on supermarket offer.



Figure 4-5: Food Package Bread Roll (<https://shop.countdown.co.nz/shop/productdetails?stockcode=270536&name=natures-fresh-bread-rolls-soft-long>)

Ingredients

Roll: Wheat flour, yeast, wheat gluten, iodised salt, sugar, canola oil, soy flour, emulsifiers (471, 481), acidity regulator (263)

Filling: Lettuce, Carrot, Chicken/Ham, Cheese, Tomato, Mayonnaise, Butter, Mustard, Jam

Figure 4-6: Ingredient List Filled Roll (food package, own representation)

Nutrition Information Panels have been assessed individually for roll and filling. Table 4-5 shows nutritional information provided by the food package of the long roll. With a serving

size of 70g, the bread roll delivers 740kJ of energy, including 6.9g of protein, 1.7g fat and 31.6g carbohydrates (cf. table 4-5).

	Per Serving	Per 100g
Energy	740kJ	1050kJ
Protein	6.9g	9.8g
Fat, total	1.7g	2.4g
-saturated	0.4g	0.5g
Carbohydrates	31.6g	45.1g
-sugars	2.9g	4.1g
Dietary Fibre	2.3g	3.3g
Sodium	300mg	430mg

Table 4-5: Nutrition Information Panel Long Roll (food label)

The filling has been weighted and recorded. Subsequently, data have been entered in *Ebispro* to calculate the content of macronutrients and energy supply. In Appendix G, the exact amounts that have been weighted and analysed with *Ebispro* are listed. Based on this data, a Nutrition Information Panel for the roll's filling has been developed.

According to *Ebispro*, the filling itself contains 1073kJ of energy per serve (129g). As shown in table 4-6, it primarily includes 21.3g fat including 10.4g saturated fat, while providing less protein with 11.2g and 5.4g carbohydrates (cf. table 4-6).

	Per Serving	Per 100g
Energy	1073kJ	832kJ
Protein	11.2g	8.7g
Fat, total	21.3g	16.5g
-saturated	10.4g	8.1g
Carbohydrates	5.4g	4.2g
-sugars	3.7g	2.9g
Dietary Fibre	1.3g	1g
Sodium	500mg	390mg

Table 4-6: Nutrition Information Panel Filling of the Filled Roll (*Ebispro*; own representation)

Summed up, roll and filling form a serving size of 199g and provide 1813kJ of energy per serve. The dish includes 18.1g protein, 23g total fat from which 10.8g is made up by saturated fat, and 37g Carbohydrates, including 6.6g of sugar (cf. table 4-7).

	Per Serving	Per 100g
Energy	1813kJ	911kJ
Protein	18.1g	9.1g
Fat, total	23g	11.6g
-saturated	10.8	5.4g
Carbohydrates	37g	18.6g
-sugars	6.6g	3.3g

Dietary Fibre	3.6g	1.8g
Sodium	800mg	402mg

Table 4-7: Nutrition Information Panel Filled Roll (own representation)

The energy distribution shows a major energy supply through fat with 47.8% and carbohydrates (34.1%). More than one fifth of the energy provided comes from saturated fat with 22.5%. Protein and sugar only contribute smaller amounts with 16.7% for protein and 6.1% for sugar (cf. table 4-8).

TOTAL ENERGY: 1813 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	18.1	302.27	16.7
CARBOHYDRATE	37	617.9	34.1
- SUGAR	6.6	110.22	6.1
FAT	23	867.1	47.8
- SATURATED	10.8	407.16	22.5

Table 4-8: Energy distribution Filled Roll (own representation)

Looking at the four food groups the Ministry of Health developed for healthy child nutrition, it can be said that foods from every group are present in a filled roll. Lettuce, Carrot and Tomato are vegetables and belong to food group one, the roll is made from grain and can be assigned to food group two 'Breads and Cereals'. Cheese and butter are milk products and belong to food group three, while chicken being poultry presents food group four.

Nutrient criteria for mixed meal dishes - including filled rolls - classified as 'occasional' are indicated with:

Energy › 1200 kJ/100 g or › 1500 kJ/serve;

Saturated fat › 7.5 g/serve;

Sodium › 750 mg/100 g (Ministry of Health, 2007; Appendix B).

The amount of energy and saturated fat the filled roll provides per serve is higher than recommended for 'everyday' or 'sometimes' school food. Energy and sodium amounts per 100g are below recommendations for classifying the dish as occasional food. As more than one criterion is not met, it can be said that the filled roll offered with a serving size of 199g would be classified as occasional food, due to high energy and saturated fat levels per serve.

Hot Saveloy Roll

A Hot Saveloy Roll consist of a buttered bread roll, a heated saveloy, and tomato sauce. Saveloys are getting heated up in a pot of boiling water, then rolled in the bread and served with tomato sauce on top.

Main components of the dish are the saveloys including 65% of meat mixed from pork, beef and mutton and the roll, whereas the sauces only contribute a small amount to the dish (cf. figure 4-8).



Figure 4-7: Food package Saveloys (own photo)

Ingredients

Saveloy: Meat (65%) (Pork, Beef, Mutton), Water, Wheat Flour, Salt, Soy Protein, Sugar, Mineral Salts (450,451, 339, 500), Dextrose, Vegetable Oil, Thickener (412), Antioxidant Enhancer (621), Dehydrated Garlic, Colour (122, 102), Casing (collagen or natural)

Roll: Wheat flour, yeast, wheat gluten, iodised salt, sugar, canola oil, soy flour, emulsifiers (471, 481), acidity regulator (263)

Sauces: Tomato Sauce (Concentrated Tomatoes (contains 142f of tomatoes per 100g or 21g of tomatoes per 15g serve), Sugar, Salt, Food Acids (acetic Acid, Citric Acid), Natural Flavours, Spice), Butter (Cream, Salt)

Figure 4-8: Ingredient List Hot Saveloy Roll (food labels, own representation)

Nutrition Information Panels for each component have been assessed and summed up. In the following, the individual panels will be introduced.

With a serving size of 120g, one Saveloy provides 1120kJ, containing 15.2g of protein, 20g of sugar and 6.8g of fat. The sugar content is 9.8g per serve, while saturated fat in only included with 0.6g. Sodium is valued with 828mg per saveloy (cf. table 4-9).

	Per Serving	Per 100g
Energy	1120kJ	934kJ
Protein	15.2g	12.9g
Carbohydrates	20g	16.7g
-sugars	9.8g	8.2g
Fat, total	6.8g	5.7g
-saturated	0.6g	0.5g
Sodium	828mg	690mg

Table 4-9: Nutrition Information Panel Saveloy (food label)

The long roll that is used for preparing this dish is the same product used for the filled roll (see above). With a serving size of 70g, the bread roll delivers 740kJ of energy, including 6.9g of protein, 1.7g fat and 31.6g carbohydrates (cf. table 4-5).

As the school always uses the same Tomato Sauce, nutritional information have been assessed via food package of 'Watties Tomato Sauce'. With an approximate serving size of 15g, the tomato sauce contributes 90kJ of energy, 4.9g of carbohydrates which is approximately 4.8g sugar, and 0.2g of protein (cf. Table 4-10).

	Per Serve	Per 100g
Energy	90kJ	610kJ
Protein	0.2g	1.2g
Carbohydrates	4.9g	32.8g
-sugars	4.8g	31.8g
Fat, total	0	0.2g
-saturated	0	0g
Sodium	150mg	1000mg

Table 4-10: Nutrition Information Panel Watties Tomato Sauce (food label)

Nutritional Information for butter have been assessed by entering 'butter' into Ebispro. Outcomes show an energy contribution per serve of 155kJ and a fat content of 4.2g from which 2.7g are saturated fat (cf. table 4-11) .

	Per Serve	Per 100g
Energy	155kJ	3101kJ
Protein	0g	0.7g
Carbohydrates	0g	0.6g
-sugars	0g	0g
Fat, total	4.2g	83.2g
-saturated	2.7g	53.8g
Sodium	0g	0g

Table 4-11: Nutrition Information Panel Butter (Ebispro, Appendix H)

By summing up data from the nutrition information panels of each food component the Hot Saveloy Roll includes, a total serving size of 210g arises.

One serve delivers 2105kJ of energy, provided by 43.3g Carbohydrates, 25.9g of total fat and 22.3g protein. The sodium level is calculated with 1278mg per serve (cf. table 4-12).

	Per Serve	Per 100g
Energy	2105kJ	1002kJ
Protein	22.3g	10.6g
Carbohydrates	43.3g	20.6g
-sugars	8.3g	4g
Fat, total	25.9g	12.3g
-saturated	12.9g	6.1g
Sodium	1278mg	609mg

Table 4-12: Nutrition Information Hot Saveloy Roll (own representation)

With 46.4%, fat contributes the greatest amount of total energy (976.43kJ). About 23% are delivered through saturated fat, which is more than one fifth of the total energy amount.

Carbohydrates contribute approximately 34.3% of total energy, sugar 6.6% and protein 17.7% (cf. table 4-13).

TOTAL ENERGY: 2105 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	22.3	372.41	17.7
CARBOHYDRATE	43.3	723.11	34.3
- SUGAR	8.3	138.61	6.6
FAT	25.9	976.43	46.4
- SATURATED	12.9	486.33	23.1

Table 4-13:Energy distribution Hot Saveloy Roll (own representation)

Two of the four food groups the Ministry of Health recommends are represented in the dish. While the roll is assigned to ‘Breads and Cereals’ (food group two), the saveloy might be counted as food group four. As recommendations advice against processed meat, it will be discussed later on, if the saveloy can be part of the fourth group as ‘lean meat’.

The Hot Saveloy Roll falls under ‘mixed meal dishes’ in the categorisation system. Similar to the Filled Roll, it is categorised as occasional food if *Energy* > 1200 kJ/100 g and/or > 1500 kJ/serve; *Saturated fat* > 7.5 g/serve; *Sodium* > 750 mg/100 g (Ministry of Health, 2007; Appendix B). With an energy content of 1002kJ per 100g or 2105kJ per serve, 12.9g of saturated fat per serve and a sodium level of 1278mg per serve, the Hot Saveloy Roll offered as it is can be classified as occasional food regarding to the Food and Beverage Classification System.

Vegetable Soup

The recipe for the vegetable soup slightly varies, depending on supermarket offer and seasonality. According to the canteen staff, one pot of soup is usually prepared using the ingredients and amounts listed on the left column of table 4-14. Through weighing the components, more precise information about amounts of ingredients have been assessed. The recipe has been rewritten using the weight in grams for each ingredient (cf. table 4-14).

