Food desert or food swamp? An in-depth exploration of neighbourhood food environments in Eastern Porirua and Whitby

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Abstract

Introduction

Many programmes that aim to reduce the prevalence of diet-related disease have chosen to focus on individual behaviour change with little recognition of the influence of the environment. The aim of this thesis was to conduct an in-depth exploration of the local food environments of two socioeconomically disparate areas of Porirua: Eastern Porirua and Whitby, to determine whether there are environmental barriers to healthy food accessibility for residents. The area of Eastern Porirua has been described as a 'food desert' – an area where healthy food is virtually inaccessible. This thesis also sought to identify the most appropriate solutions and interventions to improve accessibility of healthy food in Eastern Porirua and determine how useful the application of the ANGELO (Analysis Grid for Environments Linked to Obesity) framework is for identifying and classifying barriers to accessing healthy food.

Methods

Three methods were used to answer the research questions. Data were collected on food outlets in both Eastern Porirua and Whitby, and mapped to show the number and type of outlets in each neighbourhood of both areas. The density of each type of food outlet was then calculated for each census area unit (CAU) within the two areas. The Retail Food Environment Index (RFEI) – ratio of 'unhealthy' to 'healthy' outlets was also calculated. Second, a bread and milk price and availability survey was undertaken for the convenience stores and supermarkets across both areas and also the supermarkets in nearby Porirua Central. Finally, a focus group study was conducted with four ethnically diverse groups of Eastern Porirua residents in order to determine the perceived barriers to healthy food access and to identify potential solutions. The ANGELO framework was used to analyse the focus group results.

Results

It was found that there were more 'unhealthy' outlets, fast food outlets and convenience stores, in Eastern Porirua than Whitby and more supermarkets in Whitby than Eastern Porirua. Density of 'unhealthy' outlets was lower and the RFEI was lower for almost all neighbourhoods in Whitby compared to Eastern Porirua. Availability of bread and milk was similar across both areas but both food items were more expensive in convenience stores than supermarkets. For both foods the 'healthy' option was most often more expensive than the 'less healthy' option. The focus group participants identified income, price of foods and features of the physical environment as the main barriers to accessing healthy food. They also identified sociocultural factors such as lack of skills, knowledge, and training as barriers. Solutions suggested by participants included a neighbourhood supermarket, a neighbourhood produce market, increased income, and price subsidies/vouchers for healthy foods.

Discussion and Conclusions

The results of this research were similar to international and New Zealand studies that have examined food accessibility that have also found a higher number and density of fast food outlets and convenience stores in deprived areas. Income and the price of food have also been reported widely in the literature as barriers to accessing healthy food. A key strength of this research that separates it from other studies, is the mixed methods approach which overlays objectively measured features of the food environment with residents' perceptions. This thesis concludes that while Eastern Porirua does resemble a 'food desert' with it's lack of healthy food options, it may be better described as a 'food swamp', an area with an abundance of less healthy food options. Further research should investigate solutions across all four environments identified in ANGELO – sociocultural, physical, political and economic – to reduce the barriers to families/whānau being able to access enough healthy food. This thesis recommends that

public health organisations continue to engage with local and central government to scope food environments and work together on solutions, including policy options, to improve access, especially in deprived areas. It is also recommends that there is support for local initiatives such as community markets, gardens and food co-operatives that have the potential to increase healthy food availability and access and also provide a site to share knowledge and skills.

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Abbreviations

CAU – Census Area Unit

RFEI – Retail Food Environment Index

GIS – Geographical Information System

ANGELO – Analysis Grid for Environments Linked to Obesity

EnRG – Environmental Research Framework for Weight Gain Prevention

Heppru – Health Promotion and Policy Research Unit

RPH – Regional Public Health

LTCCP – Long Term Council Community Plan

NZDep – New Zealand Deprivation Index

SES – Socioeconomic Status

BMI – Body Mass Index

Glossary

Māori

Panui – invitation, public notice

Kuia – elderly woman, grandmother, female elder

Kai – food

Kaimoana – seafood

Samoan

Fa'a Samoa – Samoan way of life

Chapter One: Background and introduction

This thesis explores the food environments of two disparate neighbourhoods within the city of Porirua in the Wellington region. The research contains both quantitative and qualitative aspects, employing a mixed methods approach. It describes the perceptions of the environmental barriers to accessing healthy food for residents of one of these neighbourhoods, Eastern Porirua and also examines the potential solutions to improve access to healthy food. The ANGELO (Analysis Grid for Environments Linked to Obesity) framework is applied as a theoretical and methodological tool (Swinburn, Egger et al. 1999).

Background to the research project

Regional Public Health (RPH) is an organisation contracted by the Ministry of Health, responsible for delivering public health services on behalf of Capital Coast, Wairarapa and Hutt Valley District Health Boards which together cover the Wellington Region. This work includes a Nutrition and Physical Activity programme. The long-term goal of this programme is to reduce nutrition-related conditions such as obesity, diabetes, food insecurity and improve oral health. RPH had previously identified the city of Porirua as an area with high rates of obesity and type II diabetes especially in areas of high deprivation. There was anecdotal evidence that in parts of Eastern Porirua healthy food was physically very difficult to access. However, there was a lack of actual data on this and other aspects that may prevent easy access to healthy food. RPH sought to further examine the determinants of these debilitating conditions. They were interested in the environmental influences on healthy food accessibility and availability.

In order to identify appropriate programmes to address these issues, RPH commissioned a research project that would explore the environmental barriers to healthy food access in order to inform any programmes/projects they may design, to

improve food security and access to healthy food, especially in Eastern Porirua. The research was started in September 2008 and this thesis is the result.

Eastern Porirua and Whitby

Eastern Porirua has a majority Pacific population followed by Māori then NZ European. In terms of area level deprivation, Eastern Porirua ranges from NZDep2006 6-10 with most areas 9 or 10 – high deprivation (White, Gunston et al. 2008). Eastern Porirua is made up of six census area units and is separated from the urban centre of Porirua by a large roundabout and motorway. It is a mixture of hills and flat with a large proportion of Housing New Zealand properties, mainly built in the 1960s. Housing New Zealand has an office dedicated to this area and a Community Renewal project. The neighbourhoods were built quickly with little thought to community resources, facilities and neighbourhood design. A lot of work has been done by Housing New Zealand, in collaboration with residents, to make the neighbourhoods cleaner, friendlier and safer (Housing New Zealand Corporation 2009). Anecdotally, Eastern Porirua has been described as a 'food desert', however to date there has been no research conducted on the food environment in the area.

Whitby consists of mainly NZ European residents followed by a small percentage of Māori and then Pacific. The more affluent areas of Whitby are classified as NZDep2006 1 or 2 – low deprivation (White, Gunston et al. 2008). Whitby has been described as a 'dormitory' or 'commuter' suburb. It neighbours Eastern Porirua and the topography is relatively similar for both areas (hilly with some flat). Unlike Eastern Porirua there are fewer Housing New Zealand properties, Whitby is slightly younger (development began in 1971) and was more far more planned than Eastern Porirua. The 'Whitby Consortium' ensured the area had a swimming pool, schools, artificial lake and a shopping centre. Another unique feature is the under the road pedestrian tunnels (Porirua City Council 2009).

