Green Prescription and nutrition support in New Zealand: exploring the lay of the land

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Abstract

Background

New Zealand has high rates of chronic disease such as diabetes. Modifiable lifestyle factors such as physical activity and diet are supported in research in reducing the risk of these conditions. Green Prescription (GRx), an initiative implemented in New Zealand, has largely focused on supporting physical activity, but there is indication that provision of nutrition support occurs among various providers. GRx may be able to provide nutrition support in the community, but the current situation has had little investigation.

Objectives

1). To conduct a survey with GRx staff exploring the scope of nutrition support currently available from GRx providers in New Zealand.

2). To develop a basis for future investigation to determine the opportunities for the provision of nutrition support in the community focusing on preventative health.

Method

Staff from 17 GRx providers in New Zealand were invited to complete an anonymous online survey. Survey questions investigated if nutrition support was provided, if so by whom, what it entailed and if GRx personnel were qualified and supported to conduct these duties. Respondents were invited to share their perspectives on both benefits and concerns about providing nutrition support in GRx.

Results

Forty-six respondents from 15 GRx providers completed surveys. Physical activity makes up more than 50% of GRx programmes, while nutrition support makes up 31% on average. Nearly three times as many personnel qualifications specialised in physical activity as nutrition. Most respondents indicated they have professional development opportunities for nutrition. Nearly all respondents indicated nutrition support has high importance for clients. Eighty percent identified multiple benefits in providing nutrition support and concerns about resources, knowledge and support were noted.

Conclusion

Physical activity remains the key focus for GRx programmes, however nutrition support is perceived as being important for health and contributes an average of 31% to programmes. Many providers have personnel with nutrition qualifications but not in designated roles. Opportunities for professional development are indicated but need more clarification. Further investigation into provision of resources and personnel support is warranted.

Key words: Green Prescription, GRx, nutrition support, situation analysis

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Abbreviations

AMA	- American Medical Association
B4SC	- Before(4) School Check
BMI	- body mass index
CVD(s)	- cardiovascular disease(s)
DALY(s)	- disability-adjusted life-year(s)
DASH	- Dietary Approaches to Stop Hypertension
DHB(s)	- district health board(s)
ESRD	- end-stage renal disease
FAO	- Food and Agriculture Organization of the United Nations-
GBD	- global burden of disease
GP	- general practitioner/family doctor
GRx	- Green Prescription
HAL	- Healthy Active Learning
HbA1c	- glycated haemoglobin
HEHA	- Healthy Eating, Healthy Action
HLA	- healthy lifestyle advisor
IDF	- International Diabetes Federation
IGT	- impaired glucose tolerance
IOTF	- International Obesity Task Force
KA	- Kia Ākina
KAP	- knowledge, attitudes and practices
MOH	- Ministry of Health
NCD(s)	- non-communicable disease(s)
NIDDM	- non-insulin-dependent diabetes mellitus
NZ	- New Zealand
NZD	- New Zealand dollar
OECD	- Organisation for Economic Co-operation and Development
PA	- physical activity
PHO(s)	- primary health organisation(s)
PHU(s)	- public health unit(s)
QALY(s)	- quality-adjusted life-year(s)
RST	- regional sports trust
SCS	- service coverage schedule
SPARC	- Sport and Recreation New Zealand
T2DM	- type-2 diabetes mellitus
US	- United States (of America)

WHO - World Health Organisation

YLD(s) - years of healthy life lost due to disability

YLL(s) - years of life lost

Glossary of Māori kupu (words and terms)

It is important to note words in the Māori language (te reo) have different meanings depending on the context. Common definitions have been sourced from Te Aka Māori dictionary (Moorfield, 2011). The likely definition in the given context is underlined.

kai = [1.] (verb) to eat, consume, feed (oneself), partake, devour

[2.] (verb) to drink- used for any liquid other than water

[3.] (noun) food, meal

māra kai = [1.] *māra* (noun) garden, cultivation. Māra kai is a term which denotes food garden

maramataka= [1.] (noun) almanac, Māori lunar calendar- a planting and fishing monthly almanac

te reo= *te* (determiner) the

reo [1.] (noun) voice, sound

[2.] (noun), language, dialect, tongue, speech

[3.] (noun) speech, utterance, statement, remark

whānau = [1.] (verb) to be born, give birth

[2.] (noun) extended family, family group, a familiar term of address to a number of people (which may include friends who have no kinship ties to other members).

Te Whare Tapa Wha = a Māori health model developed in 1984 by Sir Mason Durie and widely used in New Zealand. It demonstrates four interconnected domains related to health: physical, mental, spiritual and family/relationship health (Durie, 1985; Rochford, 2004).

Chapter 1: Introduction

1.1 Background to study

New Zealand is described as being on a trajectory for chronic diseases such as type-2 diabetes to reach epidemic proportions soon. Individualised lifestyle interventions, including nutrition support, may play a significant part in preventing or delaying the onset of these conditions (PricewaterhouseCoopers, 2021). The effect that modifiable lifestyle factors including diet and physical activity have on the risk and development of chronic disease conditions such as diabetes, cardiovascular disease and some cancers is well known (Sun et al., 2017; Zhang et al., 2020a; Zhang et al., 2020b). Recognising the magnitude of problems associated with chronic disease, multiple public health initiatives have been implemented in New Zealand for many years. One which was developed to provide individualised lifestyle intervention began in 1998 and was called Green Prescription (GRx). It was developed as an initiative for health professionals to 'prescribe' lifestyle changes to a patient to support and encourage increased physical activity and eating healthier as part of an overall health plan to reduce chronic disease prevalence and incidence (Ministry of Health, 2017a).

GRx programmes currently are provided by regional sports trusts (RSTs), or primary health organisations (PHOs) and managed by district health boards (DHBs). As of 2021, there were 15 GRx programme providers in New Zealand named on the Ministry of Health (MOH) website (Ministry of Health, 2017a, 2022c). DHBs and GRx providers negotiate on the programme delivery including specific engagement targets and provision of services. In this respect, each GRx provider has autonomy over its programme in relation to the needs of the community in which it serves. GRx has undergone changes since its inception with an increase in self-referral, where referrals previously were made only by health professionals, and more broadly encompasses sedentary lifestyles with or without a diagnosed chronic condition (personal communication with contract and GRx managers, April 2021).

For much of its history, the focus of GRx has been on supporting people to increase their participation in physical activity and exercise, aligned with the guidelines of 30 minutes per day of physical activity for adults. Several studies on the efficacy of GRx focusing on this have been conducted, demonstrating that it has been beneficial. Those who participated in GRx were more likely to continue engaging in physical activity following

the completion of their programme enrolment (Hamlin et al., 2016; Patel et al., 2011; Sellman et al., 2017; Sinclair & Hamlin, 2007; Swinburn et al., 1998).

In 2002, the World Health Organisation (WHO) identified diet and nutrition-related recommendations for various chronic disease conditions and highlighted the need to support intersectoral initiatives promoting healthy diets. It also recommended ensuring health professionals are sufficiently trained in diet, nutrition and physical activity as integral components of health (WHO, 2003).

The New Zealand Ministry of Health's Service Coverage Schedule (SCS) for DHBs describes what GRx services are intended for, however, there is not, nor has there been a specific requirement for GRx programmes to provide nutrition support or advice (Ministry of Health, 2014, 2015a, 2015b, 2016b, 2017b, 2018, 2019, 2020, 2021d). Some DHBs and PHOs provide additional funding to GRx providers to strengthen nutrition support and provide concentrated group programme delivery (Ministry of Health, 2017a). It is understood some GRx providers employ or contract qualified nutritionists or dietitians in specific nutrition support roles, while others have qualified personnel operating in adjunct or separate roles. However, the specifics of nutrition support provision within GRx programmes are largely unknown and have not been previously investigated.

The Ministry of Health collects and reports on annual surveys completed by GRx clients/patients. The most recent findings (2018) indicated that 65% of respondents had made changes to their diets following enrolment in GRx and details of these changes described increasing vegetable consumption and reducing sugar-sweetened beverages, (Research New Zealand, 2019). The 2016 patient survey report indicates that 68% of respondents had received specific advice on healthy eating. Seventy percent had made changes to their diet since receiving their GRx. The most common change was having less or avoiding sugar and sugary foods, sweets and soft drinks. Māori were more likely to have received specific advice on healthy eating at 76% compared with 68% overall (Research New Zealand, 2016).

Good nutrition literacy has been identified as a predictor of adherence to dietary patterns consistent with reducing chronic disease risk (Taylor et al., 2019), while low health and nutrition literacy is associated with increased incidence of chronic disease risk factors (Michou et al., 2019). Dietary intervention has a positive impact across the lifespan,

influencing the development of chronic disease, and as such, registered dietitians and nutritionists are a crucial part of health care teams to deliver nutrition education in clinical and community settings (Early & Stanley, 2018; Slawson et al., 2013).

1.2 Justification for the study

GRx is a community-facing initiative, open to all adults in New Zealand who want to improve their health and wellbeing (Ministry of Health, 2017a) and, as such, is well-placed to provide both physical activity and nutrition support. To date, the scope in which nutrition support is provided in the programmes has not been explored extensively.
While there are international studies combining physical activity and nutrition support, few exist locally in the New Zealand population. Several pilot projects have been developed and implemented within GRx, with a focus on nutrition advice as a key component of support alongside physical activity (McRobbie, n.d.). These, however, have focused on pre-diabetes or diabetes and it is unknown whether (or to what extent), nutrition support continued following the project conclusion.

Programmes with a focus on nutrition, either as specific goals or provision of advice and resources, have been highly successful (Elliot & Hamlin, 2018; Glover et al., 2019; Mitchell et al., 2017). A recent study by Elliot and Hamlin concluded a combination of nutrition/diet support and physical activity would likely provide better outcomes than either physical activity or diet support alone and specific provision of nutrition support within GRx services is prudent (Elliot & Hamlin, 2018). Clarity is needed regarding the current provision of nutrition support for GRx clients as there is an increasing focus on nutrition information and individualised support as part of general health and the prevention of chronic conditions.

The primary researcher had a part-time role between late 2018 to mid-2021 as the sole nutritionist in a GRx provider and has first-hand experience of the challenges associated with providing nutrition support in the programme. The researcher's experience in delivering nutrition support to clients and providing professional development support to GRx colleagues highlighted it is an integral part of a person's health and well-being journey.

The effects of gaining knowledge and confidence around healthy eating has both immediate and longer-term benefits, including changes to lifestyle that have impact in the client's home, wider family, social circles and community, which can impact across generations. These personal insights and the contribution of colleagues within the researcher's GRx team and other GRx providers were crucial in the shaping of this study. Nutrition support within GRx programmes has been variable across providers and often challenging, fraught with limited resources and engagement issues. An exploration of this aspect of preventative health care is warranted to determine the feasibility of its inclusion in all GRx programmes.

This study has several potential benefits. These are:

- Identifying the current state of nutrition support provides insight to further develop and enhance preventative healthcare measures in our communities.
- Findings can support GRx providers, DHBs and MOH to determine the future direction of GRx progammes in providing meaningful health support.
- It identifies potential for cohesive strategies around nutrition messaging to be developed, gaps in knowledge can be identified and ensure nutrition advice is accurate and applicable to effect change for individuals, whānau and communities.

An investigation into the knowledge, practices and attitudes about nutrition among GRx personnel as a situation analysis is beneficial to identify priorities and support future intervention planning (Marías & Glasauer, 2014).

1.3 Aims and objectives

Aims:

1. To conduct a survey with Green Prescription (GRx) staff exploring the scope of nutrition support currently available from GRx providers in New Zealand
2. To develop a basis for future investigation to determine the opportunities for provision of nutrition support in the community focusing on preventative health.

Objectives:

1. Identify if within GRx providers there are specific nutrition support roles, or nutrition support duties as an adjunct to other roles

2. Determine the qualifications of personnel involved in nutrition support
3. Identify how GRx providers implement nutrition support in their programme
4. Determine how GRx providers measure the impact of nutrition support
5. Explore the perceived value of including nutrition support in GRx programmes

1.4 Research question

Is nutrition support currently provided as part of a client's journey within GRx programmes in New Zealand? If so, what does it look like, who provides it and is there appropriate professional support?

1.5 Eligibility to study

To be eligible to participate in the study, individuals needed to be currently employed by a GRx provider during the time the survey was completed (August-October 2021).

1.6 Thesis structure

The thesis begins with Chapter 1, the introduction and background to the study. Chapter 2 is a literature review, which provides background to the concept of chronic disease and how it came to be studied. It describes the global burden of leading chronic diseases, before examining how these same conditions affect the New Zealand population. The study of causes and risk factors, including modifiable lifestyle factors, is explored before describing New Zealand initiatives to address these. The literature review concludes with Green Prescription (GRx) investigated as a chief example of supporting changes to lifestyle to reduce chronic disease burden. Chapter 3 introduces the methods for the study, including a comprehensive description of the survey development and background to this, as well as data collection and analysis. Both chapters 4 and 5 provide the results of this situation analysis.

Chapter 4 presents the quantitative results which address nominal and descriptive data about the GRx programme and personnel involved. These results are also discussed within this chapter. To obtain a rich data set open ended questions were asked on perceived benefits and concerns of providing nutrition support in GRx. These results are presented and discussed in chapter 5. Open and axial coding for these data are described and reflective coding is included as part of the discussion.

Chapter 6 provides conclusions and recommendations based on the combined results and discussion of both the quantitative and qualitative data, including contribution to research, strengths and limitations of the study and recommendations for further research.

1.7 Researcher's contributions

Researcher	Contributions
Cherise Pendergrast	Primary researcher, conducted literature review, contacted GRx providers, developed survey, analysed data and reported findings
Professor Pamela von Hurst	Reviewed literature review, developing survey, specific review of results, discussion and conclusion, general review of thesis
Associate Professor Cathryn Conlon	Reviewed literature review, developing survey, specific review of methods and results, general review of thesis
Dr. Rachel Batty	Developing background of GRx information, developing qualitative questions, tuition of Qualtrics XM software, specific review of study design, qualitative data analysis, results and discussion and general review of thesis

Chapter 2: Literature review

2.1 Literature search strategy

As the primary researcher had prior knowledge about the operations of GRx, it was important to establish a foundation of understanding on how GRx came to be implemented in New Zealand, what other initiatives had been utilised, chronic disease as a global and New Zealand concern and the evidence for relationships between risk factors and disease conditions. This knowledge guides development of initiatives to reduce the burden of chronic disease and leads to exploring what has been done in New Zealand, including the history of GRx and what this looks like. In recent years, prescriptive and counselling-based nutrition support have increased in popularity internationally, as well as in New Zealand.