1 ½ L water	1500g water
4 medium potatoes	500g potatoes
½ small pumpkin	310g pumpkin
½ leeks	230g leeks
2 carrots	160g carrot
2 parsnips	150g parsnip

2 tbsp salt	21g salt
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Table 4-14: Ingredients Vegetable Soup (own representation)

The recipe has been created in Ebispro, which has been saved as ‘Vegetable Soup-School’ (Appendix I). Dividing the cooked soup into serving containers and weighing each container showed an approximate serving size of 520g per container. Subsequently, data assessment has been implemented by entering recipe and grams per serve in Ebispro.

One serving of 520g vegetable soup provides 477kJ of energy. The carbohydrate content is the greatest amount with 22.7g including 3.2g sugar, followed by protein with 3.9g and fat with 0.4g including 0.1g saturated fat. The sodium level is 1496mg per serve (cf. table 4-15).

	Per Serving	Per 100g
Energy	477kJ	92kJ
Protein	3.9g	0.8g
Carbohydrates	22.7g	4.4g
-sugars	3.2g	0.6g
Fat, total	0.4g	< 0.1g
-saturated	0.1g	< 0.01g
Sodium	1496mg	288mg

Table 4-15: Nutrition Information Panel Vegetable Soup (Ebispro; own representation)

Nearly 80% of total energy is contributed by carbohydrates. Protein provides 13.7% of energy, while 3.2% is delivered by fat. The sugar energy contribution is calculated with approximately 11%, saturated fat contributes less than 1% (cf. table 4-16).

TOTAL ENERGY: 477 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	3.9	65.13	13.7
CARBOHYDRATE	22.7	379.09	79.5
- SUGAR	3.2	53.44	11.2
FAT	0.4	15.05	3.2
- SATURATED	0.1	3.77	0.8

Table 4-16: Energy distribution Vegetable Soup (own representation)

The vegetable soup contains different colours of vegetables, which are part of food group one in the nutrition recommendations for children by the Ministry of Health (Ministry of Health, 2007).

Nutrient criteria for ‘occasional’ soups can be found in ‘Product Group 6: Mixed Meal Items’ in the Food and Beverage Classification System (Appendix B). Soups can be categorised as occasional when

Energy › 1000 kJ/100 mL

Saturated fat › 5 g/100 mL

Sodium › 450 mg/100 mL (Ministry of Health, 2007; Appendix B).

The vegetable soup's values are lower in all three criteria, with an energy content of 92kJ per 100g, saturated fat less than 0.01g and a sodium level of 288mg per 100g. It should be noted that prescribed values are indicated in millilitres, while the calculated values have been assessed in grams. One serving of soup contains approximately 250 mL liquid, depending on evaporated water during the cooking process.

However, values are lower than criteria for categorising the soup as occasional food. Fresh soups are generally categorised as 'everyday' or 'sometimes'-food.

4.1.2. Snacks

All snacks offered by the canteen are pre-packed and provide ingredient lists and nutrition information panels. Data will be introduced in the following.

Chocolate Muffin

As a snack food, the ingredient which contributes the most to the chocolate muffin is sugar. Other main ingredients are wheat flour, canola oil and palm oil, followed by several food additives. The chocolate chip amount makes up 5% of the whole product (cf. figure 4-10).



Figure 4-9: Chocolate Muffin (<https://good-time.co.nz/metro-schools-range/>)

Ingredients

Sugar, wheat flour, canola oil, palm oil, whey powder, modified starch, salt, gluten, raising agent (500, 450, 541), stabiliser (415), emulsifier (475), acidity regulator (330), flavour, antioxidant (320), water, soya oil, egg, chocolate chips (5.0%) (sugar, skimmed milk powder, emulsifier (492), soya lecithin (322), flavourings (colour (150c), water, cocoa powder (15%), flavour, colour (122, 133, 155), stabiliser (405), preservative (216, 202), inulin

Figure 4-10: Ingredient List Chocolate Muffin (food label)

The Chocolate Muffin provides 781kJ with a serving size of 50g. With 21.8g including 13.6g of sugar, carbohydrates present the greatest amount of macronutrients, followed by fat with 10.2g including 2.5g saturated fat, and 2.3g protein. Additionally, 184mg sodium are contained (cf. table 4-17).

	Per Serving	Per 100g
Energy	781kJ	1563kJ
Protein	2.3g	4.6g
Fat, total	10.2g	20.3g
-saturated	2.5g	4.9g
Carbohydrates	21.8g	43.6g
-sugars	13.6g	27.3g
Dietary Fibre	1.8g	3.5g
Sodium	184mg	368mg

Table 4-17: Nutrition Information Panel Chocolate Muffin (food label)

The energy distribution shows an allocation of 49.2% total fat, 46.6% carbohydrates and 4.9% protein. Approximately 29% of total energy is provided by sugar, about 12% by saturated fat (cf. table 4-18).

TOTAL ENERGY: 781 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	2.3	38.41	4.9
CARBOHYDRATE	21.8	364.06	46.6
- SUGAR	13.6	227.12	29.1
FAT	10.2	384.54	49.2
- SATURATED	2.5	94.25	12.1

Table 4-18: Energy distribution Chocolate Muffin (own representation)

In the Occasional List of the Food and Beverage Classification System, chocolate muffins are represented in Product Group 7 'Snack Items/Baked Snack Foods/sweet muffins' and are classified as occasional food if

Energy › 1800 kJ/100 g and/or › 900 kJ/serve

Saturated fat › 3 g/serve

Fibre < 1.5 g/100 g

(Ministry of Health, 2007; Appendix B).

Nutritional Information of the offered muffin show, that all values lie outside of the range for classifying the snack as occasional food. Due to its moderate levels of sugar and saturated fats, and not providing great amounts of ingredients from the four food groups, the chocolate muffin can be allocated as 'sometimes food'.

Chocolate Chip Cookie

The Chocolate Chip Cookie Jumbo consists of wheat flour as its main component, 23% chocolate chips, sugar, butter, margarine and eggs. Additionally, flavours and food additives are presented in the ingredient list below (cf. figure 4-12).



Figure 4-11: Food package Chocolate Chip Jumbo (own photo)

Ingredients

Wheat flour, chocolate chips (23%) [sugar, cocoa mass, milk solids, cocoa butter, emulsifier (322, soya, 476), flavour], sugar, butter (cream, water, salt), margarine [animal fat, water, salt, emulsifier (471, 322, soya), flavour, antioxidant (307b soya), colour (160a), food acid (330)], egg, raising agent (500, 541), salt, flavour

Figure 4-12: Ingredient List Chocolate Chip Jumbo (food label)

With a serving size of 90g, it provides 1690kJ energy. The Nutrition Information Panel shows amounts of 56.3g carbohydrates, from which 32.5g are sugar, 18.1g total fat including 9.6g saturated fat, 5.3g of protein and 322mg of sodium (cf. table 4-19).

	Per Serving	Per 100g
Energy	1690kJ	1880kJ
Protein	5.3g	5.8g
Carbohydrates	56.3g	62.6g
-sugars	32.5g	36.1g
Fat, total	18.1g	20.1g
-saturated	9.6g	10.7g
Sodium	322mg	358g

Table 4-19: Nutrition Information Panel Chocolate Chip Jumbo (food label)

Based on the Nutrition Information Panel, energy distribution calculations show that carbohydrates and fat deliver the greatest amount of energy with 55.6% for carbohydrates and 40.4% for fat. Sugar (32.1%) and saturated fat (21.2%) together, provide more than 50% of the total energy amount. Protein contributes the less energy amount with 5.2% (cf. table 4-20).

TOTAL ENERGY: 1690 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	5.3	88.51	5.2
CARBOHYDRATE	56.3	940.21	55.6
- SUGAR	32.5	542.75	32.1
FAT	18.1	682.37	40.4
- SATURATED	9.6	359.04	21.2

Table 4-20: Energy distribution Chocolate Chip Jumbo (own representation)

Being part of the product group ‘sweet snacks’ as biscuits (Product Group 7/Snack Items), this snack should not exceed the following values:

Energy > 1900 kJ/100 g and/or > 600 kJ/serve

Saturated fat > 2 g/100 g

Sodium > 200 mg/serve (Ministry of Health, 2007; Appendix B).

The amount of energy the snack delivers, is with 1880kJ per 100g only nearby the limited value for being classified as occasional. As the offered snack delivers 1690kJ per serve, 9.6g saturated fat per 100g and 322mg sodium per serve it can be classified as occasional food in schools.

Popcorn

The light and buttery popcorn the school canteen offers is made out of 78% air popped corn, vegetable oil, salt, butter flavour and food colour (cf. figure 4-14).

Ingredients

Air popped corn (78%), vegetable oil (antioxidant (319)), salt, natural butter flavour, colour (160a)

Figure 4-14: Ingredient List Popcorn (food label)



Figure 4-13: Food package Popcorn (<http://www.daviesfoods.co.nz/products/popcorn/pop-n-good/pop-n-good-light-and-buttery-popcorn/>)

Sold with a serving size of 12.5g, the popcorn provides 254kJ of Energy. The macronutrient distribution is 8.1g of Carbohydrates containing less than 1g of sugar, 2.6g of fat including 1.1g of saturated fat, and 1.2g of protein. Per serve popcorn, 38mg sodium are present (cf. table 4-21).

	Per Serving	Per 100g
Energy	254kJ	2030kJ
Protein	1.2g	9.3g
Fat, total	2.6g	21.1g
-saturated	1.1g	8.9g
Carbohydrates	8.1g	64.5g
-sugars	Less than 1g	Less than 1g
Sodium	38mg	304mg

Table 4-21: Nutrition Information Panel Popcorn (food label)

More than 50% (53.3%) of total energy is contributed by carbohydrates, whereas 38.6% is provided by fat and 7.9% by protein. As the sugar content is listed with less than 1g, it can only be said that sugar contributes not more than 6.6% of energy to the total. Saturated fat makes up 16.3% of the total energy amount (cf. table 4-22).

TOTAL ENERGY: 254 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	1.2	20.04	7.9
CARBOHYDRATE	8.1	135.27	53.3
- SUGAR	<1	<16.7	<6.6
FAT	2.6	98.02	38.6
- SATURATED	1.1	41.47	16.3

Table 4-22: Energy distribution Popcorn (own representation)

In the Food and Beverage Classification system for occasional food, popcorn can be found in Food Group 7 under 'Savoury Snacks'. Values for popcorn that should not be offered in schools, are

Energy › 1800 kJ/100 g and/or › 600 kJ/serve

Saturated fat › 3 g/100 g

Sodium › 200 mg/serve (Ministry of Health, 2007; Appendix B).

With 254 kJ per serve, the offered snack's energy value is lower than 600kJ per serve. Focusing on 100g popcorn, it provides 2030 kJ of energy. Furthermore, it contains 8.9g of saturated fat per 100g, which is significantly higher than acceptable for not being an occasional snack. Sodium levels are lower with 38mg per serve. As products already fit into the occasional food category by meeting one of the listed nutrient criteria, popcorn as it is offered in the canteen is classified as occasional food.