Research questions

Eastern Porirua has been previously described as a 'food desert'. This research describes the food environment of Eastern Porirua and also how the residents of this area navigate their environment. Four research questions were developed by the researcher in collaboration with advisors from Regional Public Health and the University of Otago:

1. How do the food environments of Whitby and Eastern Porirua compare in terms of availability of outlets and price and availability of basic foods?
2. What are the perceived environmental barriers to accessing healthy food for residents of Eastern Porirua and Whitby?
3. What are potential points of intervention/solutions to improve access to healthy food in Eastern Porirua?
4. How useful was the ANGELO framework for indentifying and classifying barriers to accessing healthy food?

Overview of this thesis

This chapter has provided a background to the research and follows with an introduction to why food accessibility is important for population health. It gives an overview of the burden of diet-related disease and describes food-related inequalities. It then provides a discussion of different approaches to identifying influences on food choice. Ecological models are introduced including the ANGELO framework (Swinburn, Egger et al. 1999).

In *Chapter Two a* review of the available academic literature examines neighbourhood food environments and the environmental barriers and influences on healthy food accessibility, including both international and national sources. This review also

explores potential solutions and interventions that aim to improve healthy food accessibility.

Chapter Three describes the theoretical perspective underpinning this thesis. It then provides an outline of the combination of quantitative and qualitative sections as a mixed methods approach to this research. Methods for the food outlet data collection and mapping, bread and milk price and availability survey and focus group study are described in this chapter.

The results of this research are then presented in *Chapter Four.* This chapter is separated into three parts; the food outlet data collection, the food availability and price study and the focus group study. The ANGELO framework (Swinburn, Egger et al. 1999) is used to categorise barriers and solutions to healthy food accessibility and analyse the focus group results.

A discussion of the main environmental barriers to healthy food accessibility is provided in *Chapter Five*. Key results and a critique of the application of the ANGELO framework are also included along with discussion of the potential solutions to improving healthy food accessibility in Eastern Porirua. Implications and recommendations for research are then followed by policy and practice implications and recommendations. The research conclusions are then presented.

Introduction

Food selection and consumption are often framed as issues of personal choice and responsibility where the emphasis is on human agency rather than any structural or environmental influence on behaviour (Delormier, Frohlich et al. 2009). Most efforts to curb the rise of obesity have focussed on personal strategies including educational approaches. These strategies are often centred upon modifying behaviour through influencing attitudes, motivations and beliefs (Brug, Van Lenthe et al. 2006). Typically, health behaviour theories such as the Theory of Planned Behaviour, the Transtheoretical model and Social Cognitive Theory have been used to inform approaches to improve eating habits and increase physical activity in the hope of reducing overweight and obesity (Kremers, De Bruijn et al. 2006).

Projects and programmes designed on this basis often assume that everyone has the opportunity to logically and rationally choose which types of food to eat, when, how much and how often. With indications that health education and other individual approaches are not having the desired effect on obesity rates, the focus has shifted in the past decade to look at what influence the environment, or the context in which people live, may have on food 'choice' and consequently population overweight and obesity (Dibsdall, Lambert et al. 2003). It is suggested that while there is some ability to make choices when it comes to food consumption, these choices are constrained largely by the environment in which this 'choice' takes place.

Food as a determinant of health

Food is undeniably related to health. Excess consumption of food and poor diet quality are associated with adverse health outcomes including obesity, overweight, diabetes, cardiovascular disease, some cancers, micronutrient deficiencies and oral health disease (Robertson, Brunner et al. 1999). The Ottawa Charter for Health Promotion identifies food as one of the fundamental conditions and resources for health (World Health

Organization 1986). Food and diet-related conditions including malnutrition, obesity, oral health concerns, food insecurity and non-communicable diseases are a significant burden on societies, developed and developing (Robertson 2001).

Overweight and obesity

Overweight and obesity are defined as abnormal or excess body fat accumulation that may impair health. Overweight is defined as a body mass index (BMI) of 25 or over and obesity as BMI of 30 or over (World Health Organization 2006). Worldwide it is now estimated that 1.6 billion adults and at least 20 million children under five are obese (World Health Organization 2006). In most developed countries obesity and overweight typically follow a social gradient with highest rates among the poorer, more deprived sections of the population (Drewnowski 2009). However, developing countries are also beginning to suffer the effects of increased rates of overweight and obesity. This is often described as part of a 'double-burden' of disease with obesity and chronic disease sitting alongside infectious conditions and malnutrition.

Obesity is a risk factor for many chronic and debilitating conditions including cardiovascular disease, type II diabetes, musculoskeletal disorders and some cancers – colon, endometrial, and breast cancers (Swinburn, Ashton et al. 1997; World Health Organization 2006). Particularly alarming is the rate at which overweight and obesity have increased over the last 20 years, including in New Zealand (Ministry of Health 2008). National Nutrition Surveys (Russell, Parnell et al. 1999) show a 55% increase in adult obesity prevalence between 1989 and 1997. New Zealand Nutrition and Child Nutrition Surveys reports that around 50% of adults and 30% of children in New Zealand are either overweight or obese (Russell, Parnell et al. 1999; Parnell, Scragg et al. 2003).

There are considerable economic, social and health costs associated with obesity and overweight, not only to affected individuals and families but the nation as a whole

(Swinburn, Ashton et al. 1997). In New Zealand, the costs of obesity as part of the total health care budget were estimated at around $247.1 million (based on around 2.5% of health expenditure) for 2000/01 but are likely to be higher than this due to the increase in prevalence of both conditions (Ministry of Health 2003).

Food and nutrition inequalities: Ethnicity and deprivation

This burden of food-related ill health, especially overweight and obesity is carried unequally, both on a global level and within developed countries. Inequalities in health exist both between countries and also within countries (World Health Organization 2008). Food and nutrition inequalities are no different (Robertson, Brunner et al. 1999). Poverty and social inequality are important determinants of obesity and other diet-related conditions (Robertson 2001). In many countries indigenous and/or migrant populations are also disproportionately affected (Hao and Kim 2009). In Zealand, Māori, Pacific peoples and those living in deprived areas suffer from higher rates of food-related ill health. These populations are more likely to be overweight or obese than non-Māori non-Pacific and those living in more affluent areas (Russell, Parnell et al. 1999; Parnell, Scragg et al. 2003).

Rates of obesity and type II diabetes are patterned by a social gradient in New Zealand as they are in various other developed countries (McLaren 2007; Drewnowski 2009). In New Zealand, socioeconomic status is often shown using small area level deprivation, as is often the case internationally. This is measured using the NZDep scale, which is composed of eight variables of material and social deprivation including employment, car ownership, income and qualifications (Crampton, Salmond et al. 2007). NZDep is an aggregated score that aims to measure deprivation at area level by summarising the characteristics of individual residents.