A summary of search terms and databases is presented below**.**

Date searched: March 2021 to June 2022
Search criteria:
"Chronic disease" OR "non-communicable disease"
"Impact of chronic disease" OR "burden of chronic disease"
"Chronic disease and risk factors" OR "modifiable lifestyle factors"
"Cardiovascular disease burden" OR "Diabetes burden" OR "stroke burden" OR "obesity impact"
"Obesity effect on employment" OR "economic costs of obesity" OR "social cost of diabetes"
"physical activity and chronic disease" OR "diet and chronic disease" OR "nutrition support and chronic disease
"New Zealand population and chronic disease" OR "New Zealand public health and chronic disease"
"Green Prescription" OR "Green Prescription and nutrition support"

Filters: Past 5 years, Past 10 years, Full-text links

Electronic databases: Massey PubMed, Google Scholar, Discover

Appropriate literature (including that which was outside of the date range of 5-10 years) also found through examination of references included in research studies and government reports. The New Zealand Ministry of Health website was used extensively to find reports on chronic disease, public health initiatives, statistics of disease over time, and information about Green Prescription (GRx) and other initiatives.

2.2 Historical exploration of chronic disease

Disease has always been a part of the human story, infectious as well as non-communicable and chronic diseases. For much of human history, injuries and various diseases curtailed the life expectancy of humans. These diseases were often viral or bacterial in nature and alongside changes to diet resulting in nutritional deficiencies, many

people did not live long enough to experience disease states that might occur later in life such as heart disease, diabetes, cancers and the effects of obesity (Hong, 2019). However, between the late 18th and the first half of the 20th century, with improved public health and the development of vaccines such as smallpox discovered in 1796 (Riedel, 2005) and antibiotics like penicillin discovered in 1928 (Kardos & Demain, 2011), many of the infectious disease epidemics which had dominated causes of death were on the downturn while chronic diseases began to rise. By the early 21st century, cardiovascular disease, heart disease and cancer were the leading causes of death compared to pneumonia, tuberculosis and gastroenteritis in the preceding century (Hong, 2019).

As chronic disease incidence was rising in the 20th century, so too were research studies to investigate the phenomena including large-scale studies from the 1960s onwards. Prominent observational studies beginning as early as 1948, such as the Framingham Heart Study, the British Doctors Study, and the Seven Countries Study, all contributed valuable insights into the development, causes, and risk factors associated with chronic diseases (Doll et al., 2004; Gaetano, 2018; Keys et al., 1984; Keys et al., 1986; Mahmood et al., 2014).

2.3 Global burden of disease (GBD)

The first report on the global burden of disease (GBD) was commissioned by the World Bank in 1991 as part of its 1993 World Development Report (World Bank Group, 2022). Since the 1940s the quality-adjusted life-year (QALY) had been used as a single measure to depict the impact of disease resulting in premature death and/or disability. The QALY tool was primarily used as an economic measure to determine the cost-effectiveness of treatments (MacKillop & Sheard, 2018). With the GBD report, this measure was modified and developed to become an international standardised form known as disability-adjusted life year (DALY). The DALY expressed years of life lost to premature death and years lived with disability of specific severity and length of time and allows for costs beyond merely economic. Under this measure, one DALY is equal to one year lost of healthy life (Murray & Lopez, 1996).

In 1990, eighty-six percent of deaths in developed countries were identified as chronic disease causes including ischaemic heart disease as the leading cause, followed by cerebrovascular disease in second place, and diabetes mellitus as the tenth leading

cause of death. Since 1990, further assessments have been carried out and now include 369 diseases and injuries and reviews data from 204 countries and territories. It includes more measures such as years of life lost (YLLs) and years lived with disability (YLDs), (Vos et al., 2020). Accounting for population growth and ageing, overall health has improved globally since 1990 (Vos et al., 2020). There are, however, some distinct shifts in three chronic diseases as causes of DALYs and other outcomes (Tables 1 and 2).

Table 1.

Changes in three chronic diseases as leading causes of DALYs[1] from 1990-2019 (all ages)

Chronic disease	Rank in 25 leading causes (1990)	% of DALYs 1990	Rank in 25 leading causes (2019)	% of DALYs 2019	% change in number of DALYs 1990-2019	% change in age-standardised DALY rate 1990-2019
Ischaemic heart disease	4th	4.7	2nd	7.2	50.4	-28.6
		CI*: 4.4 to 5.0		CI: 6.5 to 7.9	CI: 39.9 to 60.2	CI: -33.3 to -24.2
Stroke	5th	4.2	3rd	5.7	32.4	-35.2
		CI: 3.9 to 4.5		CI: 5.1 to 6.2	CI: 22.0 to 42.2	CI: -40.5 to -30.5
Diabetes	20th	1.1	8th	2.8	147.9	24.4
		CI: 1.0 to 1.2		CI: 2.5 to 3.1	CI: 135.9 to 158.9	CI: 18.5 to 29.7

[1]DALYs- Disability-adjusted life-years

*CI: Confidence Interval (Vos et al., 2020)

Table 2.

Rank for three chronic diseases; global deaths, YLLs[1], YLDs[2] and DALYs[3] (1990, 2010 and 2019).

Chronic disease	Year	Deaths	YLLs	YLDs	DALYs
Ischaemic heart disease (rank among Level 3 causes)	1990	1st	4th	51st	4th
	2010	1st	2nd	43rd	2nd
	2019	1st	1st	36th	2nd
Stroke (rank among Level 3 causes)	1990	2nd	5th	17th	5th
	2010	2nd	4th	18th	3rd
	2019	2nd	3rd	18th	3rd
Type 2 Diabetes mellitus (rank among most detailed causes)	1990	17th	28th	10th	23rd
	2010	10th	16th	8th	13th
	2019	9th	14th	6th	7th

[1]YLLs- years of life lost

[2] YLDs – years of healthy life lost due to disability

[3] DALYs- disability-adjusted life-years (Vos et al., 2020)

Cardiovascular diseases (CVDs)

Despite improvements in overall global health, cardiovascular diseases (CVDs) remain the leading cause of death globally, with nearly 17.9 million people dying from CVDs in 2019, representing approximately 32% of all global deaths in that year (World Health Organization, n.d.- a). The number of people with ischaemic heart disease (IHD) globally increased nearly 75% between 1990 and 2017, but the age-standardised global prevalence rate and incidence rate decreased markedly in 1990. The greatest decreases were found to be in countries with high, and high-middle socio-demographic index (SDI) quintiles. Between 1990 to 2017, the greatest decreases in age-standardised incidence rates were found to be in Central Europe, followed by Australasia (Dai et al., 2022).

The three leading potential modifiable risk factors for IHD mortality in 2017 were found to be dietary risks (68% for females and 70% for males), high systolic blood pressure (55% for females, 53% for males) and high low-density lipoprotein (LDL) cholesterol (43% for females, 41% for males). High-fasting plasma glucose and high body-mass index were ranked fourth and sixth on the attributable risk factor list and should be considered in preventative initiatives (Dai et al., 2022).

Stroke

Stroke falls under the category of cerebrovascular diseases and in the GBD study data is defined using the WHO criteria developed in 1970. This is “rapidly developing clinical signs of usually focal disturbance of cerebral function lasting more than 24 hours or leading to death” (Aho et al., 1980; Vos et al., 2020). In 2019, stroke accounted for around 6.5 million deaths, 143 million DALYs and there were approximately 12 million cases globally (Vos et al., 2020). The WHO estimates 15 million people each year experience stroke, with approximately five million dying as a result and another five million suffering permanent disability (WHO Eastern Mediterranean Regional Office, 2022).

Lifestyle risk factors associated with stroke include tobacco smoking, physical inactivity, overweight/obesity and alcohol abuse. There are several medical risk factors including high cholesterol, diabetes and high blood pressure. The most substantial modifiable risk factors are identified as tobacco use and high blood pressure. An estimated four out of every ten stroke deaths may be prevented by blood pressure being regulated. With one in four people at risk of stroke in their lifetime, the WHO seeks to support

countries to implement strategies to lessen this burden. The South-East Asia region of WHO, (which includes New Zealand and Australia), has several interventions underway, including improving public knowledge of the early detection of stroke signs. This, alongside appropriate medication for stroke management, early medical intervention and lifestyle factor modification may prevent up to 50% of stroke incidents in years to come. (Singh, 2021; WHO Eastern Mediterranean Regional Office, 2022).

Diabetes

Persons affected by type-2 diabetes mellitus (T2DM) in 2019 were estimated to be around 438 million globally (Vos et al., 2020) but prevalence could be as high as 462 million (Khan et al., 2020). It was ranked ninth among causes of global death in 2019, compared with seventeenth in 1990 and had an increase of 36% in DALYs count between 1990-2019. Diabetes now sits at seventh place for DALYs compared to twenty-third in 1990 (Vos et al., 2020).

Despite public health measures, diabetes prevalence has continued to rise in developed areas such as Western Europe; and several Pacific Island nations and some Southeast Asian countries sustain a high prevalence of the disease. The rise in diabetes appears across all age ranges in adulthood but has also had increased diagnosis in young adults, many of whom are defined as obese. Early onset of the condition, coupled with rising life expectancy in many countries, could mean there is a markedly greater burden of diabetes and its effects among the older adult population in the future (Khan et al., 2020).

Global prevalence of diabetes (age-standardized) has increased over the last three decades, across all income levels and approximately doubled between 1980 to 2014. The rise in diabetes also reflects the upward trend in rated of overweight and obesity, a key risk factor in the development of diabetes (World Health Organization, 2016).

As well as leading to premature death, complications of diabetes also adversely affect the quality of life and include loss of vision due to diabetic retinopathy and end-stage renal disease (ESRD) of the kidneys. The incidence of ESRD may be as high as ten times for persons with diabetes compared to those without (World Health Organization, 2016). The rate of developing a cardiovascular disease may be two-to-three times higher for those with diabetes than those without. Lower extremity amputations are approximately

10-20 times higher among the diabetic populations than those not diagnosed with diabetes (World Health Organization, 2016). With an increased risk of persons with diabetes experiencing multiple potential life-limiting complications over their lifetime, it is crucial that health initiatives focus on prevention of disease development in the first instance- targeting modifiable lifestyle factors such as physical activity and diet.

Obesity

Obesity had previously been described as a condition, rather than a disease, but in 2013 the American Medical Association (AMA) determined obesity would be recognised as a disease that required a range of medical interventions to improve both treatment and prevention (Obesity Medicine Association, 2013). Overweight and obese is described as having fat accumulation that is abnormal or excessive and poses a health risk. Although once considered an issue of more affluent nations, both overweight and obesity are radically on the rise in low- to middle-income countries (WHOn.d.-b).

In 2016, 39% of adults aged eighteen years or over were overweight and 13% were obese. In this same year, 340 million children and adolescents between the ages of five to nineteen years were overweight or obese, nearly 39 million children under the age of five were identified as obese in 2020 (World Health Organization, 2021a, 2021b). Overweight and obesity at younger ages poses life-long risks to health and further increases the burden of chronic disease.

Obesity has causal links and significant contribution to other disease conditions such as cardiovascular and cerebrovascular diseases, hypertension, respiratory conditions, gall bladder and kidney impairment, diabetes, infertility, osteoarthritis and as many as eleven types of cancer (Dobbins et al., 2013; Harvard School of Public Health, n.d.) It also has associations with non-alcoholic fatty liver disease and some dementias including Alzheimer's disease (Li et al., 2019; Obesity Evidence Hub, 2021; Qu et al., 2020). Along with impacts on physical health, overweight and obesity also carry far-reaching consequences in the areas of economic costs, environmental costs and socio-cultural costs including social and familial relationships (Clough & Destremau, 2015).

Obesity carries significant costs to a nation's economy, including health care such as surgery, specialist treatment, medication as well as costs due to income loss and unemployment or early retirement (Clough & Destremau, 2015; Tremmel et al., 2017). Obesity has strong associations with development of cardiovascular disease, stroke and diabetes, as well as increasing risk of complications related to these conditions. Additionally, obesity impacts the quality of life not only of affected individuals, but also their households, families, and wider communities. With so much influence on all areas of health and wellbeing, including that of the population, it is necessary that obesity is addressed through multi-faceted approaches.

2.4 New Zealand population and chronic disease

Despite its relatively small population of five million people (Statistics New Zealand, 2022), New Zealand unfortunately tracks along similar trajectories as much larger countries regarding prevalence of chronic disease. In 2011, it was identified as third most-obese nation in the Organisation for Economic Co-operation and Development (OECD) and continues to have high rates of overweight and obesity among the population as well as cardiovascular disease, stroke and diabetes (Clough & Destremau, 2015).

Some population groups are at higher risk of developing, or having complications with chronic diseases such as diabetes. In New Zealand, this includes ethnic groups of Māori and Pasifika descent, as well as South Asian. Data suggests there is greater risk of diabetes development, at an earlier age, with increased comorbidity and mortality among these particular groups (Atlantis et al., 2017; Gurney et al., 2020; Health Quality and Safety Commission New Zealand, 2021; Shah & Kanaya, 2014; Yu et al., 2021).

Cardiovascular disease (CVD) in New Zealand population

Since 2011/12, data on ischaemic heart disease has been collected annually and demonstrates the trend is gradually on a downward slope. However, despite the decline over time, cardiovascular disease remains the leading cause of death for New Zealanders. The 2020/21 Annual Health Survey estimated four percent of the population had diagnosed angina or were admitted to hospital with a heart attack. Of those affected, approximately three percent were in the 45-54 years age group, which is important to note as individuals with diabetes are at higher risk of developing cardiovascular disease. This

same age-group contributed 6.5% of all those diagnosed with diabetes (Heart Research Institute NZ, 2021; Ministry of Health, 2022a).

Stroke in New Zealand population

In New Zealand**,** stroke is the leading cause of serious disability among adults and the second leading cause of death (Neurological Foundation, 2019; Stroke Foundation NZ, 2022). Mortality data between 1948 to 2018 demonstrates deaths as a result of cerebrovascular disease have been declining since 1974 (Ministry of Health, 2021c). The age group with the highest distribution of stroke is 75+ years at eight percent, followed by 65-74 years with 3.6%, however, approximately one quarter of persons who suffer a stroke are under 65 years (Ministry of Health, 2022a; Neurological Foundation, 2019).

Stroke incidence is estimated to rise by 40% between 2015 to 2028 (n=7,231 to 10,112) based on stroke incidence and projections of the ageing population. A 30% reduction in stroke incidence needs to be achieved in order to stabilise stroke volumes (Ranta, 2018). More than 75% of strokes are deemed preventable, meaning stroke incidence would be greatly reduced if all strategies to reduce risk were implemented by the population. High blood pressure (hypertension) remains the leading risk factor for stroke and an estimated one in five New Zealanders have hypertension (Stroke Foundation NZ, 2022).