Juicies (Apple)

Juicies are iceblocks, containing 99.9% fresh pressed apple juice and added Vitamin C (cf. figure 4-15). The school canteen offers 'Juicies Apple' in a serving size of 100mL, which provides approximately 197kJ of energy. The snack contains 11.7g carbohydrates in the form of sugar, 0.1g of protein and fat and 3mg of sodium (cf. table 4-23).

Ingredients
Fresh pressed apple juice (99,9%), Vitamin C

Figure 4-15: Ingredient List Juicies Apple (food label)



Figure 4-16: Food package Juicies Apple (<http://www.tasmanbay.co.nz/products>)

	Per Serving
Energy	197kJ
Protein	0.1g
Fat, total	0.1g
-saturated	0.0g
Carbohydrates	11.7g
-sugars	11.7g
Sodium	3mg

Table 4-23: Nutrition Information Panel Juicies Apple (food label)

Sugar provides nearly all of the total energy with 99.2%, while fat (1.9%) and protein (0.9%) only deliver low amounts due to low content levels (cf. table 4-24).

TOTAL ENERGY: 197 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	0.1	1.67	0.9
CARBOHYDRATE	11.7	195.39	99.2
- SUGAR	11.7	195.39	99.2
FAT	0.1	3.77	1.9
- SATURATED	0	0	0

Table 4-24: Energy distribution Juicies Apple (own representation)

Values for iceblocks in the nutrient criteria for 'occasional foods' under snack items in Product Group 7 are *Energy* > 600 kJ/serve ; *Saturated fat* > 3 g/serve (Ministry of Health, 2007; Appendix B). As Juicies contain 197kJ per serve and no saturated fat, they cannot be classified as occasional, but sometimes food due to moderate values of added sugar.

4.1.3. Drinks

Flavoured Milk

Flavoured milk is offered with chocolate, banana or strawberry flavour. Anchor CalciYum Milk with chocolate flavour has been chosen to represent all three products, as nutrition information and energy amounts of various flavours only slightly differ.

One drinking pack mainly includes low fat milk, non-fat milk solids and sugar. A minimum of 0.8% cocoa is included in each serve. Vegetable gums, minerals, flavours and vitamin D are added (cf. figure 4-18).



Figure 4-17: Food package flavoured CalciYum Milk (<https://www.anchor-dairy.com/nz/en/products/flavoured-milk/anchor-calciyum-chocolate-flavoured-milk-250ml.html>)

Ingredients

Low fat milk, milk solid non-fat, sugar, cocoa (min. 0.8%), vegetable gums (460, 466, 407), mineral (calcium carbonate), flavours, vitamin D

Figure 4-18: Ingredient List flavoured CalciYum Milk (food label)

A look on the Nutrition Information Panel shows a serving size of 250mL, providing 630kJ of energy. Carbohydrates are listed with 20.5g including 20g of sugar. Protein is contained with 8.5g, while total fat contributes 3.5g including 2g saturated fat. Sodium is declared with 105mg per serve (cf. table 4-25).

	Per Serving	Per 100mL
Energy	630kJ	252kJ
Protein	8.5g	3.4g
Fat, total	3.5g	1.4g
-saturated	2.0g	0.8g
Carbohydrates	20.5g	8.2g
-sugars	20.0g	8.0g
Sodium	105mg	42mg
Calcium	263mg	105mg
Vitamin D	1.3µg	0.5µg

Table 4-25: Nutrition Information Panel CalciYum Chocolate Flavoured Milk (food label)

More than 50% of total energy provided is contributed by sugar, 22.5% by protein and 20.9% by fat. Saturated fat delivers 12% of the total energy (cf. table 4-26).

TOTAL ENERGY: 630 KJ

	AMOUNT IN G	AMOUNT IN KJ (OF TOTAL ENERGY)	AMOUNT IN % (OF TOTAL ENERGY)
PROTEIN	8.5	141.95	22.5

CARBOHYDRATE	20.5	342.35	54.3
- SUGAR	20	334	53
FAT	3.5	131.95	20.9
- SATURATED	2	75.4	12

Table 4-26: Energy distribution CalciYum Chocolate Flavoured Milk (own representation)

The Food and Beverage Classification System lists flavoured milks in Product Group 1 ('Drinks') and assigns flavoured milks as occasional when the package size is larger than 350mL or the total fat content is greater than 3.3g per 100mL (Ministry of Health 2007; Appendix B). As the chocolate flavoured milk offered in the canteen is served with 250mL and a fat content of 1.4g per 100mL, it is not classified as 'occasional', but 'sometimes'-drink.

4.2. Feasibility

To assess the feasibility of the canteen, it is necessary to analyse the amount of orders per dish per day. Therefore, canteen order sheets have been collected over a time period of 59 operating days.

The best-selling product of the main dishes was the Butter Chicken Wrap with a mean order of approximately 18 per day (median value = 18). Looking at the amount of orders for the Wrapped Filled Rolls and Chicken/Beef Noodles shows a significant difference. While approximately seven serves of Chicken/Beef Noodles have been sold daily, only two to three (median value = 2) Wrapped Filled Rolls have been ordered a day (cf. table 4-25).

Juicies and Flavoured Milk were the most ordered snacks. Approximately 13 Juicies and 11 milks are getting sold each day, whereas about six orders of each, Chocolate Muffin and Chip Cookie have been received. Popcorn was the least ordered snack with approximately 3 orders per day. During the selected timeframe, an average of one to two bottles of water have been sold each day (median value =1) (cf. table 4-25).

The median determines 67 orders each day (mean = 69.1), including approximately 27 main meal orders, 39 snacks and one bottle of water.

	Item	Total Orders (59 days)	Mean	Median
Main dishes	Butter Chicken Wrap	1066	18.1	18
	Filled Rolls	146	2.5	2
	Chicken/Beef Noodles	407	6.9	7

Snacks	Chocolate Muffin	377	6.4	6
	Chocolate Chip Cookie	361	6.1	6
	Popcorn	220	3.7	3
	Flavoured Milk (S,B,C)	630	10.7	11
	Juicy	783	13.3	13
Drinks	Bottled Water	88	1.5	1
Total		4078	69.1	67

Table 4-27: Total orders, mean and median of ordered dishes over a timeframe of 59 days (Canteen order sheets; Excel; own representation)

As the Hot Saveloy Roll and the Vegetable Soup were only offered on selected days, these dishes have been analysed separately.

Offered on 21 days, the soup has been sold 28 times, which results in a median of one order per day. The Hot Saveloy Roll has been offered on 12 days and has been sold 139 times, which means approximately 11 children ordered this dish each day of offering.

	Item	Total Orders	Mean	Median
Main dishes	Vegetable Soup	28 (in 21 days)	1.3	1
	Hot Saveloy Roll	139 (in 12 days)	11.6	11

Table 4-28: Total orders, mean and median of exceptionally offered dishes (Canteen order sheets; Excel; own representation)

4.2.1. Facilities and Equipment

Wairoa Primary School's canteen is located at the school campus, next to the playground. The canteen is self-operated and is registered to sell pre-packed food.

Canteen kitchen facilities and equipment have been assessed by an on-site inspection. Figure 4-21 shows a floor plan of the canteen kitchen including rough dimensions. With a total area of 9m², the kitchen provides technical equipment, cooking utensils, storage and work space. In the following, assessed equipment and utensils will be listed to get an overview of the canteen facilities.

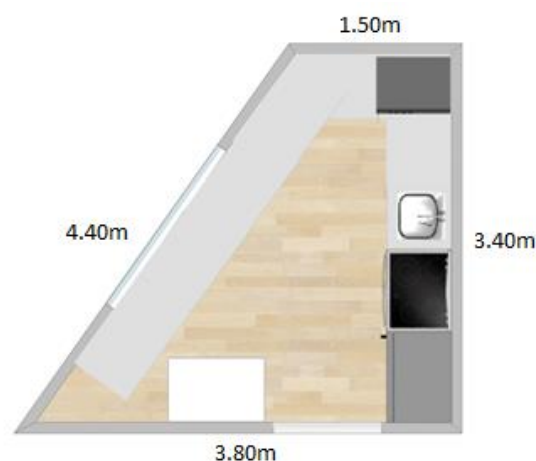


Figure 4-19: Floor Plan Canteen Kitchen (https://planner.roomsketcher.com/?cxtx=rs_de; own representation)

The basic equipment offers a fridge and freezer, a stove including baking oven, a hot-water dispenser and a hot food counter. Cooking utensils are only available once each, except of two

butter knives. Other equipment listed is a sink, cabinets, and cleaning equipment (cf. table 4-29). Figures 4-20, 4-21 and 4-22 demonstrate the kitchen equipment to get an overview of kitchen design and organisation.

Technical equipment	Cooking utensils	Other
Fridge	1x Cutting Knife	Sink
Freezer	2x Butter knife	Storage cabinets
Stove (including oven)	1x Teaspoon	Hand towels
Hot-Water Dispenser	1x Peeler	Broom
Hot Food Counter	1x Grater	Hand brush
	1x Soup Ladle	
	1x Chopping Board	
	1x Pot (1 litre)	
	1x Tong	

Table 4-29: School canteen facilities and equipment (own representation)



Figure 4-20: View onto the kitchen entrance/exit (https://planner.roomsketcher.com/?ctxt=rs_de; own representation)

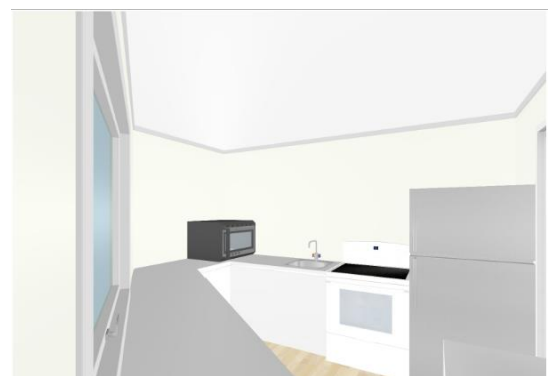


Figure 4-21: View onto kitchen equipment, including hot food counter, sink, stove & oven, and fridge (https://planner.roomsketcher.com/?ctxt=rs_de; own representation)



Figure 4-22: View from the entrance of the canteen kitchen (https://planner.roomsketcher.com/?ctxt=rs_de; own representation)

Via observation, a list of technical equipment, cooking utensils and food preparation counters have been created (cf. table 4-30). The list only includes fresh foods to be prepared, pre-packed food which requires heating and pre-packed food that requires cooling. Technical

equipment, such as fridge or freezer, mainly describes the storage of the product or ingredients used for each dish. The hot food counter is exclusively used for warming up the Butter Chicken Wraps after delivery. Cooking utensils are not indicated with numbers; however, usage is listed in the brackets behind each utensil (cf. table 4-30).