Diet-related ill health and disease disproportionately affect low socioeconomic groups, low-income people and those living in deprived areas (McLaren 2007). Statistics show that 20% of Pacific children and 16.7% of Māori children are considered obese (Parnell, Scragg et al. 2003). Māori and Pacific and those living in highly deprived areas are less likely to meet the daily recommended intakes of fruit and vegetables than non-Māori and those in more affluent areas (Russell, Parnell et al. 1999). The association between deprivation, diet and weight has also been demonstrated widely outside New Zealand (Robertson 2001). Studies in Australia, Canada and the U.K., have indicated that neighbourhood level (or other small area) deprivation is a significant predictor of overweight and obesity independent of demographic and SES characteristics (King, Kavanagh et al. 2006; Harrington and Elliott 2009). Similar relationships have also been observed for fruit and vegetable intake, with area deprivation impacting on intake independent of individual characteristics (Shohaimi, Welch et al. 2004). In New Zealand, those living in areas of high deprivation are more likely to have poor quality diets, purchase more fast food, consume more soft drink and eat less fruit and vegetables than those in less disadvantaged areas (Utter, Scragg et al. 2007; Ministry of Health 2008).

Context and composition

As described above, people who live in deprived areas tend to have poorer diets and worse health outcomes than people in more affluent areas. Is it something about the people who live in these areas that makes them more at risk of food-related ill-health? Or is it something about the places themselves that increase likelihood of developing risk factors? The effects place has on health are often referred to as context, while composition effects are those that arise as a result of individual characteristics (Macintyre, Ellaway et al. 2002).

Cummins, Curtis et al. (2007) suggest that focussing on individual characteristics or place in isolation from one another can underestimate the influence of the place on health. It is likely that there is a reciprocal relationship between people and place

suggesting that it is more useful to examine both in relation to their effects on health. Deprivation amplification is the idea that people of lower socioeconomic status at the household or individual level are further deprived by area in which they live (Macintyre 2007). It has been suggested that lack of access to health promoting resources such as stores selling healthy food, parks, and medical centres is compounded or "amplified" by individual disadvantage, this concept of deprivation amplification at first glance makes sense although findings vary by type of resource and area of interest (Macintyre 2007). Rather than focusing solely on individual characteristics, it is necessary to also look to the influence the environment may have on health outcomes.

The environment

It is necessary then to examine how the 'environment' has been conceptualised through the use of ecological theories. Historically in health, the environment has often been used to refer to the physical environment, specifically health damaging, toxic and pathogenic features of it (Stokols 1996). In a social ecological context the influence of the environment includes all features external to the individual or community including social, cultural as well as physical aspects. A social ecological approach considers features of the environment to be potentially health promoting as well as health damaging.

Recently these alternative approaches have been applied to the study of the determinants of obesity and are embedded in ecological theories, which acknowledge the influence of the environment on behaviour as well as biology (Egger and Swinburn 1997; Cohen, Scribner et al. 2000). Kurt Lewin was one of the first theorists to describe the interaction between individual and environment as the combination that determines human behaviour with his equation $B = f(P, E)$ – behaviour is a function of both person and environment (Brug, Van Lenthe et al. 2006).

Proponents of environmental or ecological approaches argue that social and environmental as well as personal factors, influence health behaviour (Glanz and Yaroch 2004). They posit that structural and environmental factors influence individual perceptions, thoughts, and attitudes to mediate the health choices people make (Cohen, Scribner et al. 2000). This has been articulated in key health promotion documents such as the Ottawa Charter, which identifies the creation of supportive environments as one of its five core actions to promote health (World Health Organization 1986).

This ecological approach is particularly useful when examining people's' ability to access healthy food given the constraints of their environment. If the barriers to accessing healthy food can be identified then it is possible the environment may be modified to enable people to achieve the goal of accessing healthy food.

Ecological model of obesity

Put simply, obesity and overweight are the result of energy imbalance where energy intake (consumed) has exceeded energy expenditure. The cause of energy imbalance is not so simple. Diet and physical activity are the two main influences on this energy in-energy out relationship (Andrew 2006). Prevention of obesity and weight gain in general is a result of the successful balancing of energy expended, through daily tasks and physical activity, and energy intake, through food consumption (Brug, Van Lenthe et al. 2006). An ecological model of obesity proposes that both biological characteristics as well as the environment influence behaviour, especially diet and physical activity related behaviour. These influences then serve to determine whether there is a balance (or imbalance in the case of obesity/overweight) between energy intake and energy expenditure. An imbalance will result in excess body weight.

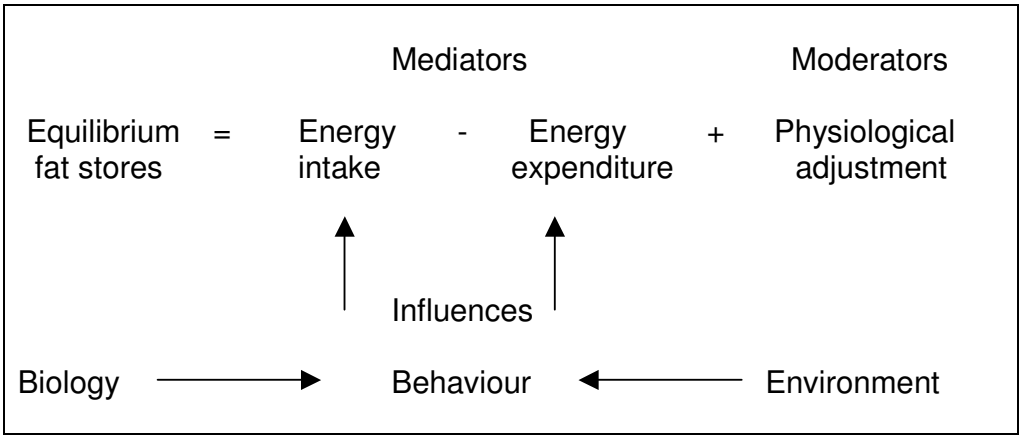

Figure 1: An ecological model of obesity (Egger & Swinburn, 1997)

In the context of obesity and the influence of food in particular, social ecological approaches propose that the food purchase and consumption choices we make are constrained by the environment in which we live (Hill and Peters 1998). Egger and Swinburn (1997) have argued that obesity is a normal response to an abnormal environment, one that promotes eating too much and moving too little. This notion of an 'obesogenic environment' – an environment that is conducive to the consumption of energy dense food and/or discourages physical activity - has become popular in public health research (Reidpath, Burns et al. 2002). It has also been argued that environmental changes may be more cost-effective than individual programmes that aim to improve healthy eating in order to reduce obesity. It has been suggested that differences in the structure of residential environments may help to explain differences in diet, especially between those living in deprived compared to more affluent areas (Papas, Alberg et al. 2007).

Various researchers have attempted to conceptualise the environment and the effect features of it may have on food choice and in turn obesity rates (Swinburn, Egger et al. 1999; Kremers, De Bruijn et al. 2006; Story, Kaphingst et al. 2008). Often the environment is divided into types and settings. Glanz, Sallis, Saelens and Frank (2005) outline a conceptual model of nutrition environments. This includes four types of environment: community nutrition environments (type and location of food outlets and accessibility

of these), organisational nutrition environment (describes settings: home, school, work), the consumer nutrition environment (availability, price, promotion, placement of food options) and the information environment (media and advertising). This model also acknowledges the influence of individual variables on behaviour.