Diabetes in New Zealand population

The first New Zealand national health survey took place between 1992 and 1993. It showed that two percent had been diagnosed with diabetes (Statistics New Zealand, 1993). With each subsequent health survey, prevalence of diagnosed diabetes has increased over time peaking in 2014/15 and most recent data indicated five-and-a-half percent of the population are affected (Ministry of Health, 1999, 2008, 2021e, 2022a, 2022b). It is noted, however, that in four of the national health surveys, data regarding diabetes was through individuals' self-report of their doctor's diagnosis (Coppell et al., 2013).

The New Zealand Adult Nutrition Survey conducted over 2008/09 provided an opportunity to investigate the prevalence of both diagnosed and undiagnosed diabetes in

the population. Glycated haemoglobin, or HbA1c, is used as an international diagnostic measure for type-2 diabetes. HbA1c is a type of haemoglobin chemically linked to sugar and is a measure of the average blood glucose levels present in the body over the previous two to three months (Health Navigator NZ, 2019; International Diabetes Federation, 2017). Using both self-report of their doctor's diagnosis and blood samples to determine HbA1c levels of 71% of survey respondents, researchers identified a total of seven percent diabetes (diagnosed and undiagnosed) and 25.5% prediabetes in the sample population (n= 4,721) (Coppell et al., 2013).

Estimates for New Zealand adults (15+ years) living with diagnosed diabetes range from 217,260 to 268,700 and a further 100,000 to 122,000 undiagnosed (Diabetes New Zealand, 2019a; Health Navigator NZ, 2019; Ministry of Health, 2021e; Price Waterhouse Cooper, 2021). The International Diabetes Federation (IDF) estimates persons in New Zealand with diabetes in 2030 at approximately 296,800 and by 2045, this number could reach 319,600 (International Diabetes Federation, 2021).

Costs of diabetes

New Zealand has a substantial chronic health issue in the form of diabetes affecting the population. Diabetes not only has far-reaching effects on the health of individuals but also poses threats in economic terms. Currently, the estimated economic cost of type-2 diabetes per year is two billion dollars. This is made up, in part, of publicly funded health costs carried by the Government and estimated to be one billion dollars annually, as well as the economic costs of lost personal income and non-salary labour (Price Waterhouse Cooper, 2021). The IDF estimates total diabetes-related health expenditure is currently over $1.6 billion NZD in 2021, projected to reach nearly $1.7 billion NZD in 2030. This equates to approximately $6,310 NZD per person per year by 2030 (International Diabetes Federation, 2021).

Diabetes has significant effects on physical health but also in other areas. Alongside the stress of managing the condition through lifestyle changes, medication, regular check-ups etc, a diagnosis of diabetes has been identified as being connected to deterioration of mental health, a reduction in social interactions and contributes to loss of work (Price Waterhouse Cooper, 2021). Additionally, many New Zealanders diagnosed with diabetes experience negative attitudes and stigma (Diabetes New Zealand, 2019b).

A survey conducted in 2018 revealed 40% of respondents with type-2 diabetes had experienced judgment of their food choices, exclusion from social events, and half described assumptions from others that they had overweight issues in order to develop diabetes (Diabetes New Zealand, 2019b).

Prediabetes

Prediabetes, also known as impaired glucose tolerance (IGT), is characterised by prolonged elevated blood glucose concentrations which are below the cut-off for a diabetes diagnosis. Prediabetes increases the risk of developing type-2 diabetes and cardiovascular disease, but can be managed with lifestyle changes as well as medication (if needed), to prevent or delay the development of type-2 diabetes (Diabetes New Zealand, n.d.; New Zealand Society for the Study of Diabetes, 2022). Criteria for a prediabetes diagnosis in New Zealand is an HbA1c level of 41-49mmol/mol (Coppell et al., 2013; Ministry of Health, 2016a).

Prevalence of prediabetes among respondents to the 2008/09 New Zealand Adult Nutrition Survey was found to be 25.5% (Coppell et al, 2013), and is currently estimated to be affecting around 18-20% of the total population (New Zealand Society for the Study of Diabetes, 2022; Price Waterhouse Cooper, 2021),

Obesity in New Zealand population

The criteria for obesity is a Body Mass Index (BMI) measure of 30 or higher for adults and there are internationally standardised equivalents (IOTF) for children aged below 18 years (World Obesity Federation, 2019). There are three distinctions of obese classification to enable further defining of associated risks; obese class I identifies BMI 30 to <35, obese class II has a BMI 35 to <40 and obese class III has a BMI of >40. Obese class III carries a very severe risk of co-morbidity (Centers for Disease Control and Prevention, 2022; Clough & Destremau, 2015).

Obesity rates among New Zealanders were identified in 2020/21 as affecting 34.3% of adults aged over 15 years (with IOTF equivalent measures for 15–17-year-olds) and almost 13% children aged two to fourteen years (Ministry of Health, 2022a). Both rates were an increase of just over three percent from the previous data in 2019/20. OECD data

from 2019 indicated approximately 65% of the adult population are overweight or obese (OECD, 2022).

While intensifying the risk for developing multiple chronic disease and other poor health conditions, obesity also has significant other costs. These are often described in terms of direct costs (for example, health care), indirect costs (such as lost productivity) and intangible costs; relating to wellbeing and impact, such as the human cost of disability and premature mortality (Barton & Love, 2021). Other reports highlight costs can be identified across three comprehensive domains: economic, socio-cultural and environmental (Clough & Destremau, 2015).

Total health costs related to overweight and obesity were estimated to be around $623.9 million NZD in 2006 (Lal et al., 2012) and increased to $1.5 to $2 billion NZD per year in 2020 (Barton & Love, 2021). The indirect cost of productivity loss in New Zealand in 2006 was estimated between $98 to $225 million NZD; costs which are related to absenteeism, disability and other productivity losses (Lal et al., 2012). There is much consensus in literature that indirect costs (such as loss of productivity) may be at least as high as direct costs, possibly two- to three-times higher (Barton & Love, 2021).

2.5 Investigating risk factors and leading causes for chronic disease

Chronic diseases such as cardiovascular diseases, cancer, diabetes and chronic respiratory disease are the cause of nearly 70% of global deaths (World Health Organization, 2020a). Early studies such as the Framingham Heart and the Seven-Countries studies began to investigate potential causes for chronic disease and identified diet, physical inactivity, high blood pressure and cigarette smoking as contributors to leading causes of death (Remington & Brownson, 2011).

The Framingham study (among others) was aimed at identifying causal factors for disease and studied healthy people into the future, whereas the Seven-Countries study looked at multi-centre cohorts in order to examine differences and similarities of disease trends across populations (Luepker, 2011).

Evidence was mounting that after the epidemic of heart disease peaking in the 1960s in the United States (U.S.), age-adjusted mortality rates were declining in the U.S. while CVDs remained a leading cause for mortality and morbidity (Luepker, 2011).

It was recognised as early as 1985 that many of the chronic diseases prevalent in developed countries had origins in a few distinct, preventable causes (Grabauskas et al 1985, cited in (Jordan et al., 2008). Some of these causes have been identified as poor diet or nutrition, smoking, hazardous drinking and low physical activity and are widely regarded as key factors to address in both prevention and management of chronic diseases (Bauer et al., 2014; Jordan et al., 2008).

The Global Burden of Disease study conducted a systematic analysis of 87 risk factors. Among global deaths in 2019, high systolic blood pressure, dietary risks, and metabolic risks (including high BMI and high fasting plasma glucose) were among the top five attributable risks for females and in the top six for males. Low physical activity had a lower contribution to global deaths in 2019, ranking at 13th and 15th for females and males respectively. The ten leading risks for contribution to DALYs in all ages in 2019 featured high systolic blood pressure, smoking, high fasting plasma glucose, high BMI, high LDL cholesterol and alcohol use; a marked change from 1990 where high systolic blood pressure and smoking were the only matching risk factors (GBD Collaborators & Ärnlöv, 2020).

While determining a ‘global optimal diet’ is fraught with difficulty due to differences in agriculture, climate, cultural aspects and plant and animal diversity; the GBD analysis in 2017 identified multiple dietary risks associated with chronic diseases regardless of the specifics of diet in each region or country. (Afshin et al., 2019). Data from 195 countries from 1990-2017 regarding diet and nutrition was distilled into 15 dietary risks after previously determining optimal levels of intake that minimises risk of all causes of death. These risks highlighted ten “lows”; diets low in fruit, vegetables, legumes, wholegrains, nuts and seeds, milk, fibre, calcium, seafood omega-3 fatty acids and polyunsaturated fatty acids. Five “highs” were also noted: high in red meat, processed meat, sugar-sweetened beverages, trans fatty acids and sodium. These dietary risks attributed to 11 million deaths globally in 2017, with a further 255 million of all DALYs among the adult population. Sub-optimal levels of consumption for nearly all the healthy foods and

nutrients identified was noted across the global data in 2017, while intake of unhealthy foods and nutrients exceeded optimal levels. The report proposed that up to one in five deaths could be prevented around the world with dietary improvements. Despite the variability of diet across countries, suboptimal intake of wholegrains and fruit as well as intake of sodium exceeding optimal levels, related to more than 50% of deaths and made up 66% of the DALYs related to diet. (Afshin et al., 2019)

Many chronic diseases are found to have the same key risk factors and disease conditions often co-occur (such as advanced diabetes and heart disease). This results in convoluted interfaces across risk factors, diseases and management or treatment (Bauer et al., 2014). According to the principle of the prevention paradox (Geoffrey Rose, 1981 cited in (Jordan et al., 2008), the reduction of disease incidence can only happen if the mean levels of risk factors are decreased among a sizeable portion of the population (Jordan et al., 2008).

2.6 Evidence for lifestyle factors affecting development and progression of chronic disease.

Substantial evidence exists supporting modifiable lifestyle factors such as physical activity and dietary habits can influence preventing, delaying and the management of various chronic disease conditions.

Physical activity

In 1996, the first-ever Surgeon General's report on physical activity and health was published in the United States and brought to light the overwhelming evidence of the benefits conferred by regular physical activity (Johnson & Ballin, 1996). Contained within it was robust data related to many chronic conditions and the association between regular physical activity and reduced development or improved management of diseases such as non-insulin dependent diabetes mellitus (NIDDM or type-2 diabetes, T2DM) and cardiovascular diseases, among others. The findings of the report identified people of all ages benefit from regular physical activity and should aim for at least 30 minutes of activity of moderate intensity on most, if not all, days of the week. It was also stated any active movement was better than nothing, encouraging people in a range of activities that could be undertaken for shorter periods of time if 30 minutes was not manageable (Centers for Disease Control and Prevention, 1996).

Since that time, guidelines have suggested a minimum of 150 minutes per week of moderate-to-vigourous physical activity (Warburton & Bredin, 2017).
The World Health Organization recommends 150-300 minutes per week for most adults and around 60 minutes/day of moderately intense physical activity for children and adolescents (World Health Organization, 2020b).

Daily physical activity and exercise training have been shown to improve glucose sensitivity, impact on glucose metabolism and insulin signalling (Anderson & Durstine, 2019; Kirwan et al., 2017), and is beneficial in improving body composition, glycaemic control and reducing insulin resistance. Insulin resistance is a factor strongly associated with type-2 diabetes development and on its own has been identified to significantly increase cardiovascular disease among persons with T2DM (Kumar et al., 2019).
Regular physical activity has also demonstrated beneficial effects for reducing and managing overweight and obesity besides weight loss, including reduced blood pressure, muscle strengthening and improved mood, stress and sleep (World Obesity Federation, 2021).

Both regular aerobic exercise and resistance training over a six-to-twelve-month period has been associated with improved body composition. Aerobic exercise resulted in two-to-three percent initial body weight loss without dietary intervention, and while resistance training without calorie restriction did not have significant weight loss, it nonetheless brought about changes to body composition. Dietary intervention alongside physical activity was associated with weight loss more so than diet alone, but needed to be maintained long-term to prevent weight gain (Kim et al., 2017).

Diet

The joint WHO/FAO technical report on ‘Diet, nutrition and prevention of chronic diseases’ in 2003 outlined dietary effects on health are present throughout the lifespan, from conception to older adulthood, highlighting a life-course approach is necessary to address the myriad factors and outcomes (World Health Organization, 2003).
Adulthood is typically when most chronic diseases begin to be expressed and is also the period in which preventative action can be taken to reduce risk factors, slow or prevent disease progression and enable effectual disease management and treatment. (World Health Organization, 2003).

The association between diet and chronic disease continues to be researched covering a range of factors and outcomes. Research includes randomised, controlled trials on specific nutrients and changes to biomarkers associated with chronic disease (blood pressure, cholesterol or glucose, inflammation) and observational studies examining broader dietary patterns in a population and their subsequent effects (Casas et al., 2018).

One well-known diet developed to reduce hypertension and its effects, is the Dietary Approaches to Stop Hypertension (DASH). The study involved a four-site randomised, controlled trial in 1997, with a combination diet (DASH) developed made up of high vegetable and fruit intake, low-fat dairy, reduced saturated and total fat. Sodium intake and body weight remained steady for both test groups. The results demonstrated the combination diet had greater effect on lowering blood pressure in subjects with, or without hypertension. (Appel et al., 1997). Since then, multiple studies have taken place, utilising the DASH diet as an intervention with significant results. Although methods and measures have varied across different studies, a meta-analysis conducted recently demonstrates that adopting the DASH diet alone or alongside other lifestyle changes such as increasing physical activity, reducing sodium intake and weight loss is beneficial to reducing blood pressure. There is evidence of significantly reduced blood pressure across the board, even for non-hypertensive participants, though the results are more pronounced for persons with hypertension (Filippou et al., 2020).

The WHO/FAO report highlighted the effects of diet and physical activity on specific chronic diseases as well as recommendations for prevention. Included in the recommendations were strategy and policy considerations at the population level. Utilising intersectoral initiatives and enabling training in diet, nutrition and physical activity for all health professionals were two such recommendations (World Health Organization, 2003). The (American) Academy of Nutrition and Dietetics strongly expressed that registered dietitians and dietetic technicians (registered) could be utilised as key personnel in health promotion and disease prevention initiatives at primary, secondary and tertiary levels (Slawson et al., 2013).

Individuals have long sought information about nutrition and diet for their health. In this age, however, there is a saturation of information which can be unfounded, from dubious

sources and without sufficient evidence. Many people look to the Internet, friends and family for advice on diet (Cash et al., 2015) and people can be susceptible to misleading or incorrect information from these sources (Fassier et al., 2016).