Ready-to-sell-food such as popcorn, chocolate muffin or flavoured milk is not mentioned in the table as these products do not require cooling or heating, but only storage in the canteen kitchen.

Food to be prepared	Technical Equipment	Cooking Utensils	Food preparation counters
Filled Roll	Fridge	<ul style="list-style-type: none"> - Cutting knives (<i>Bread; Vegetables</i>) - Butter knives (<i>Mayonnaise, Butter, Mustard, Jam</i>) - Grater (<i>Carrots, Cheese</i>) - Chopping boards (<i>Vegetables, Meat</i>) 	
Vegetable Soup	Stove Fridge	<ul style="list-style-type: none"> - Pot (<i>Cooking</i>) - Cutting knife (<i>Vegetables</i>) - Chopping board (<i>Vegetables</i>) - Peeler (<i>Vegetables</i>) - Soup ladle (<i>Serving</i>) 	 
Hot Saveloy Roll	Stove Fridge	<ul style="list-style-type: none"> - Pot (<i>Cooking</i>) - Cutting knife (<i>Bread</i>) - Butter knife (<i>Butter</i>) - Tong (<i>Saveloy</i>) 	
Chicken/ Beef Noodles	Boiler	-	
Pre-packed food			

(heating re- quired)			
Butter	Hot food counter	-	-
Chicken			
Wrap			
Pre-packed food (cool- ing re- quired)			
Juicie	Freezer	-	-

Table 4-30: List of necessary equipment for food preparation (own representation)

Table 4-30 also shows, that several dishes are getting prepared on the same food preparation counters.

4.2.2. Time management

Work times and processes have been assessed via observation and staff-interview. In the following, tasks and time management will be presented.

The canteen staff is employed for three hours each day, from Tuesday to Friday 10.00am to 1.00pm. During this time, it is her responsibility to take orders, prepare and hand out food and clean up the canteen kitchen.

As Canteen Order Sheets and money per class is getting dropped off by students or teachers each morning, the daily routine starts with counting incoming orders and money. This includes preparing change for each order that has not been paid the correct change. Counting money, adding orders and listing daily orders take up to 30 minutes.

When orders are assessed, the staff must check if required foods to prepare the dishes are available, which takes her about five minutes. According to the canteen employer's statements, going shopping is a daily task as orders vary each day and food cannot be stored properly due to a lack of storage (Appendix J). The shopping time can be estimated with approximately 30 minutes, depending on the amount of orders and food availability.

Subsequently, food preparation occurs. Within a timeframe of one hour to one and a half hours, dishes are getting prepared. This includes chopping ingredients, topping, cooking and wrapping self-prepared foods. Self-prepared dishes are finished first, afterwards prepacked foods and snacks are arranged. Depending on the amount of orders, time varies. The more dishes are ordered, the longer the food preparation takes.

15 minutes are scheduled for packing the classes' food baskets, 5 minutes are needed for handing out food baskets to the responsible students.

In the end, washing the dishes and cleaning the canteen kitchen is required before the staff leaves the workplace. This takes approximately 20 minutes (cf. table 4-31).

Work tasks	Time needed
1. Counting orders and money	30 min
2. Checking food availability	5 min
3. Shopping	30 min
4. Food preparation	60-90 min
5. Packing food baskets	15 min
6. Handing out baskets	5 min
7. Cleaning the kitchen	20 min
	165-195 min
TOTAL	= 2h 45 min – 3h 15 min

Table 4-31: School canteen work tasks and required (own representation)

As table 4-31 shows, finishing every work task requires between two hours and 45 minutes to three hours and 15 minutes. Food preparation occupies most of the working time, followed by counting orders, shopping and cleaning the kitchen. Checking food availability, packing food baskets and handing them out requires less time (cf. table 4-31).

An interview with the canteen staff of Wairoa Primary School points out, that she is not satisfied with time management during work hours. On a scale from 0 to 10, with 0 being not satisfied and 10 being very satisfied, she decided for two. In her opinion, she spends too much time counting orders and calculating money and loses too much time by going shopping each day, instead of spending the majority of time preparing food (Appendix J).

As the canteen menu does not vary, procedures are usually the same. Timing depends on the incoming number of orders. Even though, the canteen lady states, she is late with getting the food baskets ready in time nearly every day. Reasons for that are seen in several processes; trivial matters such as missing the right amount of change or daily shopping are complications that make her run late. On the question if the food preparation is difficult for her, she answers that preparing the dishes themselves is not complicated, but time pressure confuses her when packing the food baskets, especially with special request.

To improve work processes and timing, she states, the school kitchen needs to be better

equipped, needs more storage and available money to do a weekly shopping. Additionally, the staff strongly believes that the time requirement of three hours is too short to complete all the tasks appropriately (cf. Appendix J).

4.2.3. Availability of groceries

Wairoa Primary School’s canteen relies on a food provider from Gisborne, who delivers ordered food usually once a week, occasionally twice. Delivery reliability has been reviewed by summarising Canteen Order Sheets from January to May. Delivery days were marked with a ‘D’ and a tick when foods have been delivered or a cross for not being delivered.

In the prescribed period, food has been ordered for delivery on 16 days in total, including 12 deliveries on Thursdays, and four on Tuesdays.

Results show that the delivery has been successful on 11 from 16 days. On five days, food delivery has been unsuccessful. This means that in proportional terms, the probability that ordered food has been delivered was 69%, whereas 31% of food deliveries have been unsuccessful.

Four of the failed deliveries happened when orders have been made for two days a week (Tuesday and Thursday) (cf. table 4-32).

Date	Delivered
Thu 8/2/18	✓
Thu 15/2/18	✓
Thu 22/2/18	✓
Thu 1/3/18	X
Thu 8/3/18	✓
Thu 15/3/18	✓
Thu 22/3/18	X
Tue 27/3/18	✓
Thu 5/4/18	X
Tue 9/4/18	✓
SCHOOL HOLIDAY	
Tue 1/5/18	✓
Thu 3/5/18	X
Thu 10/5/18	✓
Thu 17/5/18	✓
Thu 24/5/18	✓
Tue 29/5/18	X

Table 4-32: Food deliveries from 31st of January to 31st of May 2018 (Canteen Order Sheets; own representation)

The local supermarket has been visited from the 1st to the 30th of November, every day from Tuesday to Friday between 10.30 and 11.00am to assess the availability of groceries that are needed for food preparation. A checklist including all food ingredients have been used to record the supermarket grocery availability (Appendix E). Record options were either ‘available’, ‘not available’ or ‘available on request’.

Data of grocery availability are summarised in Appendix K. Nine of 18 groceries (Carrots, Potatoes, Cheese, Butter, Chicken, Mayonnaise, Yam, Mustard, Saveloy) were available at all times. Saveloys were available on-shelf on 16 days and have been in stock on two days. Lettuce, Tomato Sauce and Tomatoes were almost always available (less than five times not in stock or on-shelf), while Tomatoes were available once on request. More than half of the days, pumpkin, parsnip, popcorn and Juicies were purchasable. Leeks and Long Rolls could only be purchased on seven and eight days.

On a percentage basis this means, that 50% of required groceries were purchasable at all days

while the data acquisition has been occurred. Approximately 39% were almost always (17%) or most of the days (22%) available, while 11% of the required items were purchasable on less than half of the days (cf. table 4-33).

Always available

	Carrots
	Potatoes
	Cheese
	Butter
	Chicken
	Mayonnaise
	Yam
	Mustard
	Saveloy (twice on request)
	Lettuce
	Tomato Sauce
	Tomatoes (once on request)
	Pumpkin
	Parsnip
	Popcorn
	Juicies
	Leeks
	Long Rolls

***Almost always available
(less than five days not available)***

***Most of the time available
(more than half of the days)***

Less than half of the days available

Table 4-33: Grocery availability on 18 selected days in Wairoa's local supermarket (own representation)

4.3. Survey results

The survey has been implemented by the principal. Every class participated in the study by filling out the questionnaire, which makes a sample size of 195 (20 students Year 1, 33 students Year 2, 35 students Year 3, 20 students Year 4, 21 students Year 5 and 66 students Year 6). Four classes including Year 1, 2 and 6-students were able to carry out the 'open round'-study (n=80).

The recorded questionnaire-results are summarised and presented in figure 4-23,4-24 and 4-25.

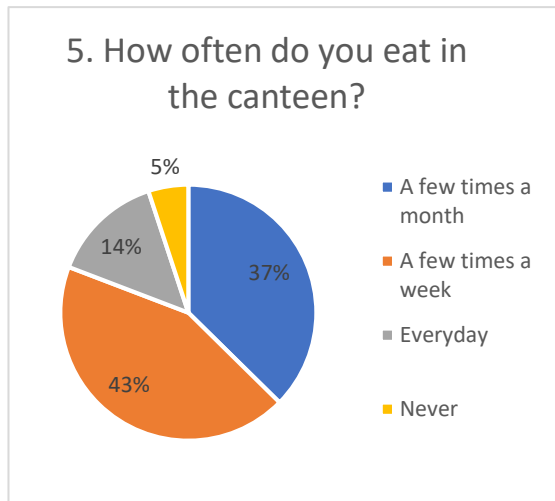


Figure 4-23: Study outcome question no. 5 (own representation)

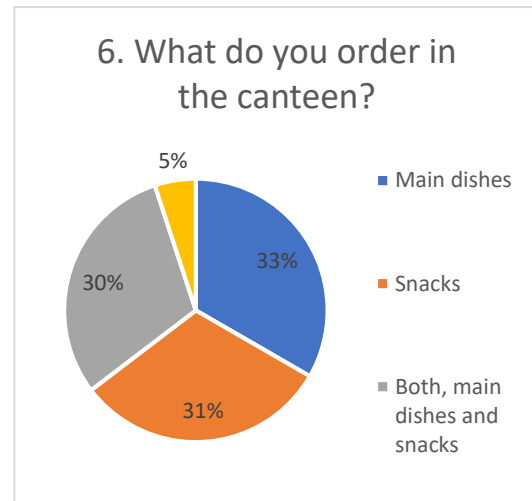


Figure 4-24: Study outcome question no. 6 (own representation)

73 students state they eat in the canteen a few times a month (37%), 84 children order food a few times a week (43%) and 29 students order food daily(14%). Only 10 children (5%) indicate to never eat canteen food. 33% of the students who order food in the canteen buy main dishes, but no snacks; 31% buy snacks, but no main dishes and 30% order both, main dishes and snacks. 5% of probands state to not ordering anything (cf. figure 4-23 & 4-24).

62% of children like eating food in the canteen, while 38% do not like eating there. 69% of children state they do like the variety of food, but 81% would eat more often in the canteen, if there would be different options to eat (cf. figure 4-25).