Kamphuis, van Lenthe, Giskes, Brug and Mackenbach (2007) have also developed a framework of environmental determinants contributing to the explanation of socioeconomic inequalities in health behaviours. In this framework, accessibility and availability, psychosocial conditions, material conditions and cultural conditions are identified as environmental influences. These are then hypothesised to influence attitude, social influences, and perceived behavioural control and intention (constructs of the Theory of Planned Behaviour). These in turn determine health behaviour including physical activity and diet.

ANGELO

Based on the ecological model for understanding obesity, Swinburn and Egger (1999) have developed the Analysis Grid for Environments Linked to Obesity (ANGELO) model, which divides the environment into four types of influence, physical, economic, political, sociocultural. This is the most commonly used framework to identify obesogenic factors in the environment. Although other models may seek to explain the mechanisms by which the environment actually influences behaviour – which ANGELO does not seek to do – it allows for any and all features of the environment to be identified and categorised (Brug, Kremers et al. 2008). It is also one of the only frameworks to include sociocultural influences as part of environment influences rather than individual variables.

ANGELO also distinguishes between macro and micro environments. Micro environmental settings include schools, workplaces, homes and neighbourhoods. Macro

environments consist of areas such as health systems, government, food marketing/production and industry, transport infrastructure. The four environment types are described below:

Physical (What is available?)

In regards to food this refers to what is available in terms of outlets – supermarkets, fast food etc – and also what is available in these outlets and also other settings where food is available such as workplaces, schools and community facilities. Other, less tangible, features may also be included such as the availability of nutrition information and training opportunities.

Economic (What are the costs?)

The economic food environment includes the costs involved with food production, retailing and manufacturing. This can involve subsidies, incentives, discounts, taxes and also the price of food. Swinburn et al., (1999: p.566) also include income and its importance in determining body weight through food choice, in their description of economic environment features. They differentiate income from true economic environmental features but acknowledge the importance of the environmental determinants of income.

Political (What are the rules?)

The political environment refers to the rules, laws and policies that may determine behaviour. This includes macro level policy such as regulation governing the food industry. It can also involve micro settings such as school food policies and even home food rules, which can both influence food choice and consumption.

Sociocultural (What is the social and cultural background?)

The sociocultural environment refers to the attitudes, beliefs and values – often referred to as social and cultural norms - of communities and society towards food. Again, these influences can be divided into macro and micro. Micro settings such as schools can demonstrate a health promoting culture, which may influence the behaviour of students

and teachers while at a macro level the media plays a role in influencing attitudes and beliefs about food.

The ANGELO framework has been previously applied in New Zealand to classify environmental factors that may contribute to obesity. The APPLE study conducted in Christchurch used this structure to investigate barriers and promoters of healthy eating in children (Williden, Taylor et al. 2006). Lack of availability of convenient healthy food options and cost of healthy food were identified by community stakeholders as major barriers (Williden, Taylor et al. 2006). Sociocultural barriers such as childrens' preference for less healthy food and parents' knowledge were also recognised as barriers to healthy eating in children (Williden, Taylor et al. 2006).

This framework has also been used by the authors of the ENHANCE study – Enhancing Food Security and Physical Activity for Māori, Pacific and Low-income New Zealanders (Bowers, Carter et al. 2009). This research explored the physical, sociocultural, economic and political barriers to food security and also physical activity via literature review, stakeholder workshops and focus groups with Māori, Pacific and low-income New Zealanders. The research revealed the main barriers in regard to being able to access enough food for a healthy diet as; lack of money, cost of food, lack of knowledge, habit, availability, and rural isolation.

Harrington and Elliott (2009) also used the ANGELO framework to conceptualise and deconstruct features of the obesogenic environment. While Harrington and Elliott (2009) did examine the neighbourhood environment they only considered census variables such as area level education, which were then grouped into the ANGELO environments. There were no specific measures of the food environment. They found ANGELO useful to ensure a broader range of influences on obesity and overweight were examined and also note that application of ANGELO is limited in the literature and gaps at the

political environment and macro level, in particular, still exist. This is a common observation throughout all the studies that have applied ANGELO. This is not to say that it is not useful to try and identify influences in all four types of environments. However, it may be that the environment types as they currently sit may not be the best way to describe ecological influences on behaviour. This study will take into account the limitations of ANGELO and attempt to better understand it by applying it to a specific geographical location.

Environmental Research framework for weight Gain prevention (EnRG)

Other models may also be useful to consider when trying to identity environmental influences on food accessibility. Kremers, De Bruijn et al. (2006) have presented a dual-process view of the environment and illustrate this in the EnRG framework. The authors comment that their framework builds on models such as ANGELO in that it attempts to also include the factors on the causal pathway from environment to behaviour: cognitive mediators and moderators. Cognitive mediators include attitudes, subjective norms, perceived behavioural control and intention sit on this pathway and these mediators are moderated by person and behaviour factors. Person moderators include demographic, personality, awareness and involvement, while behaviour consists of habit strength and clustering. Environmental influences are separated into mediated and unmediated. The EnRG model may be useful to describe the pathways or mechanisms by which environmental influences affect food choice.

Neighbourhood food environments

As described above ANGELO has been applied to school food environments (Williden, Taylor et al. 2006), also at a geographical level as applied to a island food environment (Swinburn, Egger et al. 1999) and the smaller scale neighbourhood environment (Harrington and Elliott 2009). The present study appears to be one of the first to explore a neighbourhood food environment and its influence on healthy food accessibility using the ANGELO framework.

There are various features of the neighbourhood environment that can be classified as either health promoting or health damaging (Stafford, Cummins et al. 2007). For example neighbourhood access to gambling venues has been associated with gambling and problem gambling behaviour (Pearce, Mason et al. 2008). It is also clear that the certain features of the neighbourhood physical environment have an influence on the physical activity levels of the residents (Frank, Andresen et al. 2004). There is a small, but growing, body of work that investigates food environments in New Zealand (Pearce, Blakely et al. 2007; Pearce, Day et al. 2008; Pearce, Hiscock et al. 2008; Pearce, Hiscock et al. 2009; Walton, Pearce et al. 2009).

The importance of place on health as been widely investigated however research on the effect of place on food-related ill health is in its relative infancy. The neighbourhood food environment is proposed to be an important influence on food accessibility and consequently nutrition outcomes (Ellaway and Macintyre 2000). Food consumption and nutritional outcomes seem to be patterned by neighbourhood deprivation indicating that there may be specific differences in the food environments of different neighbourhoods that influence the ability to access healthy food (Moore, Diez Roux et al. 2008). Specifically, fruit and vegetable consumption levels are lower in neighbourhoods of higher deprivation in New Zealand (Russell, Parnell et al. 1999). Children living in neighbourhoods of high deprivation consume fast food and soft drink more often than children in less deprived areas (Ministry of Health 2008). Therefore there is a need to explore these influences and identify barriers to accessing healthy food at a neighbourhood level.