2.7 New Zealand initiatives for tackling risk factors for chronic disease

Figure 1 presents a time line of key events and health initiatives in New Zealand.

In 1995, a trial was already underway to determine whether written advice from a general practitioner (GP) regarding physical activity was more effective in increasing a patient's physical activity than verbal advice and the results were significantly in favour of written advice (Swinburn et al., 1998).

The New Zealand national health survey conducted over 1996/97 indicated six out of ten adults were physically active, having completed at least two-and-a-half hours of physical activity in the preceding seven days, while 15% were sedentary. One in ten adults had high blood pressure and one in twenty-seven had diabetes. Nearly 45% of adults had at least one of the four identified cardiovascular disease risk factors; smoking, sedentary lifestyle, high blood pressure and diabetes (Ministry of Health, 1999).

Following the U.S. Surgeon-General's recommendation that most people would benefit from regular physical activity equating to approximately 30 minutes per day of moderately intense exercise (Centers for Disease Control and Prevention, 1996), the Hillary Commission conducted a survey of physical activity among New Zealanders and found approximately 36% of adults were inactive, taking part in physical activity less than two-and-a-half hours over the course of a week. (Ministry of Health, 1998).

Over 1997 and 1998, GPs in the Northern Health District (Northland and Auckland) were invited to participate in a trial of Green Prescription (GRx), whereby they received training and resource packs pertaining to prescription of physical activity and exercise. The programme at this point entailed a 'Green Prescription' provided by the individual's GP specifying the number of minutes and number of times per week to engage in physical activity/exercise such as a brisk walk or a suitable alternative as guided by the GP. In addition to the Prescription from the doctor, an individual could contact a tollfree number and speak with a local Regional Sports Trust (RST) staff member to discuss the prescribed programme and have continued support (Gribben et al., 2000).

The Green Prescription as a nation-wide initiative was officially implemented in 1998, coming under the umbrella of the 'Push Play' campaign; a health initiative by the Hillary Commission to encourage New Zealand adults to be physically active for at least 30 minutes per day (Sport New Zealand: Ihi Aotearoa, 2022c; The Hillary Commission, 1999). GRx focused on supporting New Zealand adults to become more physically active through a GRx provided by a GP or clinic nurse and ongoing support offered by RST staff, usually for around 12 weeks.

A government report 'Tracking the Obesity Epidemic' noted obesity rates had accelerated through the late 1980s and early 1990s, and as such, a new health strategy 'Healthy Eating, Healthy Action- Oranga Kai, Oranga Pumau' (HEHA) was developed in 2000. It prioritised the following objectives: reduce obesity, increase physical activity and improve nutrition throughout the population. Background evidence of HEHA identified ischaemic heart disease, cancer and stroke as the three leading causes for mortality among New Zealanders, and food and nutrition played a significant part in those (Ministry of Health, 2003a, 2003b, 2004).

Nutrition was also a chief factor in obesity, hypertension and type-2 diabetes. It was estimated that even small improvements in risk factor exposure levels such as reducing total cholesterol and increasing vegetable and fruit intake could have significant impact on disease and mortality. During this time, it was noted that nutrition support and services were largely carried out by public health units (PHUs), purchased by the government (Ministry of Health, 2003a).

The HEHA Strategic Framework highlighted the need for intersectoral partnerships, policy changes, enhanced service delivery and identifying areas for action across local, regional, and national levels to contend with the triad of nutrition, physical activity, and obesity. Additionally, it was stated that the development and continuation of specialist skills in both physical activity and nutrition was crucial and needed to be both preserved and heightened (Ministry of Health, 2003b).

While the government was putting into play the HEHA strategy and the Hillary Commission was facilitating increased physical activity in the nation with the Push Play

campaign and Green Prescription initiatives, many other organisations had also been providing resources, support, and information for New Zealanders for healthier living.

Some of these were in the form of public health campaigns such as: Pick the Tick, implemented by the National Heart Foundation in 1991. This supported consumers choosing food items displaying a tick (checkmark) if the food item met specific nutritional criteria including low sodium and fats. The campaign was successful both in increasing consumers understanding and making better food choices and food manufacturers reformulating multiple food products for better nutrition (Young & Swinburn, 2002).

The '5+ a day' campaign, in the early 1990's, promoted the message to eat more vegetables and fruit for health. It encouraged the public to consume at least three servings of vegetables and two servings of fruit per day, aligning with the Ministry of Health and World Health Organisation eating guidelines at the time. Surveys in 1999 and 2000 demonstrated there was good awareness of the message and understanding about what it meant but understanding about what a portion or serving meant was less apparent (Ashfield-Watt, 2006). The '5+ a day' charitable trust was formed in 2007 and has continued to promote increasing vegetable and fruit intake for all people, but particularly children, using resources, recipes, social media promotion and information (5aday, 2022).

Organisations such as the Stroke Foundation, the New Zealand Heart Foundation, and the Diabetes Foundation; each with over 40 years of operating history, are notable examples of charitable trusts providing support, information, research and resources to the public for specific conditions. As well as information about the medical conditions, there is advice on reducing risk factors including lifestyle changes to diet and physical activity. (Diabetes New Zealand, 2022; Heart Foundation NZ, 2019; Stroke Foundation NZ, 2020).

Notable initiatives focusing particularly on children to reduce risk of chronic disease development by encouraging positive lifestyle habits at younger ages have also been implemented. These include Project Energize, a partnership between primary schools, RSTs and DHBs (Rush et al., 2016; Rush et al., 2012), and Healthy Active Learning (HAL), a recent initiative between the Ministry of Health, Ministry of Education and Sport New Zealand (Sport New Zealand: Ihi Aotearoa, 2022b)

2.8 Green Prescription

For over 20 years, Green Prescription has been supporting New Zealand adults to become more physically active and live healthier lives. From its inception in 1998, it was facilitated by the Hillary Commission (Bauman et al., 2003), which became Sport and Recreation New Zealand (SPARC) in 2002 (Sport New Zealand: Ihi Aotearoa, 2022a). In 2004, Green Prescription Active Families programmes were introduced to support primary school-aged children (five-to-twelve years old) and their whānau to become more physically active and eat healthier (Research New Zealand, 2018).

Research indicates people who undertook GRx experienced increased physical activity as a result (Swinburn et al., 1998), there was long-term benefit due to continuing with increased physical activity after the programme (Hamlin et al., 2016) and participants self-reported they had experienced changes in health outcomes such as weight loss, reduced blood pressure and HbA1c after being in GRx (Sinclair & Hamlin, 2007).

Patient surveys from 2015-2018 strongly indicate increased undertaking of physical activity, feeling stronger and fitter and noticing positive changes to their health after enrolling and going through the GRx programme (Research New Zealand, 2015, 2016, 2019).

In 2009, GRx was transferred from SPARC to the Ministry of Health with the expectation that in the future, funding would be more closely aligned with other services helping to manage long-term conditions. Regional Sports Trusts and selected Primary Health Organisations continued to deliver the programme and services (Ministry of Health, 2017a).

While the GRx has focused on physical activity throughout its implementation, there are indications that nutrition support has also been included in modified GRx programmes, although it is not clear when this began (Tava'e & Nosa, 2012; Williams et al., 2017; Williams et al., 2015). Patient survey reports from 2015, 2016 and 2018 have included questions about the nutrition support respondents have experienced while in the GRx programme. These questions include: "Have you received any specific advice on healthy eating?" In each survey report, 64% to 71% of respondents indicated they had received advice on healthy eating while in GRx (Research New Zealand, 2015, 2016, 2019). Data

from 2013-2018 (2017 not included) indicate between 63% and 70% of respondents had made changes to their diet and eating habits as a result.

As each GRx provider (mainly RSTs contracted by DHBs) has autonomy over how their programme operates according to the needs of that community, nutrition support is likely to be varied across providers.

Supporting children to eat healthier is stated (and some nutrition support therefore implied) in the aims of Green Prescription Active Families, (Ministry of Health, 2021a). It is not apparent in the description of GRx services, although it is stated that some DHBs and PHOs contribute funding for the development of group programmes and enhance the nutrition component (Ministry of Health, 2017a). All but two of the Green Prescription Active Families programmes are administered by the same Green Prescription providers in New Zealand (Ministry of Health, 2021b, 2022c). Green Prescription was not included in the service coverage schedule for DHBs prior to 2016 and does not include nutrition support in its description of the GRx services in the years following (Ministry of Health, 2014, 2015a, 2015b, 2016b, 2017b, 2018, 2019, 2020, 2021d).

2.9 Green Prescription programmes including nutrition support

Some GRx programmes have been modified in content, including weekly or monthly workshops on topics such as medical conditions, smoking and nutrition. Group activities and workshops, and development of healthy eating plans based on Ministry of Health eating guidelines have been implemented by a facilitator with nutrition training (Tava'e & Nosa, 2012; Williams et al., 2017; Williams et al., 2015).
There have also been several pilot projects incorporating nutrition support alongside physical activity as outlined in the following two pages.

Choose Change (Harbour Sport)

This project involved four GRx centres across Auckland and looked to improve GRx best-practice in pre-diabetes and type-2 diabetes management in at-risk target population groups using and inventive mode of delivery. The programme included weekly consultations with a healthy lifestyle advisor for the first 12 weeks and fortnightly up until 24 weeks. Individual consultations with a dietitian and psychologist were also included or group psychotherapy sessions and nutrition workshops formed part of the programme.

Just over 280 participants completed the 12-week intensive stage and reductions in blood pressure, fat mass and HbA1c were identified. However, a significant amount of data was missing, making it difficult to assess the overall effectiveness of the programme (McRobbie, n.d.).

Sport Bay of Plenty

The programme aimed to enable people diagnosed with pre-diabetes to access information, education, nutrition support and physical activity to reduce risk of their condition progressing to type 2 diabetes. As well as new options for physical activity, participants were offered nutritional workshops, an individual consultation with a dietitian and healthy cooking classes.

The results indicated the majority (60-79% of 174 participants) attended at least one of the many nutrition support events on offer. At six months follow up, 66% had decreased their baseline HbA1c level and of the 75% who provided weight measurements, 39% had lost at least 1.6kg of their baseline body weight (McRobbie, n.d.).

Energized Practices (collaboration between Sport Waikato, Gisborne-Tairawhiti and Taranaki, these same region-DHBs and the Midlands Health Network)

The focus of the project was to improve healthy eating and lifestyles for patients through development of resources, processes and systems in the related primary health care practices. GPs and Practice Nurses (PNs) were provided with training and resources to support their provision of healthy lifestyle advice (Lite GRx) to their patients. Results indicated an increase of referrals to the standard GRx programme. Anecdotal evidence was noted about positive health changes in clients who received Lite GRx, but no data was provided (McRobbie, n.d.).

These projects, while demonstrating some promising results, lack sufficient data to indicate whether provision of nutrition support (targeted or generalised) alongside physical activity support was more effective than physical activity support alone.

Kia Ākina

This randomized, controlled trial utilised the GRx programme and the GRx programme plus Kia Ākina (KA/GRx), which included psychosocial support following

addiction treatment strategies for obesity recovery. At this time, the GRx provider involved (Sport Canterbury) had expanded their programmes to include instruction about healthy food and eating behaviour in addition to physical activity. An eating programme called 'Appetite for Life' was introduced which included six two-hour group sessions over six weeks (Sellman et al., 2017). These sessions covered information about the importance of nutrition, healthy habits, smart snacking, modifying recipes, particular nutrients, understanding food labels and were both information and experiential sessions. The Appetite for Life programme was delivered by trained nurses (Cutler et al., 2010). The GRx updated programme also included education and group support sessions and messages of encouragement through text or email (Sellman et al., 2017). While the participants in the GRx-only group lost less weight than the KA/GRx group participants, both were very effective due to the inclusion of dietary advice alongside physical activity support (Sellman et al., 2017)

Despite the difficulty finding sufficient data to determine the effectiveness of some GRx projects utilising nutrition support, information from the patient surveys over the last 18 years indicate there is benefit from clients receiving support in both physical activity and nutrition to enhance health outcomes (Elliot & Hamlin, 2018).

Elliot and Hamlin, each involved in other studies of Green Prescription and exercise prescription (Elliot et al., 2016; Hamlin et al., 2016; Sinclair & Hamlin, 2007) found from a surveyed subsample of Green Prescription clients (n=1488), that the effects of combining diet and physical activity had a greater impact on health improvements than either behaviour change alone. Five health problems were identified in the metabolic subsample and 80% of the respondents reported more than one. It was found that dietary changes alone significantly increased the odds for lower cholesterol (OR 3.5), lower blood pressure (OR 2.4) and weight loss (OR 7.2), while an increase in physical activity by itself resulted in weight loss (OR 5.2). Participants who increased physical activity as well as making changes to the diet had much greater odds for weight loss (OR 17.5) (Elliot & Hamlin, 2018).

The authors noted that despite nutrition support not being explicitly provided in GRx programmes, many participants did make changes to their diets (Elliot & Hamlin, 2018), which is also reflected in patient surveys. (Research New Zealand, 2015, 2016, 2019). The

study acknowledges some GRx providers may offer specialised nutrition support in addition to more general healthy eating information. The recommendation is that provision of nutrition support should be considered by GRx funders for all programme providers (Elliot & Hamlin, 2018).

Conclusion to literature review

Chronic disease conditions have adversely affected the global population for some time, and New Zealand, despite its small population has similar trends. Significant evidence exists demonstrating associations between risk factors such as physical inactivity and poor diet and chronic disease conditions including cardiovascular disease, stroke, diabetes and obesity.

Over the last few decades in New Zealand, multitude health initiatives have been implemented at the population level in efforts to reduce the risk and progression of chronic disease conditions. These include public health campaigns to provide information and increase awareness, organisations and charitable trusts to support and inform and services provided to support individuals and communities to make lifestyle changes that are associated with improved health and reduced disease risk.

One of these initiatives, Green Prescription (GRx) has been in operation for over two decades, largely focusing on physical activity. However, nutrition support has been a part of some GRx programmes and is a reasonable option to enable improved nutrition support in the community.

Figure 1 is a representation of the timeline of health initiatives implemented in New Zealand to support healthier lifestyles and reduce the burden of chronic disease. Reports from government departments and research studies and their contribution to the initiatives are described, as well as key changes which affected the implementation of programmes.

Figure 1: A timeline of key events in New Zealand to reduce the burden of chronic disease.