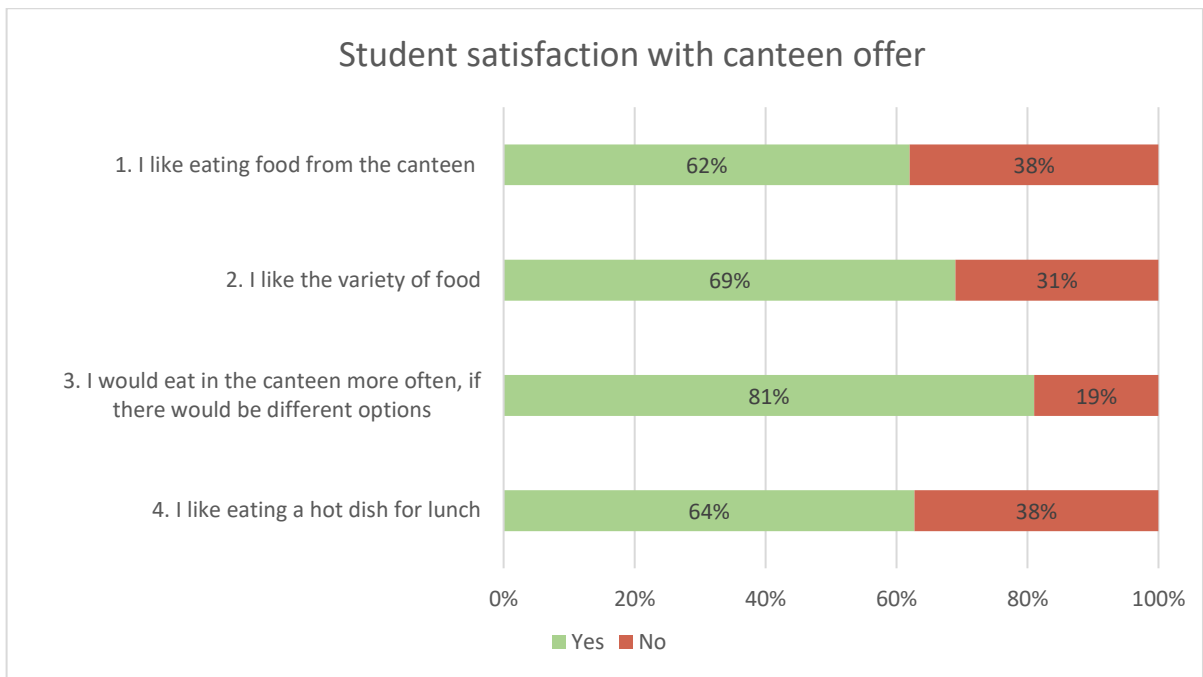


Figure 4-25: Questionnaire outcomes about student's satisfaction with the canteen (own representation)

The open round has been implemented in four classes, including 20 students from Year 1, 17 from Year 2, and 43 from Year 6 (n=80). Students have been asked to write two sentences about their satisfaction with the school canteen. Outcomes have been summarised and will be presented in the following.

Several answers about what student's like or dislike about the canteen were repetitive. The three most frequent replies for satisfaction with the canteen were:

I like...

- ...that most of the food is tasty (n=20)
- ... the snacks (n=19)
- ... that the food is healthy (n=11)

Further, the school children stated they do like that the canteen is opened on four days a week (n=5) and a hot lunch is available in school (n=8), in particular Hot Saveloy Rolls (n=7). A few children answered to like that they don't need to bring food from home (n=3) and they can afford buying snacks from their own pocket money (n=2).

In contrast, students stated certain criticisms. Main influences on children's satisfaction and therefore most frequent sentences were:

I don't like...

- ... that the canteen lady is unfriendly (n=12)
- ... that we cannot buy pies anymore (n=10)
- ... that we are not allowed to have fizzy drinks (n=9)
- ... the filled rolls being too dry (n=8)

It is conspicuous that only Year 6-students criticised the unavailability of pies and the ban of fizzy drinks, while Year 1 and 2-students were more aware of the canteen lady being unfriendly (n=8) and the filled rolls being too dry (n=5).

Additionally, seven students find the food is not tasty and another seven criticised that food offered in the canteen is unhealthy. Further answers show, that some students are upset that the canteen is not open on Mondays (n=5) and that food out of the school garden is not used for preparing dishes (n=5). Some children don't like eating lunch in class and wish to eat in the hall (n=3), another three kids complained about the canteen offering the same food every day (n=4). Two children stated they don't like that they often don't get what they ordered. Single answers include a child saying the portions are not big enough, and one student who is missing fruit in school.

All statements added together reveals a greater variety of answers on the criticism side. While statements about what students like are mostly focussed on the food itself, criticism includes different aspects of the canteen, such as service and offers.

5. Discussion

5.1. Interpretation of results

The assessment of the canteen offer according to selected criteria has shown a variety of outcomes. In general, it can be said that the canteen predominantly offers pre-packed food, while self-prepared meals only represent a relatively small proportion of its range. With the Filled Roll being available every day, one fresh prepared dish is offered daily. On selected days, the canteen also offers two fresh prepared dishes (Hot Saveloy Roll/Vegetable Soup). Additionally, students can order pre-packed food delivered by a food provider from Gisborne, which includes the Butter Chicken Wrap and the Chicken/Beef Noodles.

In total that means the canteen offers three main meals on every day it is operated; occasionally four main meals including the Hot Saveloy Roll or the Vegetable Soup. Pre-packed snacks are always available, plus bottled water and flavoured milk. The canteen offer is determined and does not change during days or weeks.

Food classification according to the Food and Beverage Classification System has shown that several foods offered in the canteen can be classified as 'occasional' food, which is defined as foods, which should not be offered in schools at all (Ministry of Health, 2007). Three of five main meals the canteen offers have been classified as 'occasional' food. These outcomes will be discussed in the following.

The Chicken/Beef Noodles contain high amounts of saturated fat, added salt and energy. Values of saturated fat are nearly seven times higher than the Ministry of Health recommends for 'everyday' or 'sometimes' foods. While the maximum level is determined with 1.5g per 100g for instant noodles, this dish contains 10g per 100g. Calculations of energy contribution have shown that approximately one fifth of the energy provided is contributed by saturated fat; nearly 40% by total fat in general. Added salt amounts are higher than the vegetable content, which is less than 2.72g per serve and energy levels exceed the nutrient criteria approximately two times. With containing wheat flour noodles, the dish provides food belonging to food group two of the nutrition recommendations for children. However, it is recommended to choose wholegrain options and combining foods from different food groups to provide nutrient rich meals. Outcomes of the Ingredient List, Nutrition Information Panel, energy distribution and Classification System indicate that the Chicken/Beef Noodles do not provide acceptable amounts of nutrients, and contribute to high energy, saturated fat and salt levels. Therefore, it should not be offered in a school canteen.

The Filled Roll contains a variety of foods from the four food groups as shown in the ingredient list and appears as a nutritious meal for children at first glance. The Nutrition Information panel and energy distribution calculations, however, show high saturated fat contents with 10.8g per serve and total fat providing nearly 50% of total energy.

The Filled Roll's total energy and sodium levels per 100g do not exceed the defined nutrient criteria for 'occasional' foods, thus energy contents per serve are higher than recommended. This indicated that reducing the serving size and therefore lowering the energy level, could lead to meeting the requirements for 'everyday' or 'sometimes' food.

As the dish provides food from all four food groups, such as bread, vegetables, lean meat and milk products, it can be generally seen as appropriate meal for children. However, the serving size and the amount of saturated fat should be modified to meet nutrient criteria for school children.

Only offered once a week, the Hot Saveloy Roll is the best-selling main meal after the Butter Chicken Wrap. Approximately 46% of energy is provided by fat, including great amounts of saturated fat which is mainly provided by butter and the saveloy itself. The serving size and therefore energy supply of the Hot Saveloy Roll exceeds the recommended maximum energy level by approximately 600kJ per serve. Added salt leads to high sodium levels. Additionally, tomato sauce contains added sugar.

Considering a five-year old girl with an estimated energy requirement of 2300kJ/day consuming a Hot Saveloy Roll with 2105kJ/serve, means she would cover approximately 92% of her total energy requirement per day with her lunch in school. As this only represents one meal out of three per day, the Hot Saveloy Roll can contribute to high energy intakes.

The Ministry of Health strongly advises against processed meat as it often contains medium to high levels of saturated fat and added salt. This dish underlines this statement by containing high levels of both. According to nutrient criteria of the Food and Beverage Classification System, the Hot Saveloy Roll is not a meal to offer in a school.

All of the three main meals that have been classified as 'occasional' food according to the Ministry of Health's Classification System, provide high energy and saturated fat. Additionally, the Chicken/Beef Noodles and the Hot Saveloy Roll provide great amounts of sodium. As school food recommendations mainly point out to reduce foods high in saturated fat and salt, these three dishes are not acceptable according to school food. By providing a variety of foods from the four main food groups, the Filled Roll potentially fits into a canteens menu if serving size and saturated fat levels get modified.

Ingredient Lists, Nutrition Information Panels and Energy distribution calculations of the Butter Chicken Wrap and the Vegetable Soup have shown that these dishes can be classified as 'everyday' meals by providing a variety of foods, low sugar-, sodium- and saturated fat-levels. With an energy distribution of 19% protein, 61% carbohydrates and 16% fat, the Butter Chicken Wrap contributes to a balanced macronutrient intake, which is recommended with 14-16% protein, 48-54% carbohydrates and 33-35% fat, as illustrated in table 2-1.

It should be noted that the soup is only offered on selected days which means it is not part of the daily menu.

Taking a look at the assessment outcomes of the snacks, it is found that two snacks fall under the category of 'occasional' food and three under 'sometimes' food.

The Chocolate Chip Jumbo as a snack contains high amounts of sugar with 32.5g per serve,

high amounts of saturated fats with 9.6g per serve and a high level of sodium with 322mg. It provides nearly three times more energy than recommended for a snack. Whereas nutrient criteria recommend not to exceed 600kJ/serve, the Chocolate Chip Jumbo delivers 1690kJ per serve, which would be approximately 74% of an estimated energy requirement for a five-year old girl or 50% of an estimated energy requirement for an 11-year old boy. The snack being not nutritious, and contributing to high energy, saturated fat and sodium levels, does not comply with nutrition recommendations for children.

Popcorn being classified as ‘occasional’ can be traced back to high levels of saturated fat and energy amounts per 100g. The serving size of 12.5g only delivers 254kJ which is lower than values defined for ‘occasional’ foods. High levels of fat and energy could be caused by vegetable oil and butter flavour-contents. Choosing a product not being advertised with ‘buttery’, containing less fat might fulfil the Ministry of Health’s nutrient criteria for ‘sometimes’ or ‘everyday’ snack.