What is healthy food accessibility?

In order to determine how the neighbourhood food environment may impact on healthy food accessibility and availability it is necessary to try and define these two constructs. Although these terms are used in various ways, most commonly they are used in the following ways:

Availability is usually defined as provision and measured through the presence or absence of types of food outlets and food sold within the outlets (Donkin, Dowler et al. 2000). Youth, elderly and others that do not drive or have access to a private vehicle are more reliant on the direct and proximal food environment and so what is available within their neighbourhood may be more important (Frank, Glanz et al. 2006).

In the context of the neighbourhood food environment it could be argued that availability is a sub-set of accessibility. For food to be accessible it must first be available.

Accessibility then is a complex concept to quantify and can include: number and variety of shops, opening hours, distance from homes, travel mode and public transport availability (Donkin, Dowler et al. 1999). It is often described by measuring proximity of outlets to residents' homes. Often other components of accessibility are not considered and the assumption is made that because something is provided (available) within a certain distance (proximity) then it is accessible. Features of the built environment can be assessed via indirect (census data, GIS information), intermediate (surveys, databases, photos) and direct (environmental audits) methods (Booth, Pinkston et al. 2005).

Summary

This chapter has introduced the topic of the thesis and the research questions posed. It has given a background to the initiation of this research and how it has evolved into this thesis. This chapter then described the reasons why it is important to study influences

on food accessibility and how the environment may be a significant factor. Ecological models of obesity were described including the ANGELO framework (Swinburn, Egger et al. 1999) which will be applied later on in this thesis. This chapter finished by giving brief introductions to neighbourhood food environments, and healthy food accessibility. The next chapter provides more detail on these topics with a review of the literature on healthy food accessibility at the neighbourhood level.

Chapter Two: Literature review of environmental barriers to healthy food accessibility

The focus of this thesis is investigating healthy food accessibility at a local or neighbourhood level, rather than by other settings – home, work or school – to provide a description of potential barriers and influences on healthy eating within the local food environment. In this chapter the international and New Zealand literature related to neighbourhood food environments and potential environmental barriers to healthy food accessibility is reviewed. Interventions that aim to improve healthy food accessibility are also considered. As described in Chapter One, these barriers have been divided into physical, sociocultural, political and economic (Swinburn, Egger et al. 1999). This framework will be used to ensure features of the neighbourhood food environment are widely scoped so that not only physical barriers are investigated. This literature review is divided into three sections:

(1) Research that examines features of the physical healthy food accessibility,
(2) Research that examines sociocultural, political and economic influences on healthy food accessibility,
(3) Interventions that aim to improve access to healthy food.

The literature review strategy included searching online databases, specific journals and also included relevant theses. If a journal article was not available through the University of Otago library, librarians sought this from another New Zealand University Library. A number of related search strings were used to source this literature. A literature review on neighbourhoods and health, which one of the research supervisors (V.I.) had been involved in, supplemented the online search strategy (Stevenson, Pearce et al. 2009). Relevant references were also suggested by other researchers in the same field or obtained from reference lists of other articles. Specific care was taken in finding

New Zealand literature, however, very little was available. Search strings used included 'food deserts', 'food access', 'food accessibility', 'food availability, 'neighbourhood food environment', 'environmental barriers and food', 'barriers and healthy eating'.

Physical food environments

Compared to other features of the food environment there is an abundance of literature on physical features: this section is devoted to examining the influence of certain geographical features and types of food outlets on access to healthy food. This begins with the concept of food deserts, which has been the focus of much of the research on physical barrier to accessing healthy food.

Food deserts

Research on the influence of the neighbourhood environment on access to food has been fuelled by the notion that 'food deserts' may exist. Food desert is a term that has been used to describe, "areas of relative exclusion where people experience physical and economic barriers to accessing healthy food" (O'Dwyer and Coveney 2006). The term food desert was first coined in the early 1990's and has since been the subject of debate and interest (Cummins and Macintyre 2002).

Various studies have defined and measured the existence of food deserts in varying ways. The existence of food deserts has been investigated across the U.K., the U.S., Canada and Australia with mixed findings (Reisig and Hobbiss 2000; Dowler, Blair et al. 2001; Wrigley 2002; Wrigley, Warm et al. 2002; Clarke, Hallsworth et al. 2004; Wrigley, Warm et al. 2004; Pearson, Russell et al. 2005; Smoyer-Tomic, Spence et al. 2006; Apparicio, Cloutier et al. 2007; Short, Guthman et al. 2007; Larsen and Gilliland 2008; Morton, Bitto et al. 2008). The use of the term has become slightly controversial as evidence of the existence of food deserts varies by country (Cummins and Macintyre 2002). Research in the U.S. consistently finds that food deserts do exist however outside of the U.S. evidence is mixed (Beaulac, Kristjansson et al. 2009).

The identification of food deserts appears to depend on the definition employed. A study of food deserts in New Orleans found that the percentage of tracts that would be classed as food deserts ranged from 17 to 87% depending on the definition used (Rose et al. 2009). As Reisig and Hobbiss (2000) contend, however, "the term [food desert] has remained conceptual rather than becoming an operational term by which geographical areas can be identified, and indeed is proving hard to define given that the ease with which people access food is a function of more than geography" (p. 138). Similarly, Shaw (2006) argues that food deserts have physical, geographical components (lack of nearby access) and attitudinal components (for social or lifestyle reasons people do not purchase healthy food). There has been little investigation, attempted classification or identification of food deserts in New Zealand with the exception of the series of papers that have been generated from a national study that measured locational access to sixteen potentially health promoting community resources including food outlets (Pearce, Witten et al. 2006). This study is known as the Community Resource Access Index New Zealand (CRAINZ). The findings of this study are discussed in more detail in the following sections.

Food outlets as features of the physical food environment

Physical access to healthy food is most often measured by examining the types of food outlets in a defined geographical area. Typically food outlets are broken into three types: supermarkets, fast food outlets, and convenience stores (Morland and Evenson 2009). Most research on local food environments has measured access to supermarkets and fast food outlets with more recent studies now including convenience stores. Greengrocers (fruit and vegetable stores), butchers, bakeries, and petrol stations are also often included as main sources of food. Food outlets such as supermarkets or greengrocers are treated as a proxy to healthy food while fast food outlets are used to quantify access to less healthy food (Burns and Inglis 2007).

There seems to be no consensus on the best way to measure physical access to food outlets. Different methods include:

- distance to nearest food outlet of different types
- travel time to nearest food outlet (sometimes by various different modes) to nearest food outlet
- the density of different types of food outlet in a defined area

To complicate this further distance is measured as either euclidean (as the crow flies) or by road network. The latter is more reliable and accurate as this tends to be the most common route used by people. These factors make it difficult to compare findings from different studies.

One thing most studies of physical access do have in common is the use of geographical information systems (GIS), which are increasingly being used as a public health research tool (O'Dwyer and Burton 1998). They allow any number of community or health resources to be geo-coded (assigned a geographical co-ordinate) and plotted on a map (Witten, Exeter et al. 2003). Availability, by whichever method chosen, can then be calculated. This has been found to be particularly useful in research examining physical access and availability of food outlets and many of the studies discussed below employ these systems to measure exposure to different types of food.