- **1987-** Hillary Commission established in New Zealand under the Recreation and Sport Act 1987 (Sport New Zealand: Ihi Aotearoa, 2022a)
- **1995-** An RCT of Green Prescription is conducted (Swinburn et al., 1998).
- **1996-** US Surgeon General report: 'persons of all ages (should) obtain a minimum of 30 minutes of physical activity of moderate intensity on most, if not all, days of the week'. (Centers for Disease Control and Prevention, 1996; Johnson & Ballin, 1996)
- **1997/98-** GPs in North Health District (Northland and Auckland) invited to participate in the Green Prescription (GRx) initiative (Gribben et al., 2000)
- **1998-** Ministerial Taskforce for Physical Activity report released, findings of which lead to development of Push Play campaign (Bauman et al., 2003)
- **2000-** Labour-Alliance Coalition government facilitate health system reform resulting in 21 district health boards (DHBs) being formed. (New Zealand Parliament: Pāremata Aotearoa, 2009)
- **2001-** New Zealand Health Strategy identifies in its DHB toolkit on obesity that referral to exercise programmes such as Green Prescription is a key population intervention. Also highlights DHBs can support increased training in obesity by public health nutritionists and dietitians. (New Zealand Health Strategy, 2001)
- **2002-** Hillary Commission is replaced by Sport and Recreation New Zealand (SPARC) following a merger with NZ Sports Foundation and the policy arm of the Office of Tourism and Sport. (Sport New Zealand: Ihi Aotearoa, 2022a)
- **2002**- WHO report identifies diet and nutrition-related recommendations for prevention and management of long-term disease conditions (World Health Organization, 2003)
- **2003-** Healthy Eating- Healthy Action: Oranga Kai- Oranga Pumau (HEHA) Strategy developed by New Zealand Government to address rising issue of obesity and diabetes. (Ministry of Health, 2003b)
- **2004-** 'Tracking the Obesity Epidemic' report released demonstrating between 1977-2003, the mean BMI and prevalence of obesity had increased significantly among New Zealanders. (Ministry of Health, 2004)
- **2004-** Green Prescription Active Families programmes introduced to support school-aged children and their whānau to become more physically active and eat healthier. (Research New Zealand, 2018)
- **2009-** Transfer of Green Prescription from SPARC to the Ministry of Health. Regional Sports Trusts (RSTs) continue to deliver the Green Prescription programmes. (Ministry of Health, 2017a)
- **2012** SPARC was renamed as Sport New Zealand (Te Ara, 2022)
- **2012-** Ministry of Health devolved Green Prescription funding and management to DHBs. RSTs are contracted to deliver GRx programmes. (Ministry of Health, 2017a)
- **2013-** Additional funding of $7.2 million over the next 4 years is allocated to the Green Prescription budget. (Ministry of Health, 2017a)
- **2016**- onwards- Green Prescription is highlighted in the service coverage schedule for DHBs (Ministry of Health, 2016b, 2017b, 2018, 2019, 2020, 2021d)
- **2017-** $2.1 million allocated to 10 DHBs to provide Before School Check (B4SC) Active Families programmes for preschoolers up to age 5. (Ministry of Health, 2017a)
- **2021-** 15 Green Prescription providers operating in New Zealand (Ministry of Health, 2022c)
- **2022-** NZ health reform to be implemented in 2022. A new body, Whatu Ora (Health New Zealand), in conjunction with the newly formed Te Aka Whai Ora (Māori Health Authority), will take over the commissioning and planning of services and the functions currently executed by the currenty 20 DHBs. The aim is to centralise the health care system to provide consistent, high-quality services across localities. (Department of the Prime Minister and Cabinet, 2022)

Chapter 3: Methods

3.1 Study design

A situation analysis was utilised for the purpose of this study in order to describe the type, and extent, of nutrition-related issues in projects/programmes, while also enabling the identification of causal factors (Marías & Glasauer, 2014). The findings of a situation analysis can contribute to the planning of appropriate interventions. Investigating current knowledge, attitudes and practices (KAP) as part of a wider situation analysis can be beneficial to identify priorities in nutrition education or support (Marías & Glasauer, 2014). A situation analysis was also deemed an appropriate method due to the study also investigating the current situation so as to inform future planning of nutrition support within New Zealand.

The study used a self-completed anonymous electronic survey designed and distributed using Qualtrics XM experience management software to determine descriptive data about GRx programmes and personnel involved. Surveys are used in health research as they are a cost-effective and expedient way in which to obtain descriptive data from a range of people, and are useful for capturing information about knowledge, experiences and attitudes (Schofield & Forrester-Knauss, 2010).

3.2 Setting and target population

There are fifteen Green Prescription (GRx) providers named on the Ministry of Health website in New Zealand, ten in the North Island and five in the South Island. Of these fifteen providers, thirteen operate from within regional sports trust (RSTs) and two from primary health organisations (PHOs). A further two organisations, associated with PHOs, provide GRx services under the contract of an RST provider. These seventeen GRx providers were the focus for data collection. Individuals who were employed in GRx services during the time of the study (August to October 2021) were the target group for participation in the survey.

3.3 Background to survey

Development of the study was heavily influenced by the experience of the primary researcher, Cherise Pendergrast (CP) working in GRx for over 2.5 years, and included insights and knowledge gained over that time. There was frequent discussion among the

research team regarding the development and implementation of GRx programmes, RST operations, the history of GRx within the Sport New Zealand and MOH arenas and the effects of this.

3.5 Development of survey

Survey questions were designed to collect predominantly nominal quantitative data, with an additional two qualitative questions included to explore perceptions of staff within GRx services.

The quantitative questions focussed on data concerned with personnel involved in GRx services, including age, gender, length of employment, job title and qualifications. To fully capture the array of job titles, it was determined respondents would provide their job title and these would be categorised during data analysis for similarity as interpreted by the primary researcher to reflect roles as managers, advisors (working with clients), administration, communications/marketing or nutritionist/dietitian.

To capture specialisations and qualification names, respondents provided these and the primary researcher developed categories to describe these. These were qualifications:

1) specialising or majoring in nutrition (as identified by the respondent),
2). specialising or majoring in physical activity (including sports science, leisure, recreation)
3). non-specified or ‘other’ health science and
4). other specialisations.

Questions regarding provision of nutrition support related to specific personnel performing these duties, whether there are professional development opportunities, and the proportion various types of support contribute to the GRx programme. They also captured information about evaluation methods, support that is culturally relevant to Māori and other ethnic groups. There was a multiple-option selection of popular topics for nutrition advice for clients based on the primary researcher’s experience as a GRx nutritionist and supported by reports of referral reasons (Research New Zealand, 2015, 2016, 2019).

Two qualitative questions concluded the survey. These open-ended questions invited respondents to share, in their own words, any benefits or concerns they had observed or were aware of regarding the provision of nutrition support for GRx clients. The qualitative questions enabled participants to offer extended insight and rich description on key provisional considerations of the GRx programme. Such an approach conforms with the findings of Gournelos et al. (2019, p.124), who note that this allows participants to "explain rich details about their attitudes and experiences". Qualitative research is also becoming more recognised as an integral part of health research to support development of policy and practice (Swift & Tischler, 2010). Thus, the addition of these qualitative questions complemented and enhanced the collected quantitative data.

Good surveys include a range of questions to collect categorical data, identify degrees of attitudes and capture perceptions (Gournelos et al., 2019) and consider information required to meet objectives and answer the research questions (Crawford, 1997). Extensive and frequent consultation within the research team occurred to determine the content and style of questions, the language used and readability. The order of questions and length of time for completion were also reviewed. The flow of the survey was designed to guide the respondent through four sections, each related to a separate study objective. A copy of the survey, including all questions can be found in Appendix 5 of this thesis.

3.6 Survey distribution and collection

The primary researcher contacted GRx managers by telephone and invited them and their staff to complete the survey. During this process, a further two organisations (PHO) were identified as programme providers and were added to the data set, bringing the total to 17 providers. All managers verbally assented to participating and the survey link was provided via electronic mail along with a letter to managers, and a participant information sheet for managers to distribute to their staff. Managers were asked to extend the invitation to participate to all staff in their programme, regardless of their level of client contact.

A statement in both the participant information sheet and the beginning of the survey informed respondents there was no obligation to participate or complete the survey, but that consent to participate in the survey was implied with completion and submission of

the survey. A copy of the letter to managers, information sheet and survey questions can be found in Appendices 3, 4 and 5. Completion and submission of the electronic survey automatically recorded the data in Qualtrics XM experience management software.

It was anticipated there would be a minimum of two respondents from each of the GRx providers, and main centres would have larger teams than provincial providers. This number, therefore would provide a range of perspectives and responses. The survey remained open for three months so as to capture staff changes within organisations. However, there were no further responses submitted after mid-way through the second month and the link was deactivated at the close of September.

3.7 Ethics

Ethical approval was sought and provided prior to approaching GRx managers, as with the invitation to participate extended to all staff, contact with managers was considered the first stage of recruitment. Ethical approval was awarded in June 2021 by Massey University Human Ethics Committee (Northern) MUHEC NOR 21/40.

3.8 Data analysis

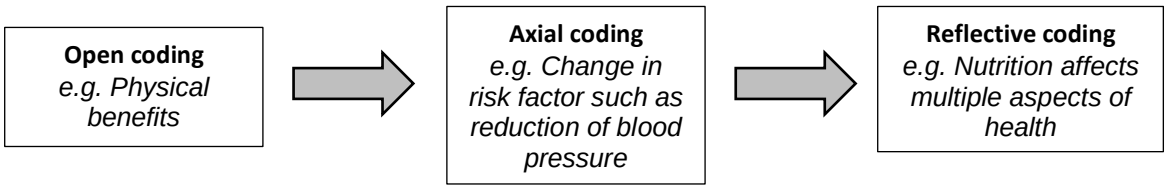
Quantitative descriptive data were analysed through IBM SPSS Statistics software (version 28.0) to determine frequency of responses and characteristics of respondents, thus enriching the representation of those currently involved with GRx. Text-based responses for job titles were reviewed and categorised by the primary researcher into those aligning with manager/team lead, advisor, administration/communications/marketing, nutritionist/dietitian or other. Respondent-provided answers for qualifications were reviewed and categorised into specialisations pertaining to nutrition, physical activity (also described as sport or exercise), other health-science specialisations and non-health-related qualifications.

The two qualitative questions, and consequent qualitative data were analysed using a general inductive approach, identifying relevant text which related to the research concerns of identifying benefits and concerns, before repeating ideas were examined (Auerbach & Silverstein, 2003). The coding strategy used was description-focused coding, for purposes of identifying specific benefits and concerns as described by respondents (Adu, 2019). A standard coding process was utilised to condense the data. This process

incorporated open, axial and reflective coding (Williams & Moser, 2019). Due to the small amount of qualitative data collected, the data could be easily managed and analysed using a manual process. This is an acceptable approach for small amounts of data, particularly for emerging researchers (Auerbach & Silverstein, 2003). It was for this reason that standard qualitative analytical software, such as NVivo was not utilised.

As an example, coding followed this sequence:

Figure 2: Example of coding for qualitative questions



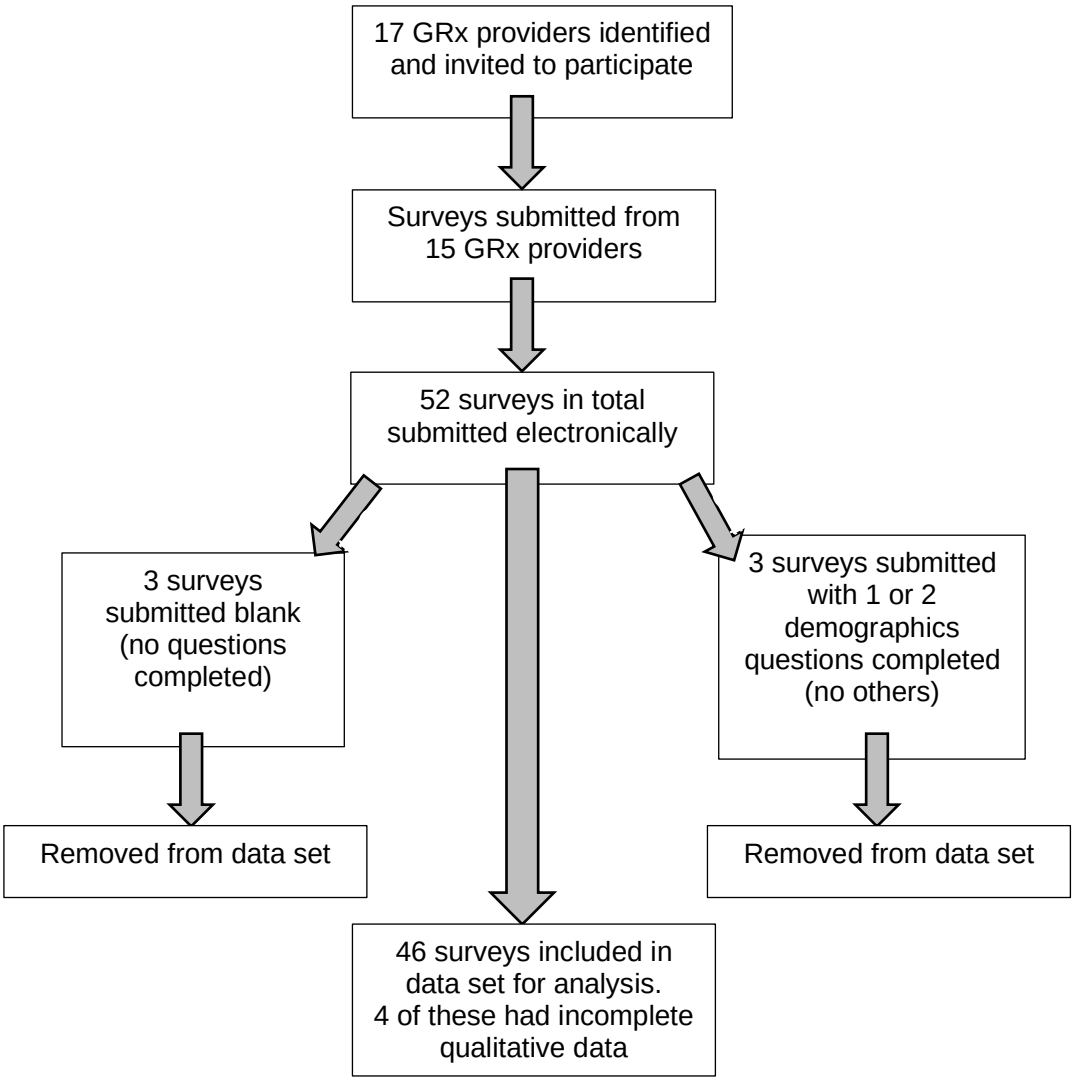
The study design utilised an anonymous electronic survey to collect data from staff employed in GRx services in New Zealand over two months in 2021.
Questions pertaining to quantitative data were designed to provide information about the personnel involved in GRx, the make-up of programmes, indications of what nutrition support looks like, and the perceived importance of this. This data was analysed using IBM SPSS Statistics software (version 28.0).