The Chocolate Muffin, Juicies and flavoured milk have been classified as ‘sometimes’ snacks. Nutrition Information Panels and energy distribution calculations have shown that all of the three snacks provide moderate levels of sugar and/or saturated fat and do not provide a variety of foods from different food groups. According to nutrient criteria of the Classification System, these snack foods cannot be classified as ‘occasional’ foods but should not be offered every day.

Summarised, the assessment of the canteen offer according to food selection and nutritional value shows, that five out of 10 offered items are not recommended as school food for children due to high levels of energy, saturated fat and salt. Three of the foods classified as ‘occasional’ are sold as main meals, whereas two items fall under the category of snacks. Furthermore, three snacks have been identified as ‘sometimes’ foods, which should not be offered every day, not dominating the menu. Only two products offered in the canteen have been classified as ‘everyday’ foods, which are two main meals of which one is only offered occasionally (cf. table 5-1).

	<i>‘Occasional’</i>	<i>‘Sometimes’</i>	<i>‘Everyday’</i>
<i>Main meals</i>	Chicken/Beef Noodles		Butter Chicken Wrap
	Filled Roll		Vegetable Soup
	Hot Saveloy Roll		

Snacks	Chocolate Chip Jumbo	Chocolate Muffin
	Popcorn	Juicies
		Flavoured Milk

Table 5-1: Outcomes of the food classification according to nutrient criteria of the Food and Beverage Classification System Year 1-13 (own representation)

Results of the assessment of canteen offer according to its feasibility have shown several issues regarding to facilities and equipment, time management and availability of groceries. In general, a basic equipment in small kitchen facilities is available. Equipment that is required for heating, cooling, cooking and preparing the dishes is part of the canteen kitchen. All utensils except of one, are simply available. If a cooking utensil is needed for different processes, it needs to be washed before being reused for another process. An example would be washing a chopping board after it has been used for cutting the chicken before vegetables can be chopped on it. This depends on hygiene requirements that should be met, which is not discussed in this thesis but should receive attention in general according to the Food Act.

Due to an unavailability of a large pot and a supposedly lack of time, the soup does not get prepared in the canteen kitchen facilities which means canteen staff is not able to prepare this dish during work time in the canteen kitchen by using canteen equipment.

The work timeline shows several time restrictions. Within three hours a day, defined work tasks have to be fulfilled to provide the students with food. Every task needs to be fulfilled each day. As the main task is preparing and handing out food, the canteen staff states to be unsatisfied to spend too much time with trivial matters and going shopping every day. Main issues are seen in the food acquisition and money counting.

According to the Canteen Order Sheets, the staff must prepare on average 18 Butter Chicken Wraps (only heating), two Filled Rolls and seven Chicken/Beef Noodles (only filling in boiling water) per day. On selected days, 11 Hot Saveloy Rolls and one Vegetable Soup must be provided as well.

Therefore, 60-90 minutes are needed on average. The canteen lady stated not being able to get the food baskets for each class ready in time, due to heavy workload.

With food not getting delivered 5 out of 16 times, the staff cannot rely on the food provider. In case the provider does not deliver, and the supermarket is short on groceries that day, some dishes such as the Butter Chicken Wrap, Filled Rolls or Hot Saveloy Rolls cannot be offered. As children already order in the morning before food availability is assessed, orders cannot be

cancelled, and alternative dishes need to be created.

Delivery issues and grocery shortage in the supermarket require high flexibility of canteen staff and impact the work process and time management.

Summarised, the feasibility of preparing and offering dishes on the menu is limited by heavy workload, caused by grocery shortage in the supermarket or foods not being delivered, followed by incorrect time allocation which is made difficult by a poorly equipped canteen kitchen.

After the canteen offer and its feasibility have been assessed, it was from interest to ascertain the student's satisfaction with the canteen. Study results have shown that 94% of children who participated in the questionnaire eat in the canteen regularly, while only a minority does not order in the canteen at all. There are three groups of consumers; children ordering only main meals, only snacks, or both. Each of the groups represent approximately 30% of all participants.

In general, students state to be satisfied with the canteen offer. With 62% of students saying they like eating in the canteen and 69% stating they like the variety of food, the majority of students provided positive feedback. Even though 81% of students would eat more often in the canteen if there would be more different options.

This is also reflected in the 'Open Round'-study, which proves that students have several ideas for alterations and improvements. The 'Open Round' shows that the students like the food in general, but several participants would wish to be able to order pies and fizzy drinks in the school canteen.

With 11 children saying the food is healthy and seven students stating the food is unhealthy, a contrast arises, and shows that the children have difficulties with classifying food as healthy and unhealthy which indicates a different level of knowledge about nutrition.

An interest in changing the canteen and its offer can be seen in some answers such as eating together in the hall, canteen opening hours from Monday to Friday or using food out of the school garden. A negative impact on children's satisfaction appears in the unfriendliness of the canteen staff.

5.2. Strengths and limitations

The data acquisition via ingredient list and nutrition information panel has been successful and meaningful, as significant information about food selection and nutritional value have been provided. Energy distribution calculations have been helpful to get an overview about energy

allocations of each dish. Even though it should be mentioned that food label- and self-collected data only provide average information and can vary depending on food preparation. The Food and Beverage Classification System for Year 1-13 provides a variety of information based on national and international nutrition recommendations for children and simplifies to classify foods and food groups. It would be interesting to compare these guidelines to other school food recommendations defined by other countries and determine if the outcomes agree in general.

Time management as part of the feasibility assessment was mainly based on statements of the canteen staff, which questions a representative result. Another worker might have been more experienced or differently organised, which could have changed the interview outcomes. Delivery issues could have been based on communicational issues or orders that have not been made correctly. Therefore, it would be necessary to contact the food provider to receive a second opinion about mistakes and failed deliveries.

The study has been implemented by the principal as he wished to implement it himself. Followingly, it cannot be proved if the study has been carried out the way it has been planned; without a teacher influencing the student's answers; without the children influencing each other. It should be noted that the participants were children aged five to 11, who changed their minds several times before they have decided for an answer. However, the sample size of 195 from 215 students is representative and provides an overview about general satisfaction.

The reliability of the study could have been increased by implementing an anonymous standardised questionnaire, which has been difficult as a majority of the students cannot read and write properly. It would have been interesting to get the children's parents on board to identify their knowledge about what their children eat at school and if they are satisfied with the canteen offer. The canteen staff also mentioned, that the food demand varies with the time of the year. For example, in winter children would prefer to eat a warm meal instead of cold dishes and reversed in summer.

During the assessment of feasibility, especially by performing the on-site observations, the school did not allow to take photos or food samples. For that reason, the canteen has been redesigned via computer software to give a reasonable understanding of facilities and equipment. A major issue has been shown in communication and cooperation with the school.

Due to New Zealand's health issues with overweight and obesity it can be assumed, that Wairoa Primary School is also affected by children having exceed body weight. However, there is no hard evidence that could prove the assumption, which is a limitation of this study.

5.3. Future research

In cooperation with the local District Health Board, it would be from interest to measure the school children's health status, as no study has been adequately addressed this topic in the past.

Furthermore, there is no representative data available about eating behaviour and habits of Wairoa's citizens. Personal experience and conversations with the management of the District Health Board revealed that there is a lack of nutrition education in children and adults, which should be tackled in the past.

As this thesis provides a base for Wairoa Primary School to improve its canteen offer regarding to healthy child nutrition, the next step would be an establishment of canteen menu, that is also feasible according to canteen equipment and facilities, time management and grocery availability. Being a Health Promoting School, it should also be considered to get in touch with the organisation to demand their support in rearranging the canteen offer in Wairoa Primary School.

It should also be considered to assess the canteens of other schools in Wairoa to identify how other schools manage to deal with the rurality of the area and its effects of grocery availability and meal processing.

6. Conclusion and prospect

In this research paper, a status quo analysis of Wairoa Primary School's canteen offer has been conducted to provide a base of information about suitability for school children, feasibility and satisfaction of students. Outcomes of this paper offer a foundation for future modifications and improvements.

The first research question was dealing with the food selection and nutritional value of offered dishes. Ingredients and nutritional values have been assessed and analysed critically according to school food recommendations and nutrition guidelines. Outcomes have shown that several main meals and snacks are not suitable as foods in school canteens, as they provide great amounts of saturated fat, energy, salt and sugar. Additionally, they do not provide a variety of foods from the four food groups. Only a minority of offered dishes contain fresh vegetables, while no fruits, wholemeal options, nuts or legumes are available. Instead of fresh foods, the

canteen mainly relies on pre-packed items. The offer does not vary and stays the same every day. Three out of five main meals have been classified as 'occasional' foods which should not be offered in schools; only two main meals were classified as 'everyday' foods from which one is only offered occasionally. While two of five snacks have been detected as not acceptable, three were classified as 'sometimes' foods, which means they should only be offered on selected days. In general, the results show that the menu of Wairoa Primary School's canteen should be redesigned to offer healthy meals for children according to school food recommendations and nutrition guidelines.

According to these outcomes, the first hypothesis which stated that the canteen's food supply does not comply with child nutrition and school food recommendations, can be partly proofed, as some foods are acceptable due to recommendations, but the majority does not comply with healthy child nutrition.

The hypothesis that the canteen offer is not feasible regarding facilities, time management and grocery availability has been mainly proven, as major issues have been arisen during measurements.

Nearly all students eat in the canteen regularly; 37% a few times a month, 43% a few times a week and 14% daily. Only 5% of children stated to never eat in the canteen. This results in approximately 67 orders per day including 27 main meals, 39 snacks and one bottle of water on average. Followingly the staff only prepares two fresh dishes daily (Filled Rolls) and prepares another 20 pre-packed dishes plus snacks and drinks. On occasional days, 11 Hot Saveloy Rolls must be prepared, or one serve of vegetable soup. Even if the amount of work seems to be manageable, and the canteen staff does not prepare great amounts of fresh foods each day, issues with getting food ready in time occur nearly every day. Reasons for that have been identified in a shortage of equipment, time pressure and delivery issues resulting in grocery shortage regularly. Unavailability of groceries is the main issue putting a lot of pressure on the canteen staff and requires creativity in the kitchen while preparing foods. Often, children cannot receive the food they ordered.

A restructuring of work processes including time management should be given attention in the past, to ensure an appropriate amount of time due to workload. Additionally, reflections should take place according to the food provider. Agreements could be rearranged, or in case of disagreements, an alternative food provider could be considered.

As facilities and equipment are limited, it should be considered to increase basic work

equipment such as pans and pots, cutlery or chopping boards to simplify work processes and to relieve the canteen staff. While rearranging the canteen menu, it should be carefully attended if facilities, equipment and time allow to prepare the alternate dishes. Additionally, the canteen must develop a Food Control Plan to ensure Food Safety and get registered with Wairoa District Council to sell fresh-prepared food legally.

The last hypothesis that school children are unsatisfied with the canteen offer has been mainly refuted. A majority of students stated to like the food and variety offered in the canteen. Positive feedback has been shown in the tastiness of food and the offer of snacks.