Patterning of outlets by deprivation

One explanation for differences in the diets of those living in deprived areas compared to more affluent neighbourhoods is that deprived neighbourhoods are somehow structurally different from those in less deprived areas (Reidpath, Burns et al. 2002). Specifically, it has been suggested that there may be a difference in the distribution of

certain types of food outlets – supermarkets, convenience stores and fast food outlets - across different types of neighbourhoods (Morland, Wing et al. 2002). It is likely that features of both individuals and the neighbourhood/environment in which they live influence health status (Swinburn, Egger et al. 1999; Macintyre, Ellaway et al. 2002; Cummins and Macintyre 2006).

Specifically, it has been proposed that access to healthy food is poorer in more deprived or lower income areas (Dowler, Blair et al. 2001). A robust study in the U.S. found that as the wealth of the neighbourhood increased so did the availability of supermarkets; there were three times as many supermarkets in the wealthiest areas compared to least wealthy areas (Morland, Wing, Diez Roux et al., 2002). In one of the only Canadian studies, (Larsen and Gilliland 2008) have shown that inner city neighbourhoods of low socioeconomic status have the poorest access to supermarkets and that this is has worsened over time. This is one of the only studies to investigate historical evolution of supermarket access and availability.

However, not all studies have confirmed this pattern, with some studies outside the U.S. finding no association between physical access to outlets and area deprivation. Some even find that deprived areas in fact have better access to all types of food outlets, including supermarkets (Cummins and Macintyre 1999; Pearson, Russell et al. 2005; Giskes, van Lenthe et al. 2008; Pearce, Day et al. 2008). This appears to be true for New Zealand, Pearce, Day et al. (2008) found that more deprived areas had a higher prevalence of all types of food outlets (convenience stores, supermarkets and fast food outlets) than the least deprived areas. Similar to this, all types of food stores were found to be more numerous in more deprived areas in Glasgow, with the majority of stores being small, independent grocers. However, multiple-owned retail outlets were also found in the greatest numbers in the poorest areas, although this study used availability of stores rather than a measure of access such as distance (Cummins and Macintyre

1999). Other studies have observed no difference in the number of types of outlets across areas of different levels of deprivation or socioeconomic status (SES). Winkler, Turrell et al. (2006) found no significant socioeconomic differences in food shopping infrastructure of 50 census districts in an urban Brisbane setting. A study in the U.K. found that numbers of stores, opening hours and proximity of stores were not systematically associated to socioeconomic status of area (Donkin, Dowler et al. 1999).

Unlike the inconclusive evidence of poorer access to supermarkets in deprived areas the patterning of fast food by deprivation has been widely demonstrated (Reidpath, Burns et al. 2002; Block, Scribner et al. 2004; Cummins, McKay et al. 2005; Burns and Inglis 2007; Lopez 2007; Powell, Chaloupka et al. 2007; Smoyer-Tomic, Spence et al. 2008; Kwate, Yau et al. 2009). Studies of neighbourhood or local food environments have found that there are significantly more fast food outlets located in deprived and low-income areas (Cummins, McKay et al. 2005). A similar pattern (less supermarkets and/or more fast food outlets) has also been found in some U.S and Canadian studies in areas where African-American and other indigenous ethnic groups make up a higher than average percentage of the population (Block, Scribner et al. 2004; Cummins, McKay et al. 2005; Zenk, Schulz et al. 2005; Morland and Filomena 2007; Pearce, Witten et al. 2007; Smoyer-Tomic, Spence et al. 2008). Again the results cannot be consistently compared due to differences in measure of accessibility and differences in scale. In Melbourne, Australia a dose-response relationship was found between the socio-economic status of an area and density of fast food outlets, with residents of the lowest SES (median weekly income category) being exposed to 2.5 times as many fast food outlets as residents in the highest SES area (Reidpath, Burns et al. 2002). These authors also discovered that there were actually no fast food outlets in the postal districts in the two highest income categories.

In New Zealand, associations between neighbourhood deprivation and the nearest fast food outlet were identified with travel distance being at least twice as far for those in least-deprived areas opposed to those in the most-deprived neighbourhoods; this was the same for both locally owned and multinational outlets (Pearce, Blakely et al. 2007). As part of the same research, it was also found that there were significantly more fast food outlets, per 10,000 people, in areas in the most deprived quintile compared to the least (Pearce, Day et al. 2008). Explanations for these types of patterns have been proposed as higher population density, higher demand, less civic resistance, and lower land-use costs in more highly deprived areas (Pearce, Blakely et al. 2007; Kwate 2008).

It seems that there is some evidence for patterning of certain types of food by area deprivation and area level income, and this is particularly strong for fast food outlets. There is also some evidence for lack of physical access to supermarkets for deprived areas in some countries (U.S.) but not others (N.Z.). As raised earlier, it is difficult to be definitive about these relationships due to the variety of measures of accessibility and the scale these are measured at. Whether or not these relationships do exist, the physical environment may not prove to be a barrier to accessing healthy food unless access to food outlets does actually influence food purchasing, consumption and diet quality.

Association between food outlets, overweight and obesity

Supermarkets have become an 'important gatekeeper of the food supply', and are part of both the physical and economic environment (Swinburn, Egger et al. 1999; Hawkes 2008). One barrier to accessing healthy food may be a lack of local-area supermarkets, which may inhibit food availability and choice and in turn affect diet quality. Specifically, the presence or absence of supermarkets has been used as an indicator of availability and access to healthy food (Morland, Diez Roux et al. 2006; Burns and Inglis 2007). Supermarkets generally provide the widest variety of healthy (and possibly also unhealthy) foods at lower prices than smaller, local stores (Sallis, Nadar et al. 1986;

Cheadle, Psaty et al. 1991; Echeverria, Diez-Roux et al. 2004; Hawkes 2008; Larsen and Gilliland 2008; Moore, Diez Roux et al. 2008).

In the U.S., the presence of supermarkets in a census tract (used as a proxy for neighbourhood) has been associated with a lower prevalence of obesity, overweight and hypertension whereas presence of grocery stores and convenience stores was associated with an increased prevalence of these adverse health outcomes (Morland, Diez Roux et al. 2006; Lopez 2007). Another study in the U.S. specifically investigated food store availability and weight outcomes and observed that increased availability of chain supermarkets was significantly associated with lower adolescent BMI and overweight and higher availability of convenience stores was related to higher BMI and overweight rates (Powell, Auld et al. 2007). A well-conducted study in Scotland also identified significant associations with obesity and access to local high street facilities, including lower levels of obesity in areas with more supermarkets (Stafford, Cummins et al. 2007). However, a limitation of the research described is that the ability to determine causation is lacking due to the cross-sectional nature of the studies.