Two open-ended, qualitative questions enabled respondents to share their perspective on provision of nutrition support in GRx programmes. This data was manually coded using a standard coding process and identified open, axial and reflective coding themes. Reflective coding is included in the discussion.

Chapter 4: Results

All the known GRx providers in New Zealand (n=17) were approached to participate. The number of individuals employed within each GRx provider was unable to be determined due to a number of organisations undergoing staffing changes when GRx managers were contacted. Fifty-two responses were received from 15 GRx providers and 46 surveys were included in the analysed data set (Figure 3).

Figure 3: Flowchart of surveys included or excluded in data analysis



4.1 Demographic data

Gender and age

Eighty-one percent of respondents were female and 42% of all respondents were under 30 years of age. The age bracket of 41+ years made up of 38% percent of respondents.

Length of employment

Nearly a quarter of respondents had been employed in Green Prescription for either less than one year, or more than five. Forty-three percent had been there for one to three years.

Job title

Almost two-thirds of respondents were in the role of healthy lifestyle advisor or variation of that title. Nearly one-third were in roles related to manager or co-ordinator of programmes. One respondent identified their role as nutritionist. Two indicated they had dual roles as advisors to clients, and were managers in the team.

Qualifications

Of 70 qualifications identified by respondents, 31 relate to physical activity, compared with 11 specialising in nutrition. Twenty percent of qualifications are related to other areas of health. Ninety-three percent of respondents indicated they held university qualifications. A minimum university qualification of diploma was counted as determining the qualification level of certificates held was problematic. Eighty percent of respondents held bachelor's degrees.

Table 3 presents demographic data of respondents.

Table 3

Demographic data of respondents

Variable	**% of responses**
Gender	
Male	16.7
Female	81.3
Prefer not to say	2.1
Age	
21-30 years	42
31-40 years	20
41+ years	38
Length of employment with GRx	
Less than 1 year (<1yr)	24
1-3 years	43
3-5 years	8.7
5+ years	24
Job title	
Healthy lifestyle advisor (HLA) OR physical activity and nutrition advisor OR GRx programme (delivery) advisor OR Active Families	57
Programme team lead OR physical activity manager OR Healthy Lifestyle Advisor Lead/Manager OR programme co-ordinator	28
Administration/communication support	6.5
Nutritionist/dietitian	2.17
Dual role of advisor and manager (not counted in either of separate options)_	4.3
Qualification[1]	Number of responses
Undergraduate[2] specialisation in physical activity[3]	30
Post-graduate[4] specialisation in physical activity	1
Undergraduate specialisation in nutrition	9
Post-graduate specialisation in nutrition	2
Undergraduate specialisation in other health[5]	10
Post-graduate specialisation in other health	4
Undergraduate specialisation in other subjects[6]	11
Post-graduate specialisation in other subjects	1

[1]Respondents could select multiple qualifications. [2]Includes certificate, diploma and bachelor's degree. [3]Includes specialisations of sport, physical education, personal training leisure and recreation. [4]Includes graduate diploma, post-graduate diploma and master's degree. [5]Non-specified health science or other health specialisations. [6]Qualifications in subjects not related to health, physical activity or nutrition.

4.2 Description of support in GRx programmes

Provision of support in GRx programmes

More than half of programme delivery focus is estimated to be on physical activity and nutrition support makes up 31% on average.

Provision of nutrition support in GRx

Responses from six organisations indicated there had never been someone in the role of providing nutrition support, while a further three organisations had mixed responses (and some discrepancy) between someone currently or previously in the role, or there had never been someone in the role.

Types of nutrition support provided to clients in GRx

Use of external resources (information, recipes) from organisations such as NZ Heart Foundation or Diabetes NZ is the most common form of nutrition support offered to clients, followed by conversations between clients and advisors.

Popular or common topics of nutrition advice for clients

The top three topics for nutrition advice are fat/weight loss, diabetes and popular diets.

Table 4 presents information related to support available in GRx for clients who are enrolled.

Table 4

Descriptions of support provided in Green Prescription programmes

Focus of support in GRx programme	Estimated % of contribution (mean)
Physical activity	52
Nutrition	31
Other support (e.g. stress/sleep)	18
Specific personnel providing nutrition supports as part of main duties	% of respondents selected option
Yes, this is me	4
Yes, we currently have someone doing this	26
Yes, we used to have someone doing this	28
No, we have never had someone doing this	41
Types of nutrition support provided in GRx	% of respondents selected option
Use of resources from external organisations such as NZ Heart Foundation, Diabetes NZ etc	91
Conversations between clients and HLAs	89
Resources developed in-house and distributed	74
Workshops, seminars, other deliveries	74
Directing clients to other nutrition and health websites such as the NZ Nutrition Foundation or Ministry of Health	65
Consultation with nutritionist or dietitian	61
Other - cooking classes or courses	4
Other- referral to dietitian	4
Popular or common topics of nutrition advice for clients	% of respondents selected option
Fat or weight loss	91.3
Diabetes	82.6
Popular diets	73.9
Heart health	52.2
Cholesterol	50.0
Digestive health (e.g. food intolerances, gut health)	50.0
Fussy eating (in children or adults)	43.5
Inflammation (e.g. foods for arthritis management)	39.1
Supporting mental health	32.6
Other[1]	21.7
Supporting immunity	8.7

[1] Other topics: portion sizes, label reading, eating well on a budget, nutrition during pregnancy and breastfeeding, healthy swaps and how to grow, cook and prepare healthy food.

4.3 Support for specific groups and personnel

Provision of nutrition support relevant to Māori

The description of Māori-specific support provided included: resources in *te reo*, *Te Whare Tapa Wha* principles underpin their programme, Māori staff have relevant experience, tailored information to client needs and interests, a Māori-centric pilot programme and exploring *māra kai* and *maramataka*. During the survey collection period, one organisation was piloting a Māori-centric programme for whānau. However, among responses from this organisation, half indicated there was no provision of Māori-specific nutrition support, and a further 25% indicated they were not sure if Māori-specific support was available. The remaining 25% did not mention the pilot programme as part of their description of support provided.

Provision of nutrition support relevant to other ethnic groups

Of the responses indicating there was nutrition support related to other ethnic groups, a third of these described the use of resources such as recipes designed for Pasifika populations. Other provision described collaborating with organisations with expertise in the area, having team members with the relevant cultural background and providing professional development opportunities to develop greater cultural competency.

Opportunities for professional development

Of the responses indicating there is opportunity for professional development for staff in the area of nutrition, 26% per cent were responses from organisations where someone was currently in a nutrition support role, and 31% from organisations where there used to be personnel with those duties. Forty-three percent were from organisations where it was indicated there had never been someone in a designated nutrition role. In an unrelated question, a respondent identified they have good relationships with community dietitians who also provide the organisation's staff with workshops for enhancing their nutrition knowledge.

Measuring the impact of nutrition support

The most common method for measuring impact nutrition support has for clients was surveys, followed by conversations between advisors and clients.

Table 5 presents data on perspectives from staff on the provision and support for nutrition support for clients.

Table 5

Support for specific groups and personnel

Provision of nutrition support culturally relevant to Māori	% of respondents selected option
Yes	40
No	44
Not sure	15
Provision of nutrition support culturally relevant to other ethnic groups	
Yes	46
No	41
Not sure	13
Opportunities for professional development for staff in nutrition knowledge and skills	
Yes	76
No	13
Not sure	11
Methods to measure impact of nutrition support on clients	
Surveys	71
Conversations between clients and staff	61
Feedback forms at events	37
Email or text from clients	35
Other- stories	2

4.4 Staff perceptions of providing nutrition support

Perceived importance of nutrition support

Respondents ranked the importance of nutrition support for clients on a five-point scale. Of the 42 respondents who completed this question, 92% indicated that nutrition support was important or very important for GRx clients in their journey.

Benefits of providing nutrition support

Survey respondents were asked to describe in their own words any benefits they see in providing nutrition support to clients during their GRx journey. Thirty-seven individuals responded to this question. Over 80 benefits were identified in the responses and came under four broad, open codes. These were: physical benefits, gaining nutrition knowledge and skills, psychosocial benefits, and client success. Table 6 demonstrates the open and axial coding identified within responses from survey respondents.

Concerns of providing nutrition support in GRx

Respondents were asked to share their thoughts and perspectives about any concerns they had in providing nutrition support in GRx programmes. Thirty-five respondents completed this question. Twenty percent indicated they had no concerns but a number of these also highlighted they had good working relationships with nutritionists/dietitians in the community or had staff with appropriate qualifications (registered nutritionist or dietitian). Eleven percent of respondents overall indicated they had concerns about the provision of nutrition support. Responses were analysed and identified with three open codes: resources, the right information for clients, and practitioner confidence and competence. Table 7 displays the open and axial coding identified during analysis.

Table 6

Coding analysis for benefits of providing nutrition support

Representative quotations	Open coding	Axial coding
"*I have seen HbA1c results decrease, blood pressure decrease, people have come off of (sic) medication..." (Respondent 24)* *"…can aid in pain management…" (Respondent 19)* *"Decreased risk for chronic disease or reversal of illness/ailments." (Respondent 14)* *"….if people are not nourishing themselves properly it can be very hard to maintain physical activity." (Respondent 14).* *"I have seen people lose weight, have more energy, better sleep, improved mood." (Respondent 37)*	**Physical benefits**	**Change of condition** including reducing/stopping medication and reduced pain **Change of risk factors** including reduced blood pressure, lower HbA1c **Effect on physical activity** with food providing fuel and nourishment for activity **Improved sleep and more energy** when people eat well
"Clients have also learnt skills like reading food labels and some continue to do this in day-to-day life." (Respondent 15) *"Increased knowledge in planning nutrition- plan, content, shop, timing, prepare, portions." (Respondent 6).* *"….it gives them the tools to be able to make meals themselves…" (Respondent 34)*	**Gaining nutrition knowledge and skills**	**Learning** about food types, appropriate portions, understanding food information **Skills** to plan and implement food preparation
"I have seen huge increases in confidence when it comes to eating healthy kai, and knowing how to prepare it." (Respondent 35) *"Improved diets assist in better management of mental health issues. We often observe improved self-esteem…" (Respondent 46)* *"Individual changes to a person's diet which can also have a positive impact on partners, flatmates, friends and wider familial eating habits." (Respondent 4)*	**Psychosocial benefits**	**Confidence and self-esteem** increased with development of skills and attainment of new knowledge Diet and nutrition improve **mental clarity** and **mental health/mood** **Impact on others** including improved relationships and sharing of information and skills
"Nutrition support affects all four pillars of wellbeing, especially mental wellbeing." (Respondent 8) *"Nutrition support is critical for many of the goals that the clients are working on." (respondent 26)* *"Nutrition gives a client something to focus on if they are injured or unable to exercise." (Respondent 4)* *"Nutrition support through GRx offers clients the opportunity to learn what they would like to learn about nutrition from a trusted source." (Respondent 7).*	**Client success**	Nutrition support has **holistic impact on all areas** of health and wellbeing- physical, mental, spiritual and social/relational **Supports and enhances other goals and habits** and provides a focus other than (or alongside) physical activity Nutrition support can provide **reliable, accurate nutrition** information from a qualified professional, relevant to their situation

Table 7

Coding analysis for concerns about providing nutrition support

Representative quotations	Open coding	Axial coding
"It's not mandated across any GRx contract therefore priorities are often shifted towards physical activity and also resources as a result." (Respondent 4) *"We are doing the best we can with the limited resources and manpower together with large client loads." (Respondent 32).* *"It is very difficult to get a referral to the dietitian as they are in such high demand. Most people do not meet the criteria." (Respondent 40).*	**Resources**	**Contractual obligations** in the programme impact on what is able to be provided **Large client loads and limited staff/time** to provide nutrition support **Resources and opportunities** are limited
"Just that all Green Prescription advisors and local dietitians are following the same MOH guidelines and updating their resources as these guidelines change, therefore every client in NZ gets the same information". (Respondent 24) *"How to make it more fun and play games to share the info". (Respondent 12)* *"Lack of knowledge and miscommunication to support clients. It's really important that personal development in this area is done". (Respondent 8)*	**The right information for clients**	Differences among providers, other health professionals and changing recommendations/guidelines can impact on the **consistency of information** people receive **Communicating nutrition messages well** is crucial for people gaining benefit from it
"The majority of the people within support roles have no nutrition qualifications, therefore, are not equipped to be prescribing tailored nutrition advice." (Respondent 19) *"…a lot (of our team) do not come from a nutrition background or have a nutrition degree." (Respondent 14)* *"…My background is not in nutrition…..therefore I would be more comfortable if there was more personal support and professional development in this area". (Respondent 42)* *"Not a lot of support or upskilling in this area at times". (Respondent 27)* *"…definitely room to educate our staff further to benefit the GRx client". (Respondent 16)*	**Practitioner confidence and competence**	Not having appropriate or **sufficient qualification** to provide nutrition advice **More opportunities to upskill** and learn about nutrition are needed for staff

Chapter 5: Discussion

5.1 Respondents

Eighty-one percent of respondents were female and 42% were under the age of 30 years. Sixty-seven percent of respondents had been in GRx less than three years, respondents under 30 years made up over half that number, indicating GRx is a field of health attractive to those starting out in their career following qualification.

Fifty-seven percent of respondents identified their job title as a healthy lifestyle advisor or a variation of this title, such as physical activity and nutrition advisor, GRx advisor or healthy living advisor. Nearly a third identified they were in a role as manager or programme coordinator. Two respondents identified they had a dual role as manager and healthy lifestyle advisor. Of all respondents, one identified they are in a job designated as a nutritionist. There is opportunity for nutrition support to be embedded in programme delivery with the support of managers and carried out by personnel meeting with clients.

Eighty percent of respondents have completed a bachelor's degree, and 37% have more than one tertiary qualification. Of 70 qualifications described, 16% specialised in nutrition, including nine undergraduate and two post-graduate qualifications. In contrast, 44% of qualifications specialised in physical activity, made up of 30 undergraduate qualifications and one postgraduate qualification.

Personnel in GRx tend to be female, under 30 years or over 41 years and have completed undergraduate tertiary qualifications, many in health and wellbeing-related fields. Nearly two-thirds of personnel are involved with clients in the capacity of advisor, providing support and advice for healthy lifestyles. The focus on physical activity in GRx is evident in the number of personnel employed with qualifications in this area compared with nutrition.