Even though more than 80% would eat more often in the canteen if there would be different options available, which shows that there are still areas for improvement. Students self-written sentences have shown dissatisfaction with unfriendly canteen staff, the unavailability of pies and fizzy drinks, the filled rolls being too dry and food not being healthy.

An interesting statement of one student that food out of the school garden is not used to prepare the canteen food attracted attention, as it has not been clear at that stage that the school operates a school garden. This means that the school would be able to grow their own vegetables and could involve school children in the process of gardening and harvesting, which could also solve some issues with grocery shortage.

Rearranging the canteen menu according to school food recommendations and child nutrition guidelines, considering alternate work processes and including school children in food selection and cooking processes is strongly recommended at the end of this thesis. As issues with overweight and obesity are present in New Zealand, Wairoa Primary School could make a start in preventing children gaining exceeding body weight by promoting healthy food and educate their students regarding to healthy food choices.

In the end it can be said, that Wairoa Primary School as a health promoting school should aim to be a positive role model for other schools, supporting their students to grow up to not only proud and origin-conscious adults, but also healthy and health-conscious individuals.

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Appendix

Appendix A

Estimated Energy Requirements of Infants and Young Children

TABLE I. ESTIMATED ENERGY REQUIREMENTS (EERs) OF INFANTS AND YOUNG CHILDREN

Age (months)	Reference weight (kg)		EER (kJ/day)	
	Boys	Girls	Boys	Girls
1	4.4	4.2	2,000	1,800
2	5.3	4.9	2,400	2,100
3	6.0	5.5	2,400	2,200
4	6.7	6.1	2,400	2,200
5	7.3	6.7	2,500	2,300
6	7.9	7.2	2,700	2,500
7	8.4	7.7	2,800	2,500
8	8.9	8.1	3,000	2,700
9	9.3	8.5	3,100	2,800
10	9.7	8.9	3,300	3,000
11	10.0	9.2	3,400	3,100
12	10.3	9.5	3,500	3,200
15	11.1	10.3	3,800	3,500
18	11.7	11.0	4,000	3,800
21	12.2	11.6	4,200	4,000
24	12.7	12.1	4,400	4,200

Adapted from FNB:IOM (2002). Reference weights from Kuczmarski et al. (2000)

Appendix B

Nutrient Criteria for 'occasional' foods and drinks

Appendix 2: Nutrient criteria for 'occasional' foods and drinks

Occasional foods and drinks

Some foods automatically fit into the **occasional** food category because they are too high in fat (particularly saturated fat) and/or salt and/or added sugar and provide minimal nutritional value.

These foods are:

- confectionery
- deep-fried foods
- full-sugar carbonated drinks
- full-sugar and artificially sweetened energy drinks
- any drinks labelled 'not recommended for children'.

The following tables are nutrient criteria for foods and drinks classified in the **occasional** category for each product group listed on pages 10–17. A product fits into the **occasional** food category (rather than **everyday** or **sometimes**) if it meets one or more of the following nutrient criteria.

PRODUCT GROUP 1	OCCASIONAL CATEGORY
DRINKS	
Water	Not applicable
Flavoured and/or fortified water	Package size > 450 ml Energy > 50 kJ/100 ml
Artificially sweetened carbonated drinks Examples include 'diet', 'light' and 'zero' soft drinks or carbonated drinks.	Package size > 400 ml
Vegetable and/or fruit juice and drinks Examples include pure juices, fruit-flavoured drinks and fruit smoothies.	< 50% vegetable and/or fruit juice Package size > 350 ml Package size > 250 ml and Energy > 90 kJ/100 ml

PRODUCT GROUP 1	OCCASIONAL CATEGORY
DRINKS	
Flavoured milks and drinking yoghurts Examples include flavoured cow's milk, soy milk and rice milk.	Package size > 350 ml Total fat > 3.3 g/100 ml
Milk Examples include plain cow's milk, soy milk, goat's and rice milk.	Total fat > 3.3 g/100 ml

PRODUCT GROUP 2	OCCASIONAL CATEGORY
VEGETABLES AND FRUIT	
Fresh, canned and frozen vegetables and/or vegetable mixes (except potato, kūmara, taro and tapioca).	Saturated fat > 1.5 g/100 g
Potato, kūmara, taro and tapioca Examples include fresh, frozen or mashed potato, kūmara, taro and/or tapioca products.	Energy > 1000 kJ/100 g Saturated fat > 5 g/100 g Sodium > 450 mg/100 g
Fresh, frozen and canned fruit, fruit tubs and pureed fruit	Not applicable
Dried vegetables and/or fruit, vegetable and/or fruit leathers and chips Examples include vegetable and/or fruit chips, for example, banana chips.	< 95% vegetable and/or fruit Saturated fat > 3 g/serve

> more than < less than

PRODUCT GROUP 3	OCCASIONAL CATEGORY
BREADS AND CEREALS	
Rice, pasta, noodles and couscous Examples include fresh and dried pasta, rice, couscous, noodle cups/instant noodles, rice risotto and savoury rice, and canned spaghetti.	Energy > 1000 kJ/100 g Saturated fat > 1.5 g/100 g Sodium > 450 mg/100 g
Breads or bread products and fruit breads Examples include all breads, muffin splits, crumpets, bagels, wraps, flatbreads, rolls, fruit breads, non-iced buns, rēwena, fa'apāpā, garlic bread and croissants.	Saturated fat > 4 g/100 g
Breakfast cereals Examples include wheat biscuits, bran, rice and corn flakes and bubbles, rolled oats and muesli.	Saturated fat > 4 g/100 g Sodium > 600 mg/100 g Fibre < 4 g/100 g

PRODUCT GROUP 4	OCCASIONAL CATEGORY
MILK AND MILK PRODUCTS	
Cheese Soft and hard cheese. Examples include ricotta, cottage cheese, cheddar, cheese slices and cream cheese.	Not applicable
Milk-based snacks Examples include yoghurt, custards, dairy desserts and creamed rice, and soy versions of these items.	Energy > 1000 kJ/serve Saturated fat > 3 g/serve
Milk Examples include plain cow's milk, soy milk, goat's and rice milk.	Total fat > 3.3 g/100 ml
Flavoured milks and drinking yoghurts Examples include flavoured cow's milk, soy milk and rice milk.	Package size > 350 ml Total fat > 3.3 g/100 ml



PRODUCT GROUP 5	OCCASIONAL CATEGORY
MEAT, FISH, POULTRY AND MEAT ALTERNATIVES	
Fresh, frozen, canned and pouched fish and seafood	Not applicable
Processed fish and seafood products Examples include crumbed or coated fish, fish patties, fish fingers, surimi, and other processed seafood.	Energy > 1000 kJ/100 g Saturated fat > 5 g/100 g Sodium > 450 mg/100 g
Meat, poultry and eggs Examples include plain beef, lamb, pork, chicken and turkey, plain mince (with no added ingredients) and egg dishes.	Not applicable
Processed meats Examples include ham, salami, luncheon and minced meat patties.	Total fat > 5 g/100 g Saturated fat > 2 g/100 g
Sausages, frankfurters and saveloys	Saturated fat > 7.5 g/100 g Sodium > 900 mg/100 g
Meat alternatives (vegetarian options) Examples include vegetarian 'meats' and 'sausages', nutmeat, fetafel and tofu.	Sodium > 900 mg/100 g
Dried and canned peas, beans and lentils (pulses) Examples include lentils, split peas, chickpeas, red kidney beans, baked beans and canned bean mixes.	Saturated fat > 5 g/serve
PRODUCT GROUP 6	OCCASIONAL CATEGORY
MIXED MEAL DISHES	
Mixed meal items These items are a combination of foods from one or more food groups. These are promoted as stand-alone items that are consumed on their own or as the main item of a meal. Examples include pizza with a bread or pastry base, pasta dishes including filled pasta, lasagne and macaroni cheese, calzones and sushi.	Energy > 1000 kJ/100 g Saturated fat > 5 g/100 g Sodium > 450 mg/100 g
Soup All fresh, canned and powdered soups, soup mixes and chowders.	Energy > 1000 kJ/100 ml Saturated fat > 5 g/100 ml Sodium > 450 mg/100 ml

PRODUCT GROUP 6	OCCASIONAL CATEGORY
MIXED MEAL DISHES	
Filled sandwiches, rolls and wraps All filled bread, flavoured bread, flat bread and pita bread. Examples include sandwiches, filled rolls, wraps, American hot dogs and burgers.	Energy > 1200 kJ/100 g Energy > 1500 kJ/serve Saturated fat > 7.5 g/serve Sodium > 750 mg/100 g
Pastry products Examples include savoury pies, sausage rolls, spring rolls, quiches and samosas.	Energy > 1000 kJ/100 g Energy > 1500 kJ/serve Saturated fat > 5 g/100 g Sodium > 350 mg/100 g
PRODUCT GROUP 7	OCCASIONAL CATEGORY
SNACK ITEMS	
Milk-based snacks Examples include yoghurt, custards, dairy desserts and creamed rice, and soy versions of these items.	Energy > 1000 kJ/serve Saturated fat > 3 g/serve
Sweet snacks Examples include biscuits, bars, cereal bars and sweetened popcorn.	Energy > 1900 kJ/100 g Energy > 600 kJ/serve Saturated fat > 2 g/serve Sodium > 200 mg/serve
Savoury snacks Examples include crackers, bars, chips, potato crisps (chippies), rice crackers and plain popcorn.	Energy > 1800 kJ/100 g Energy > 600 kJ/serve Saturated fat > 3 g/serve Sodium > 200 mg/serve
Baked snack foods Examples include cakes, pancakes, pikelets, iced buns, sweet and savoury muffins, scones and sweet pastries (for example, danish pastries and fruit pies). (Excludes biscuits and pre-packaged bars.)	Energy > 1800 kJ/100 g Energy > 900 kJ/serve Saturated fat > 3 g/serve Fibre < 1.5 g/serve
Dried fruit, nut and seed mixtures Examples include any dried fruit and/or nut and/or seed sold as a mixture or sold separately.	Saturated fat > 5 g/serve Sodium > 200 mg/serve
Ice creams, iceblocks, frozen yoghurts and jellies Ices, iceblocks, ice creams, frozen yoghurts, gelato, slushies, fruit and jelly tubs, and jelly snacks.	Energy > 600 kJ/serve Saturated fat > 3 g/serve

Appendix C

Wairoa Primary School – Charter Goals

Wairoa Primary School - Charter Goals and Priorities 2017-2019

The Charter establishes the school's aims and priorities. This document acknowledges cultural diversity, individual learning needs and the unique position of Maori Culture in the school. The Charter guides the school Annual Plan and Annual Achievement Targets. The Wairoa Primary Charter references both government and school beliefs and the values we know are important to whanau and community.