In New Zealand, Pearce, Hiscock et al. (2009) found that the likelihood of being overweight was higher for those living in areas with poorer access to fast food outlets. In this study access was measured as travel distance to the nearest multinational and local fast food outlet (by road network). Counter intuitively this suggests that physical access to fast food outlets may be not an important driver of obesity in deprived areas. However, it may not be access as measured by travel distance that matters for the food environment, rather other features may be more important, such as density of outlets, or the interaction with what other types of outlets that are accessible in any given neighbourhood. Although the density of outlets has been investigated, it is yet to be examined with respect to health outcomes in a New Zealand context.

Research in the U.S. suggests that density of outlets may have some influence on health outcomes. Links between body mass index (BMI), overweight, obesity and convenience store access have been demonstrated in children, adolescents and adults. Grafova (2008) demonstrated that living in a neighbourhood with higher convenience store density was associated with a higher probability of being overweight for children and adolescents. Greater availability of convenience stores was linked to higher BMI and overweight in adolescents (Powell, Auld et al. 2007). A higher prevalence of obesity was observed in areas with at least one convenience store in the U.S. (Morland, Diez Roux et al. 2006).

Fruit and vegetable consumption and physical access

One of the mechanisms by which supermarket access may be linked to health outcomes such as weight and obesity and other diet-related conditions is via intake of fruit and vegetables (Zenk, Schulz et al. 2005). Poor neighbourhood access to outlets selling healthy foods may contribute to poorer quality of diet and lower fruit and vegetable intake (Bodor, Rose et al. 2008). As discussed earlier, a number of studies have used supermarket access as a proxy to fruit and vegetable availability in order to investigate the effect of neighbourhood fruit and vegetable availability on consumption (Pearce, Hiscock et al. 2008). There is less research on fruit and vegetable availability in non-outlet sources such as; greengrocers, community gardens and farmers markets. This is presumably because they are more difficult to collect data from. However, the omission of these alternative sources of food may bias results by underestimating opportunities to access certain types of food in any given area.

A recent systematic review of the literature identified that fruit and vegetable intake is most strongly associated with higher income, living in an advantaged neighbourhood and good access and availability (Kamphuis, Giskes et al. 2006). Again there is more research on access to fruit and vegetables in the U.S. than anywhere else. Studies in the U.S. have found that neighbourhood access to fruit and vegetables is an important

correlate of consumption. A study of food stamp recipients concluded that those living within a mile of their primary food store consumed more fruit per day than those who lived over 5 miles away (Rose and Richards 2004). They found similar results for vegetable consumption; however, these were not statistically significant. In the Netherlands Giskes, van Lenthe et al (2008) also found that having no shops in the neighbourhood that sold vegetables was associated with lower consumption of vegetables.

Subjective assessment of fruit and vegetable availability and access has also shown that people who eat five or more portions of fruit and vegetables per day have a more positive attitude towards their accessibility to these foods (Dibsdall, Lambert et al. 2003). Other studies have produced contrasting results; in a national study in New Zealand (Pearce, Hiscock et al. 2008) found that consumption of the recommended daily intake of fruit and vegetables was not related to living in an area with better access to a supermarket. International research has examined the relationship between distance to supermarkets and overall diet quality – rather than just fruit and vegetable intake – and provides some support for the notion that the physical environment influences food choice and consumption (Laraia, Siega-Riz et al. 2004). Women who shop at supermarkets have been found to consume fruit and vegetables more often than women who shopped mainly at independent grocery stores (Zenk, Schulz et al. 2005). These stores are similar to what is known as a corner store, dairy or Four Square in New Zealand. A similar relationship was observed in New Zealand, a moderate association was found between good physical access to convenience stores and decreased odds of eating the recommended daily intake of vegetables (Pearce, Hiscock et al. 2008). This implies that the location of other types of food outlets may also be important to investigate and that sources of 'less healthy' food may in fact influence healthy food accessibility, although the mechanisms by which this may happen are unclear.

Access to outlets and overall diet quality

Rather than solely looking at healthy food groups, such as fruit and vegetables, it is also important to consider how access may influence the overall diet quality (Franco, Diez-Roux et al. 2009). Recently, Moore, Diez Rouz et al. (2008) noted that residents with no supermarket near their home (within 1 mile) were much less likely to have a healthy diet than those in the highest category of supermarket density around their home. In this study diet quality was assessed comprehensively using a food frequency questionnaire with two validated measures of diet quality applied to the results. This relationship persisted when using resident-reported perceptual measures rather than objective evaluations of the local food environment with those in the worst ranked neighbourhoods less likely to have a healthy diet than those in the best ranked neighbourhood. This effect has also been demonstrated in specific populations for whom nutrition is particularly important. Another U.S. study found that pregnant women living greater than four miles from a supermarket were more than twice as likely to fall into the lowest tertile of diet quality compared to women who lived within two miles of a supermarket (Laraia, Siega-Riz et al. 2004). Here diet quality was also measured using a food frequency questionnaire. At present, no similar research has been conducted in New Zealand.

Convenience store access

Other types of food outlets such as convenience stores have also been linked to diet-related health outcomes (Morland, Diez Roux et al. 2006; Pearce, Hiscock et al. 2008). Access to convenience stores, is potentially related to food purchase, diet quality and diet-related health outcomes. Convenience stores often supply less healthy options than supermarkets with healthy items that are available often sold at a higher price (Liese, Weis et al. 2007). It has been suggested that in New Zealand convenience stores (dairies, corner store, small grocery stores, and petrol station stores) may be a good proxy for access to unhealthy foods (Pearce, Hiscock et al. 2008). However, the mechanisms by which this effect may operate are still unclear.

Access to these stores and availability of the type of food sold in convenience stores may increase inequalities in diet, obesity and overweight. Low-income and disadvantaged shoppers have reported locational access and mobility issues as barriers to accessing food and it was found that these consumers are more likely to rely on convenience type stores for 'top-up shopping' (Piacentini, Hibbert et al. 2001). It seems little is known about the effect of convenience type stores, such as dairies, and how access to them may influence access to healthy food outside the U.S.

Access to fast food and fast food outlets

Fast food has been associated with increased energy consumption and poor diet quality (French, Story et al. 2001; Bowman, Gortmaker et al. 2004). Fast food consumption has also been linked to weight gain and insulin resistance (Pereira, Kartashov et al. 2005). A study in Edmonton, Canada has found that the mean distance to the nearest fast food outlet was closer than the mean distance to the nearest supermarket, and there were almost 12.5 times more fast food outlets than supermarkets demonstrating that fast food is likely to be more readily available and more accessible than healthier options (Smoyer-Tomic, Spence et al. 2008). In Australia, Burns and Inglis (2007) also observed that less advantaged areas had closer access to fast food (by multiple transport modes) and more advantaged areas closer access to supermarkets.

As convenience has been reported as one of the key influences on food choice it is intuitive then that physical access, to and availability of, fast food restaurants has been associated with increased levels of obesity and adverse cardiovascular outcomes (Maddock 2004; Alter and Eny 2005; Morland and Evenson). However, not all studies provide support for an association between fast food access and consumption or diet quality (Jeffery, Baxter et al. 2006). A national New Zealand study investigated the relationship between access to multinational and local fast food outlets, weight and fruit

and vegetable intake (Pearce, Hiscock et al.). The investigators found that neighbourhoods with poorer access to multinational fast food outlets than the national median were more likely to meet the recommended vegetable intake compared to neighbourhoods with the best access. However, neighbourhood access to locally operated fast food outlets was not associated with vegetable intake.