5.2 Physical activity remains a key focus for GRx

On average, 52% of support focus in GRx programmes is on physical activity. More than twice as many personnel qualifications identified specialise in physical activity compared with nutrition-specific training. In spite of the evolution and development of the

GRx initiative over time, the key tenet remains as supporting people to live healthier lives by engaging in physical activity.

5.3 Nutrition is an important aspect of health and wellbeing

As described in Chapter 2 of this thesis, GRx has had a long and successful history over the last 20+ years providing support to enable New Zealand adults and whānau to improve their health and well-being through increased physical activity and healthier eating. There is, however, no inclusion in GRx service coverage schedules to provide nutrition support in GRx programmes. Despite this, many providers are doing so in some measure. Several providers employ personnel with specialist nutrition qualifications and others have access to community nutritionists or dietitians to whom they could refer clients. This reflects where GRx programmes have evolved to now; nutrition is part of the psyche of practitioners in GRx programmes, even if it is not an inherent part of programme delivery in all services.

Nutrition support has been identified by most of this survey's respondents as an important aspect of the health and wellbeing journey for many individuals and an average of 31% of GRx programme focus is on nutrition support. Most respondents to this survey have health qualifications, so may understand the impact nutrition and diet have on overall health, but particularly chronic disease conditions. It is encouraging that at the ground-level of delivery, nutrition support is deemed an important aspect of health and wellbeing journeys; limited provision of this in services is therefore likely due to other factors.

5.4 Appropriate personnel deliver nutrition support

One organisation was identified as having a nutritionist employed in a designated role at the time of the survey. Several organisations have trained personnel working in other roles who may support and have oversight of nutrition support delivered by staff; this is something to be investigated further. Still others have had personnel in this role previously. It is understood through discussion with a few GRx provider managers that personnel turnover can be high in some centres, as well as changes in roles and responsibilities. Sixty-one percent of respondents indicated consultation with a nutritionist/dietitian is a method of nutrition support used. This was higher than expected, particularly as one provider had a designated role for this.

The most common type of nutrition support reported is provision of resources from external organisations such as the NZ Heart Foundation or Diabetes NZ. Many of these resources have sound and accurate advice from a large and relevant evidence base. This may be the only option for some providers who do not have access to qualified nutrition personnel. Conversations between clients and advisors are also utilised to provide nutrition support, whether personnel have sufficient knowledge and skills to be able to practice within their scope of expertise needs further investigation.

5.5 Aligning nutrition advice with needs

The most common topic for nutrition advice for clients was fat or weight loss, with over 90% response rate. It was predictable that weight loss would feature in the most common topics as the Ministry of Health GRx patient surveys conducted between 2012-2018 indicated the most common referral reason for an individual enrolling in GRx was for 'weight problems', and attributed to 52-56% of referrals (Research New Zealand, 2015, 2016, 2019). Such a high response rate in this survey demonstrates individuals are trying to find support to improve their weight in the absence of, or alongside physical activity.

Diabetes featured as the second-most common nutrition topic in GRx programmes at the time of the survey. Discussions between the primary researcher (while engaged in GRx) and clients who had diabetes revealed some wanted 'refreshers' as they had been diagnosed so long ago they couldn't recall the advice, or they'd been recently diagnosed and were on the waitlist to see the dietitian, or the information had been overwhelming when they received it at diagnosis. All of these are reasonable explanations for why diabetes might be such a popular topic for nutrition support. Diabetes is attributed to 11-20% of reasons for referral to GRx (Research New Zealand, 2015, 2016, 2019).

Popular diets were the third-most common topic reported (74%), well above heart health and cholesterol. The high response rate attributed to popular diets as a nutrition topic represents an opportunity for GRx personnel to empower clients with accurate and reliable information from credible sources; and help them to navigate information which can be heavily influenced by friends/family, social media and influencers and even health professionals without sufficient nutrition knowledge.

5.6 Culturally relevant nutrition support is needed

Thirty-nine per cent of survey respondents indicated there was provision of nutrition support relevant to Māori in their GRx programmes. This is important to note as in the GRx patient survey from 2016, it was identified that 76% of Māori had received nutrition advice while in GRx compared with 68% of patients overall (Research New Zealand, 2016). It was noteworthy that in an organisation where a Māori-centric support programme was being piloted at the time of the survey, some respondents indicated there was no nutrition support provision relevant to Māori. Further investigation into the delivery of the pilot programme would be beneficial.

Around 46% reported there is support that is relevant to other ethnic groups; Pasifika were highlighted in the descriptions. Māori, Pasifika and South Asian groups are frequently identified as having a higher risk of development, or increased complications and mortality for some chronic diseases such as diabetes (Atlantis et al., 2017; Gurney et al., 2020; Health Quality and Safety Commission New Zealand, 2021; Yu et al., 2021).

GRx providers may have specific targets to meet in engaging with and supporting people from these groups (primary researcher's experience). Appropriate nutrition resources may be limited, and providers reliant on the expertise of staff who have cultural familiarity to support clients, but may not have sufficient knowledge to provide specific nutrition advice.

5.7 Opportunities to enhance nutrition support in GRx

An average of 31% of GRx programmes are focused on nutrition support. Options for individuals to access nutrition support is limited to lengthy waitlists in the public system (assuming they meet the criteria) or fund private consultations themselves, which is unattainable for many. A registered nutritionist or dietitian to provide in-house client support as well as oversee resource and professional development in each GRx programme could be a feasible option to provide consistency across GRx programmes and improve the holistic service provision to clients.

5.8 Nutrition support affects multiple areas of health and the impact extends beyond individuals

Nutrition affects physical health, in relation to nourishment for the function of the systems of the body and prevention or acceleration of disease conditions, mental health with the biochemical influences diet has on mood and mental functions, as well as social and spiritual health, such as how people interact and relate to one another and the wider world (Adan et al., 2019; Appel et al., 1997; Casas et al., 2018; Dai et al., 2022; Dinan et al., 2019; Durie, 1985; Filippou et al., 2020).

There is an understanding that physical activity and nutrition need to go hand-in-hand to really have a beneficial effect (Elliot & Hamlin, 2018; Sellman et al., 2017). Often, as identified by respondents, engaging in one leads to the other, or enables opportunities to begin lifestyle changes even when there are challenges in other areas (such as illness or injury limiting physical activity). Adequate nutrition affects the ability to participate in physical activity and exercise with beneficial outcomes. It is very difficult to be motivated to engage in and sustain physical activity when diet is poor.

A survey respondent made this observation:

> It [nutrition support] should be compulsory- a requirement on the DHB contract. Obesity is such a big problem in NZ, and we are not going to solve that by getting people physically active. It needs to be combined with nutrition and I believe Green Prescription programmes have the capacity to be able to deliver that alongside our physical activity targets.
>
> (Respondent 2).

Several respondents noted that there are wider benefits related to mental health and social relationships- clients were reported to feel better in body and mind when they were eating well and familial relationships improved as well.

Recent Ministry of Health patient surveys identified people who had undertaken GRx support and received nutrition advice, had made changes such as reducing consumption of sugary food and drinks, takeaways and fatty foods and increased consumption of vegetables (Research New Zealand, 2015, 2016, 2019), these changes alone would have far-reaching effects not only for the individual, but also on households,

workplaces and social activities. The knowledge and skills a person gains in relation to health naturally impact on others around them- whether that is through overt teaching or by passive observation.

Families where parents are making health changes have an effect on children through choices about food, modelling behaviour of diet and exercise and encouraging messages. Within health fields, the ripple-effect can be difficult to identify and thus, quantify, but should not be underestimated as a powerful tool in public health initiatives. Green Prescription Active Families recognises the involvement of children and their whānau has more effect than working with parents or children alone (Ministry of Health, 2021a).

For it to be truly effective however, information and delivery needs to be relevant, applicable and meaningful:

> Nutrition support via GRx has the ability to (sic) improve wider whānau confidence in preparing and enjoying healthy kai, provided we always approach from a whānau-led perspective with relatable, relevant, culturally-appropriate and cost-efficient advice.
>
> (Respondent 35)

Rapport is a significant component to supporting individuals to gain knowledge, skills and implement changes, an individual will be more willing to have a conversation about health and lifestyle changes if a respectful, dignified relationship has been made- taking into account the circumstances and concerns of the person. GRx, as a community-facing service which is widely accessible may be a reasonable entity to provide preventative health support- particularly if individuals have regular contact with a support person and have built trust and connection. However, this is difficult to achieve when hampered by limited personnel, high caseloads, contractual obligations and enrolment periods which typically last only a few months (respondent observations).

5.9 Duty of care as health professionals to provide the right support

A few survey respondents identified GRx clients can have complex needs and/or conditions and would benefit from input in other areas, including nutrition and mental health support. Lifestyle changes are rarely in isolation to one another- they each affect

other areas, therefore, “It is crucial in someone’s wellness journey to have as much information as possible for a successful outcome”. (Respondent 40)

As nutrition is recognised as being part of more comprehensive and holistic support, some respondents alluded to having a duty of care to help clients succeed in their goals and lifestyle changes by ensuring this is available:

> I think that as a lifestyle health provider it is important, we empower our clients and communities to achieve good nutrition through education and appropriate support.
>
> (Respondent 14)

To provide holistic support that encompasses physical activity and nutrition, it is necessary that personnel providing nutrition advice and support have sufficient, qualified knowledge from trustworthy sources to guide clients. As observed in survey responses, GRx advisors provide information and nutrition advice through the course of discussions with clients. While many have health qualifications, there may not be adequate depth of nutrition knowledge to fully cater to the client’s needs:

> Healthy lifestyle advisors often don’t have formal nutrition training yet often end up in positions where they are answering questions around nutrition and working with people with a variety of medical conditions that are beyond their scope of practice.
>
> (Respondent 26)

Qualified nutritionists and dietitians as inherent roles for each GRx provider would not only meet client enquiries, but also create opportunity for GRx personnel to upskill in nutrition knowledge, thus spreading the reach of reliable nutrition messages further via advisors (Early & Stanley, 2018; Hogan & Tuano, 2021; World Health Organization, 2003).

Several respondents indicated nutrition is often a large factor in the concerns clients present with, yet individuals are not able to access specialist dietary advice until they meet certain referral criteria, or need to wait long periods or fund private consultation themselves. GRx operates with a focus on preventative health support, helping clients to make lifestyle changes to slow the development or progression of a disease condition, or to address identified risk factors before disease develops. For this to contribute more

effectively in reducing the chronic disease burden in New Zealand, dedicated nutrition support needs to be included in GRx programmes:

> So many of these clients would benefit from dietetic consultation…..Especially when we consider a prevention-based approach to improving primary health care and reducing the burden of chronic disease of lifestyle-related conditions. These clients are missing that all-important nutrition intervention early-on. [They] are coming saying 'I need to see a dietitian and I need nutritional support BUT I don't YET meet the criteria to be referred to a DHB dietitian and I can't afford $180 or so to go private'.
>
> (Respondent 26)

With a long history in the community, GRx is well-placed to provide nutrition support with qualified nutritionists and dietitians overseeing its implementation. Some GRx providers have implemented nutrition as part of their delivery with resources contributed form DHBs or PHOs (Ministry of Health, 2017a), however, it is not indicated in DHB SCS (Ministry of Health, 2014, 2015a, 2015b, 2016b, 2017b, 2018, 2019, 2020, 2021d).

For the most part, GRx programmes have not had this provided for within funding and resources of GRx contracts.

> There are no specifications for support in contract. Just general mention (sic). Providers are not bound to offer specialised nutrition support, so the level of support varies between different providers."
>
> (Respondent 18)

Much of GRx programmes remain focused on support for physical activity, naturally limiting time and resources available for other forms of support. As indicated in survey responses, many advisors have nutrition qualifications, but are employed in the healthy lifestyle advisor role.

Chapter 6: Conclusion and recommendations

Despite the evolution GRx programmes have undergone over the last two decades, most continue to have a strong focus on support to increase physical activity. On average, physical activity makes up more than 50% of GRx programmes compared to 31% focus on nutrition support. Almost triple the number of the tertiary qualifications held by respondents specialised in physical activity (44%) compared with only 11 in nutrition (16%).
It is encouraging that several GRx providers employ nutritionists/dietitians, one indicated it was a designated job title. Other nutrition-qualified staff are in adjunct or separate roles with no indication of how much nutrition support they are involved with in their duties.

Most respondents (76%) indicated they have professional development opportunities for nutrition support but what these entail, how often and the quality of that learning is not known. Less than half of respondents indicated they have nutrition support provision that is relevant to Māori, Pasifika or other ethnic groups- further investigation is warranted in this area. Nearly all respondents indicated nutrition support is an important or very important part of a client's health journey in GRx.

Types of benefits which respondents described as a result of nutrition support provision included weight loss, changes to a health condition and risk factors; all of which can have a preventative effect on chronic health conditions as well as reducing the impact of these conditions. Multiple benefits were described which impact many areas of health and wellbeing including physical and mental health and there is a ripple-effect impact on people associated with a GRx client.

Few respondents expressed concerns about provision of nutrition support. Some of those who indicated they had no concerns tended to have access to, and good relationships with, community nutritionists and dietitians. Concerns regarding provision were described under categories of not being a specific requirement of GRx programmes, thus impacting resources, consistency across providers and programmes, and lack of knowledge/qualification among personnel who may provide this support.

Overall, increased and improved professional development for GRx personnel in the area of nutrition support was indicated by many as something that would be beneficial to improve their knowledge and ability to support clients.

This situation analysis indicates nutrition support is a beneficial and important part of supporting clients in their health journeys. GRx (and similar) programmes are a feasible option for nutrition support to be delivered at low- or no-cost to the general public in the community as a preventative health focus and that in some services this is already taking place. However, as is most often the case in the health sector, improvements to sufficiently resource and deliver this component are needed. Further investigation into specific challenges of delivery and understanding how GRx programmes uniquely provide nutrition support is desirable.

6.1 New knowledge generated and contribution to health

As indicated by survey responses, physical activity remains a key focus for GRx, however there was a heartening number of personnel with nutrition qualifications- even if they are not operating in a designated role. This is feasibly indicative of the broader view and evolution of the GRx over the years, beyond physical activity support.
Many GRx personnel indicated they have access to professional opportunities to learn more about nutrition support, again a reflection of the importance of nutrition as part of the health journey being acknowledged.

Nutrition resources from external organisations are the most utilised method of providing information and advice- this is helpful in determining where these organisations could focus on developing new or updated information and resources.