1. Context

School Context: Mission, Vision, Values and Beliefs for students of Wairoa Primary:

***Mission:** To provide the highest quality learning in a safe, caring environment which values diversity and prepares children for the future.*

***Vision:** E Tu E Tu Tamariki Ma; Ko au te akonga, ko te akonga ko au.*

Our tamariki stand tall and are proud of who they are, where they have come from and where they are going.

We are all learning together.

Core Values:

- *Whanaungatanga*
- *Community partnership*
- *Diversity*
- *The child as an individual*
- *Maoritanga*
- *Pride: in self, identity, community*

Health and Well Being: *The Wellbeing / Hauora for staff, students and whanau is an integral aspect of all teaching and learning at Wairoa Primary School.*

Positive Behaviour For Learning - Values: *Safe, Respectful, Responsible, Learners.*

Expectations of our tamarki:

We have very high expectation for our children and believe they will be:

- Confident in their ability to learn and achieve academic success;
- Connected to their culture and language and understand the significance of their heritage;
- Actively involved in all aspects of school life and the wider community;
- Lifelong learners who are focused on successful outcomes for themselves, their whanau and community.

Our Staff, BOT, and whanau beliefs in relation to Wairoa Primary School learners:

- All children can learn.
- Quality teaching is child centred and personalised to need.
- Positive whanau / family support and participation enhances learning.

All children are entitled to enjoy a safe and motivating learning environment where their entire well-being is nurtured.

Appendix D Canteen Order Form

WAIROA PRIMARY SCHOOL - CANTEEN ORDER FORM

Reconciliation Sheet

Date 31. 1. 2018

Rooms		4	5	6	8	9	10	11	12	13	14	15	16	office	
Amount Received		/	5.00	5.00		6.50	/		10.00		/		8.00	12.00	46.50
Item	Price														
Hot Saveloy Rolls	2.50														
Butter Chicken wrap	3.00	1		1		2		1	1		1				7.
Wrapped Filled Rolls	2.50						1H	2H							2✓
Chicken or Beef Noodles	2.50								1				1		2✓
Chocolate Muffin	1.60														
Chocolate Chip Cookie	1.60														
Popcorn	0.60						1								1✓
Bottled Water	1.50	1		1		1					1				4✓
Flavoured Milk S,B,C	2.00								1		#		1		2✓
Juicy	0.60					2	1						2		5✓
	Total		5.00	4.50		9.70			7.50				5.70	12.00	40.40
	Change	/	/	.50		80	/		2.50	/			2.30	/	6.10

Appendix E

Checklist of Grocery Availability in the Supermarket

Supermarket Grocery Availability

Date:

Time:

Item	Available	Not available	Available on request
Vegetables			
Lettuce			
Carrots			
Tomatoes			
Potatoes			
Pumpkin			
Leeks			
Parsnip			
Dairy			
Cheese			
Butter			
Meat/Poultry			
Chicken			
Ham			
Saveloy			
Spreads/Sauces			
Mayonnaise			
Yam			
Mustard			
Tomato Sauce			
Snacks			
Popcorn			
Juicies			
Bread			
Long Rolls			

Class:

Number of students:

QUESTIONNAIRE

Canteen Food

The aim of this "game" is to find out, what the students like/don't like about the canteen. The teacher reads out the following statements. If students agree, they stand up from their chair and hold both hands up into the sky. Please count the students, who agree with each statement. After each round, students need to sit down again.

1. I like eating food from the canteen. (Yes: _____)
2. I like the variety of food in the canteen. (Yes: _____)
3. I would eat in the canteen more often, if there would be different options. (Yes: _____)
4. I would like to eat a hot dish for lunch in school. (Yes: _____)
5. Choose one option: I eat in the canteen...
 - a few times a month (Yes: _____)
 - a few times a week (Yes: _____)
 - everyday (Yes: _____)
 - never (Yes: _____)
6. Choose one option: I order...
 - main dishes, but no snacks (Yes: _____)
 - snacks, but no main dishes (Yes: _____)
 - both, snacks and main dishes (Yes: _____)
 - nothing (Yes: _____)

OPEN ROUND

Canteen Food

After finishing the game, please ask the students to build two sentences beginning with the following words:

I like about the canteen, that...

I don't like about the canteen, that...

Please write down the content of each sentence in the following chart. Students who can already write, can write down their own sentences on an extra sheet.

I like 😊	I don't like 😞

Appendix G

Ebispro Data 'Filling' of the Filled Roll

Lebensmittel	Menge	kJ	Fett	Eiweiß	Kohlenhy	Ballastst	Ges. FS	Kochsalz	Sacharos
1 Butter	5	155.1	4.2	0.0	0.0	0.0	2.7	0.0	0.0
2 Mayonnaise 80% Fett	10	311.2	8.3	0.1	0.2	0.0	3.7	0.1	0.0
3 Marmelade	4	47.3	0.0	0.0	2.8	0.0	0.0	0.0	2.6
4 Senf	4	14.4	0.2	0.2	0.2	0.0	0.0	0.1	0.1
5 Kopfsalat roh	30	14.4	0.1	0.4	0.3	0.4	0.0	0.0	0.0
6 Tomate rot roh	17	12.4	0.0	0.2	0.4	0.2	0.0	0.0	0.0
7 Karotte (Mohrrübe, Möhre) roh	20	27.4	0.0	0.2	1.4	0.6	0.0	0.0	1.0
8 Suppenhuhn Schenkel gegart	23	281.3	4.9	5.9	0.0	0.0	1.7	0.0	0.0
9 Schnittkäse mind, 40% Fett i, Tr,	16	209.6	3.7	4.2	0.0	0.0	2.4	0.2	0.0

Gesamtanalyse:	
Energie	1073.1 kJ
Fett (74%)	21.3 g
Eiweiß (18%)	11.2 g
Kohlenhy. (9%)	5.4 g
Ballastst.	1.3 g
Ges. FS	10.4 g
Kochsalz	0.5 g
Sacharose	3.7 g

Lebensmittel	Menge	Energie	Kohlenhy.
Butter	5 g	155.1 kJ	0.0 g
Mayonnaise 80% Fett	10 g	311.2 kJ	0.2 g
Marmelade	4 g	47.3 kJ	2.8 g
Senf	4 g	14.4 kJ	0.2 g
Kopfsalat roh	30 g	14.4 kJ	0.3 g
Tomate rot roh	17 g	12.4 kJ	0.4 g
Karotte (Mohrrübe, Möhre) roh	20 g	27.4 kJ	1.4 g
Suppenhuhn Schenkel gegart	23 g	281.3 kJ	0.0 g
Schnittkäse mind, 40% Fett i, Tr,	16 g	209.6 kJ	0.0 g

Zwischenanalyse: Energie 1073.1 kJ (100 %), Kohlenhydrate 5.4 g (100 %)

Appendix H

Ebispro Nutrition Information Butter

Lebensmittel	Menge	kJ	Fett	Eiweiß	Kohlenhy	Ballastst	Ges. FS	Kochsalz	Sacharos
1 Butter	5	155.1	4.2	0.0	0.0	0.0	2.7	0.0	0.0
2									
3									
4									
5									

Gesamtanalyse:	
Energie	155.1 kJ
Fett (99%)	4.2 g
Eiweiß (0%)	0.0 g
Kohlenhy. (0%)	0.0 g
Ballastst.	0.0 g
Ges. FS	2.7 g
Kochsalz	0.0 g
Sacharose	0.0 g

Appendix I

Ebispro Nutrition Information Vegetable Soup

Lebensmittel	Menge	Energie
Trinkwasser	1500 g	0.0 kJ
Kartoffeln geschält roh gegart	500 g	1475.0 kJ
Kürbis gegart	310 g	337.9 kJ
Porree gegart	230 g	253.0 kJ
Karotte (Mohrrübe, Möhre) roh gegart	160 g	222.4 kJ
Pastinake roh gegart	150 g	343.5 kJ
Speisesalz	21 g	0.0 kJ

Zwischenanalyse: Energie 2631.8 kJ (100 %), Kohlenhydrate 125.5 g (100 %)

Appendix J

Interview with Canteen Staff

Interview: Time management in Wairoa Primary School's Canteen

1. On a scale from 0 to 10, how satisfied are you with your time management during work hours? (0 not satisfied, 10 very satisfied).

Answer: 3

2. Do you have an appropriate timetable for your tasks?

Answer: I've got my usual procedure, but time always depends on orders coming in. The processes are always the same; getting orders, counting them, counting the money, checking the food, going shopping, preparing food and handing it out. That's my routine. I could tell on average how long every task takes, but that varies from day to day.

3. How often are you having difficulties with getting food baskets ready in time?

Answer: I am always a couple of minutes late. The children are already waiting for their food, mucking around in front of me, which makes it really stressful. But it depends on the day and the amount of orders.

4. What takes most of your time during work hours?

Answer: Counting the orders and money can be very complicated. Most of the time I don't have enough change and need to ask the girls from the front office for coins. That's a time waster. To go shopping is another issue. Some weeks, I have to go every day, because I only get money from day to day and cannot do a big one once a week. In general, I need most of the time to prepare food, but I still don't feel like I've got enough time for that.

5. Do you think you would be less stressed with one big shopping a week or changing the ordering system?

Answer: Yes. One big shopping would be great, but we don't have enough space to store all the stuff. The order system itself is not a problem, it's more about counting money and putting the right amount of change back into the boxes. I might be less stress and get less confused with numbers if I would have a bit more time.

5. How difficult is it for you to prepare the dishes?

Answer: It's not difficult at all because most of the food is already prepared and I only have to manage the orders per class. I usually get confused when I pack the food baskets because it's so many numbers.

It's only complicated when students request specials such as no cheese on a sandwich. Then I have to mark and pack the item extra.

6. In your opinion; what could be improved to simplify your work process and timing?

Answer:

- more storage
- a responsible food provider or one big shopping a week
- couple of more hours a week
- more kitchen equipment

The kitchen is poorly endowed. I only use one knife for all of my chopping and a pot from home for the soup. I couldn't even cook the soup at work because I don't have the time, that's way I am doing it at home and freeze it.

It would be more manageable if I would have more time and a better equipped kitchen.

Appendix K

Outcomes: Grocery Availability in the Supermarket

Item	Days of availability	Available on request
Vegetables		
Lettuce	14	-
Carrots	18	-
Tomatoes	12	once
Potatoes	18	-
Pumpkin	10	-
Leeks	8	-
Parsnip	11	-
Dairy		
Cheese	18	-
Butter	18	-
Meat/Poultry		
Chicken	18	-
Saveloy	16	twice
Spreads/Sauces		
Mayonnaise	18	-
Yam	18	-
Mustard	18	-
Tomato Sauce	15	-
Snacks		
Popcorn	12	-
Juicies	10	twice
Bread		
Long Rolls	7	-