Weight or fat loss, diabetes and popular diets were the 3 most popular or common topics for nutrition advice, indicative of clients wanting to learn more about the effects of nutrition on disease conditions and risk factors, as well as navigating the field of often confusing and contradictory information available.

GRx staff identified nutrition support is an important and beneficial aspect of a client's health journey, yet resources, contract provision and other constraints limit this. The use of an anonymous survey enabled expression of perceptions and insights from personnel involved with GRx, a unique perspective which can contribute to development of cohesive strategies for programmes in the future.

6.2 Strengths of study

- Contacting each GRx manager to explain the project and personally invite their team to participate resulted in the rapid return of surveys for the most part.
- Forty-six responses were received from 15 out of 17 organisations which provided a wide range of perspectives and reflected nuances of each GRx provider serving in a unique community.
- The survey involved a range of questions, which enabled collection of data that developed a representation of GRx programmes, GRx personnel and insights for future considerations.

6.3 Limitations of study

- Recruitment relied on managers dispersing the link and personnel/staff to complete it of their own volition. There were fewer than expected responses from some of the larger centre providers and several responses were noted to come from the same organisations which appeared to have timed out after a prolonged period of being open. There was no way to follow up with incomplete responses or remind participants once managers had sent the link to staff.
- The continuing challenges of the COVID-19 pandemic disrupted usual operations for many GRx providers, including programme delivery which may have affected reporting on usual support offered in GRx.

6.4 Recommendations for further research

There are a number of recommendations for further research in this area. First, it would be beneficial to have in-depth discussion with programme leaders to identify what components regarding nutrition support are utilised and how this can be promoted within the team to enhance awareness and understanding, and also interview personnel with nutrition qualifications to determine the proportion of their usual duties that are related to this.

Second, identifying what professional development opportunities exist, what they entail and who delivers them is imperative to gain understanding about support available for personnel to perform this function.

Third, further exploration would be beneficial to identify what is available to GRx clients from other organisations if nutrition support is not provided in the programme. Inter-agency support for individuals at greater risk for chronic disease should be investigated. It would also be beneficial if sources of nutrition information for clients are explored further, particularly in GRx providers where nutrition support is limited.

Lastly, several respondents indicated more resources were needed to provide nutrition support. Discussion with personnel regarding perspectives about what is needed to strengthen nutrition support would provide valuable insight and information.

The availability of culturally relevant nutrition information, resources and support should be examined as respondents raised concerns about communication to clients and with consideration of some population groups being over-represented in data related to chronic disease.

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Appendices

Appendix 1: Letter to GRx managers

Green Prescription and Nutrition Support in Aotearoa: "Getting the Lay of the Land"

A research project to contribute to the body of knowledge in providing greater access to nutrition support throughout New Zealand*.

Tēnā koe,
Ko Cherise Pendergrast toku ingoa,
Ko Waitara, Taranaki ahau
Ko toku Te Raki Paewhenua, Tamaki Makaurau, ināianei,
He mātanga kai taiora, au ki rongoā kākāriki

Greetings,
My name is Cherise Pendergrast. I hail from Waitara, Taranaki but have lived in the North Shore of Auckland for the last 20 years.
I am a nutritionist and have previously worked in Green Prescription.

Description of the project
For a number of years, research around the effectiveness and scope of Green Prescription programmes has focused on supporting clients in their physical activity.
We understand that nutrition support is also given, but have little information about what this looks like in each Green Prescription provider.

Our aim with this project is to explore what nutrition support is given, and by whom in each Green Prescription provider in Aotearoa.
We hope the findings may lead to a doctorate project to explore development and implementation of nutrition support delivery in all Green Prescription programmes.

For this initial project (Phase 1), we are conducting a short survey to gather information about current Green Prescription programmes.

Perceptions and ideas from various people involved in the delivery of Green Prescription services and programmes are valuable to help us understand what works and what is challenging.
We would like to have people with different job titles respond, whether they have direct contact with clients or not. This information helps us to understand different perspectives of Green Prescription services.

** This project is also being undertaken to complete a Post Graduate Diploma of Science (Human Nutrition) with Massey University*

Invitation to participate

If you are willing to have personnel from your Green Prescription team complete this survey, would you please forward both the information sheet and survey link to them.
Consent to participate is implied with completion and submission of the survey.

There is no obligation for a participant to complete the survey.

All information will be kept confidential and neither personnel or Green Prescription providers will be identified in the reporting.

Participants are invited to provide their contact details if they would like to be contacted in the future for further phases of this project.

Thank you for your consideration.

If you have any questions or concerns, please contact the researcher or project supervisors directly.

Cherise Pendergrast (Researcher)
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Tēnā rawa atu koe
Cherise Pendergrast
Associate Registered Nutritionist

Appendix 2: Project information sheet

Green Prescription and Nutrition Support in Aotearoa
'Getting the Lay of the Land'
Project Information Sheet

Researcher introduction
Kia ora, my name is Cherise Pendergrast, (Ngāpuhi). I come from Taranaki and have lived in the North Shore, Auckland (Te Raki Paewhenua, Tāmaki Makaurau) for over 20 years since leaving school.
I am an Associate Registered Nutritionist and student in the Post-Graduate Diploma of Science (Human Nutrition) programme at Massey University.

In a past career, I was an occupational therapist working first in community mental health services and then with children in a physical rehabilitation service.
Through this time, I became aware of how nutrition plays a big role both in recovery and preventative health care. This led me to return to university to complete an undergraduate qualification in nutrition and then seek out my local Green Prescription provider.
During my employment with this Green Prescription provider, I saw first-hand, the benefits of providing nutrition support to clients, but also the challenges to implementing this as part of service delivery.
In turn, these experiences were the catalyst to develop this research project.

Project description
Green Prescription (GRx) began in 1998 as an initiative for health professionals to 'prescribe' lifestyle changes to a patient to support and encourage them in becoming more physically active and eat healthier as part of an overall health plan. It was initially facilitated by Sport and Recreation New Zealand (SPARC- formerly known as the Hillary Commission), and transferred to the Ministry of Health in 2009 with contracts overseen by District Health Boards (DHBs) and programme services delivered by Regional Sports Trusts (RSTs) or Primary Health Organisations (PHOs). (MOH, 2017).

To date, a number of studies have been conducted on the efficacy of physical activity as part of Green Prescription service provision, but little information is available regarding nutrition support. People are becoming more concerned about their nutrition and health and are seeking advice more readily in various places.
There is provision of nutrition support as part of Green Prescription programmes throughout Aotearoa, but it is not clear what this looks like and many service delivery models reflect much more of the original intent- to increase physical activity.

This project aims to explore the scope of nutrition support that is currently available among Green Prescription providers in Aotearoa.

Invitation to participate
As a current employee within a Green Prescription provider, you are invited to participate in an online survey to provide information about nutrition support available within your service.
Participation is optional and all information provided will be held in confidentiality and no identifying details will be published.
If you do not have direct contact with clients in Green Prescription, you may still complete the survey; a variety of perspectives is valuable to this project.

Project procedures

The online survey will take between 15-20 minutes to complete.

Data management

- The data obtained from the survey will contribute to reporting about nutrition support available among Green Prescription providers
- Confidentiality will be preserved by assigning codes to various roles and places of work (Green Prescription providers). Names and organisations will not be identified in the reporting.

Participant's rights

You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- *decline to answer any particular question;*
- *ask any questions about the study at any time during participation;*
- *provide information on the understanding that your name will not be used*
- *be given access to a summary of the project findings when it is concluded.*

Project contacts

Cherise Pendergrast (Researcher)
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Dr. Rachel Batty (Supervisor)
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Participants are welcome to contact either the researcher or any of the supervisors if they have any questions about the project.

Compulsory statements

This project has been reviewed and approved by the Massey University Human Ethics Committee: Northern, Application NOR 21/40. If you have any concerns about the conduct of this research, please contact A/Prof Fiona Te Momo, Chair, Massey University Human Ethics Committee: Northern, telephone 09 414 0800, x 43347,
***email* humanethicsnorth@massey.ac.nz.**

Appendix 3: Online survey questions

(formatting affected by conversion from Qualtrics XM software)

Section 1: Demographics: a bit about you

Green Prescription and Nutrition Supporting Aotearoa: "Getting the Lay of the Land".

You are under no obligation to complete this questionnaire or answer any question. Completion and submission of the questionnaire implies consent and that you have read and understood the project information sheet.
We invite you to complete the questionnaire even if you do not have direct contact with Green Prescription clients.
Names, roles and places of work will be kept confidential and will not be published.

Q1.0 **Section 1: Demographics**

These questions are designed so we can find out who is involved in Green Prescription currently.

Q1.1 Please tell us your gender

(Mark one option from the list below).

- ○ Male
- ○ Female
- ○ Non-binary/third gender
- ○ Prefer not to say

Q1.2 Please tell us your age.

(Mark one option from the list below)

- ○ <21years
- ○ 21-25 years
- ○ 26-30 years
- ○ 31-35yrs
- ○ 36-40 year
- ○ 41-45 years
- ○ 46+ years

Q1.3 Which Green Prescription provider are you currently employed by?

(Please mark one option from the list below).

- ○ Active Southland
- ○ Harbour Sport
- ○ Hauora Wairau Marlborough
- ○ Nelson Bays Primary Health
- ○ Nuku Ora (Sport Wellington)
- ○ Papakura Marae
- ○ South Seas
- ○ Sport Auckland
- ○ Sport Bay of Plenty
- ○ Sport Canterbury
- ○ Sport Gisborne Tairawhiti
- ○ Sport Hawke's Bay
- ○ Sport Manawatu
- ○ Sport Northland
- ○ Sport Otago
- ○ Sport Taranaki
- ○ Sport Whanganui

Q1.4 How long have you been employed with this Green Prescription provider?
(Please mark one option from the list below).

- less than 1 year
- 1-2 years
- 2-3 years
- 3-5 years
- 5+ years

Q1.5 Please identify your job title within Green Prescription (type in the box below).

Q1.6 Please identify your qualifications.
Type into the box below, the full name of the discipline and include any majors or endorsements.
For example: Bachelor of Sport and Recreation with Business Management. Include more than one if applicable.

Certificate of

Diploma of

Bachelor degree of

Graduate certificate of

Graduate diploma of

Postgraduate certificate of

Postgraduate diploma of

Other qualifications

Q1.7 Describe any prior experience relevant to your current job responsibilities.
For example: experience in running group programmes, motivational interviewing, personal training or life coaching etc.
Type into the box below.

Section 2: What's currently happening in Green Prescription?

Q2.0

Section 2: What is happening now?

These questions are designed to gather information about what Green Prescription programmes look like at the moment.

Q2.1 *

What percentage of the following are provided in your Green Prescription service at the moment?

Advice and support for physical activity	0
Advice and support for nutrition	0
Advice and support for other parts of health and wellbeing (e.g. sleep, screentime etc).	0
Total	0

Q2.2 Does your team have access to professional development opportunities around nutrition knowledge and advice?
Mark one option from the list below.

- ○ Yes
- ○ No
- ○ Not sure

Q2.3 Please indicate which methods of nutrition support for clients are used by the Green Prescription service you work in.
(Mark all that apply from the list below).

- ☐ I'm not sure
- ☐ Workshop or seminar delivery
- ☐ As part of conversations between Green Prescription clients and healthy/active lifestyle advisors/practitioners
- ☐ Resources developed in-house and distributed by email, post or social media
- ☐ Resources from external organisations such as Heart Foundation, Diabetes NZ etc distributed to clients
- ☐ Consultation with nutritionist/dietitian
- ☐ Direct clients to other nutrition and health organisation websites (e.g. Ministry of Health or NZ Nutrition Foundation).
- ☐ Other (please describe)

Q2.4 Which nutrition topics do clients commonly ask about?
(Mark all that apply from the list below).

- I'm not sure
- Popular diets
- Digestive issues (e.g. food intolerances, gut problems)
- Cholesterol
- Diabetes
- Fat or weight loss
- Supporting immunity
- Supporting mental health
- Inflammation (e.g. foods for arthritis management)
- Fussy eating (in children or adults)
- Heart health
- Other (please describe)

Q2.5 Does your Green Prescription programme provide nutrition support which is culturally relevant for Māori? (for example: may include maramataka, principles of tapu and noa, māra kai information).

- Yes (please describe in the box below)
- No
- I'm not sure

Q2.6 Does your Green Prescription programme provide nutrition support which is culturally relevant to other ethnic groups? (for example: inclusion of traditional dishes and ways of cooking etc).

- Yes (please describe in the box below)
- No
- I'm not sure

Q2.7 How does your Green Prescription service gather information about changes people make because of the support in the Green Prescription programme?

Please mark all that apply from the list below.

- o Surveys to clients during and after the Green Prescription programme period
- o Conversations with clients
- o Feedback collected at workshops/seminars/deliveries
- o Written feedback from clients (emails/texts etc)
- o Other (please type in the box below)

Q3.0 Section 3: Nutrition roles and responsibilities

These questions are designed to identify if there are specific personnel responsible for nutrition support in your programme.

Q3.1 In your Green Prescription service, is there someone whose MAIN role is to provide nutrition support?

- o Yes, this is me
- o Yes, we currently have someone
- o We used to have- (please type in the box below how long ago this was).
- o No, we have never had someone doing this

Q3.2 In relation to the previous question, is/was this person

(mark the answer which applies)

- o a registered dietitian
- o a registered nutritionist
- o working towards registration
- o I'm not sure

Q4.0 **Section 4: Looking forward**

These questions are designed to capture thoughts and ideas about nutrition support in Green Prescription

Q4.1

On a scale of 1-5 bars how important do you think nutrition support is for someone's health journey while they are in enrolled in Green Prescription?

Use the slider to indicate your rating.
(1 bar = not important at all, 5 bars = very important).

Q4.2 We would like to know your thoughts on how nutrition support in Green Prescription programmes benefits clients.

Please type in the box below what benefits you have seen nutrition support provide, and/or what benefits you think nutrition support could provide

Q4.3 Do you have any concerns about nutrition support in the Green Prescription programme you currently work in?

(type in the box below)

Future directions

Q4.4 The findings from this project, Phase 1, will be used to inform a more in-depth exploration of the role that Green Prescription could play in providing nutrition support in the future.

If you would like to contribute to Phase 2, please provide your name and email

Q4.5 Thank you for your time and participation.

Your responses have been recorded and contribute to our project information in exploring the Lay of the Land for Green Prescription service delivery.

If you have any questions or concerns, please email:

cherise.pendergrast.1@uni.massey.ac.nz

End of Survey

We thank you for your time spent taking this survey.

Your response has been recorded.