Objective as well as subjective or perceived measures of the barriers to access are important. In a focus group study in Eindhoven in the Netherlands, participants reported that the proximity to fast food outlets and convenience meals in stores in their neighbourhood led them to eat these foods more frequently and that this also had an effect on their vegetable intake (Kamphuis, van Lenthe et al. 2007). There is a lack of qualitative research that examines residents' perceptions of their neighbourhood on food accessibility. This is also true for New Zealand where food accessibility research has relied on quantitative data collection.

Ratios of unhealthy to healthy food outlets: Retail food environment index

Recently research has begun into assessing the neighbourhood food environment based on the mix of different types of outlets available. The retail food environment index (RFEI) (typically fast food/fast food outlets and convenience stores – to healthy outlets – mostly supermarkets and produce stores) has been calculated. RFEI was initially used in a study in California that calculated RFEI for all the counties and cities finding wide variation (California Center for Public Health Advocacy 2007). More recently researchers have begun to examine the effect that the mix of types of food outlets may have on physical access and in turn food consumption and diet-related outcomes. Recently the RFEI has been used to measure the ratio of 'unhealthy' to 'healthy' outlets (Spence, Cutumisu et al. 2009). This study measured RFEI within an 800m and 1600m radius of participants' homes in Edmonton, Canada and found that lower RFEI (within 800m) was associated with a lower risk of being obese. This suggests that rather than access measured by distance or proximity to one type of outlet that it is the mix or

balance of types of outlets in a neighbourhood that is important for diet and health outcomes such as obesity and overweight.

Other sources of food within the neighbourhood

Access to other sources of healthy food within a neighbourhood, such as home or community gardens, produce and farmers markets and food co-ops, are potentially also very important influences on diet. Having a vegetable garden was perceived as being important for accessing vegetables for low-income participants in the Netherlands (Kamphuis, van Lenthe et al. 2007). The introduction of a farmer's market in one Canadian town was shown to improve availability of items in a healthy food basket (Larsen and Gilliland). There is a lack of research on the influence alternative sources of food (community gardens, markets and co-ops) may have on accessibility of healthy foods. This is presumably because they are harder to gather data on than commercial food outlets and are often not considered as regular sources of food.

Transport and mobility

While geographical measures of access to food are important there is a need to also understand how transport and mobility affect food access (Wrigley 2002). Studies of mobility and food access have reported that the ability to shop for food is largely car-dependent (Clifton 2004). In a qualitative study low-income women raised lack of transport to the supermarket and high number of fast food outlets in the neighbourhood as problems to accessing healthy food (Inglis, Ball et al. 2005). Without access to private transport: public transport, walking and taxis must be made use of to varying extents. Even though some areas (less deprived) may not currently face issues of accessibility to healthy food this situation may change as the population ages and loses mobility or if the oil crisis gets worse and we are required to become less reliant on cars and private transport (Apparicio, Cloutier et al. 2007).

It seems residents of rural areas are more affected by transport and mobility issues than urban residents, not surprisingly due to the further distances they often have to travel to reach food stores and lack of public transport availability (Lanumata, Heta et al. 2008). However, residents in urban areas also face transport challenges, especially with recent rises in petrol prices. The literature reviewed here focuses on urban and suburban areas as the neighbourhoods this thesis explores are suburban areas near to the urban centre of the city.

Many studies have looked at access to food by car or private transport only, however lower income groups who are reported to have poorer diets are least likely to have access to private transportation (Robinson, Caraher et al. 2000; Bostock 2001; O'Dwyer and Coveney 2006; Pearce, Hiscock et al. 2008). It has been demonstrated that lower income groups are more varied in the mode of transport used to get to shops, with car usage increasing as income rises and the opposite occurring for walking and bus use (Caraher, Dixon et al. 1998). Lower rates of car ownership in deprived areas are sometimes compounded by fewer local supermarkets. This makes it difficult to access a supermarket for food shopping (Cassady and Mohan 2004). Just examining car ownership rates may even hide the experiences of households that own a car. The person responsible for food may not always have access to the car for food shopping or the household might not have the money to run the car on a regular basis (Clifton 2004).

A small group of studies have gone beyond car reliance and have included walking, public transport and private vehicle use as means of accessing food (Burns and Inglis 2007; Coveney and O'Dwyer 2009). Qualitative work has revealed shoppers often find public transport to be uncomfortable, irregular and inconvenient and cite these as barriers to use for food shopping (Coveney and O'Dwyer 2009). The few studies that do examine access by walking as a mode of transport have found relatively poor access to healthy food in most suburban areas. Research conducted in Pomona, California

measured access by walking for food pantry (food bank) clients to stores with fresh produce. It was found that only 59% of clients lived within 800m (defined walking distance) of a store selling a variety of fresh produce (Algert, Agrawal et al. 2006).

One study compared access to food outlets by transport mode which few others have done. Burns and Inglis (2007) examined access to supermarkets (as a proxy to a healthy diet) and fast food outlets (as unhealthy food) by car, bus and foot. They used travel time rather than distance as a measure of physical access and discovered that while 80% of the population lived within eight minutes of a supermarket or fast food outlet by car, only 50% lived within eight minutes by bus and 4% by foot, supporting the notion that good access to healthy food is car dependent. This study highlights the importance of examining mode of transport for understanding food 'choice'.

Access to transport can affect where consumers choose to shop. Especially for low-income consumers, close proximity can mean a reduction in 'total purchasing costs' – e.g. the cost of transportation to large supermarkets may not be practical for low-income groups so they choose to shop at closer but relatively more expensive food outlets (Caraher, Dixon et al. 1998). Transport-related coping mechanisms such as the use of taxis are often identified by residents that lack access to a private vehicle in areas not within walking distance of supermarkets. Walking and public transport are not suitable for carrying large amounts of groceries. Residents often report walking or travelling by public transport to the food store and taxiing home (Wrigley, Warm et al. 2003; Clifton 2004; Wrigley, Warm et al. 2004; Coveney and O'Dwyer 2009). This strategy may increase the average cost per food trip, which reduces the amount available for food (Cassady and Mohan 2004).

The choices people make when on low-income are largely influenced by income and transport, with those with access to a car more likely to shop at out-of-town

supermarkets than those without (Robinson, Caraher et al. 2000). It has also been proposed those groups that suffer from lack of mobility due to illness, disability, age, low-income and those who do not have access to private transport may be even more vulnerable to the neighbourhood environment as they are least able to escape it (Clifton 2004; Kamphuis, Giskes et al. 2006; Coveney and O'Dwyer 2009). One study showed that with increasing income people were less likely to shop at local shops providing support for the idea that those without transport are more reliant on their local food environment (Caraher, Dixon et al. 1998).

How mobile a person is outside of their neighbourhood for reasons other than food shopping is also a consideration when examining access to healthy food. This means that those who are less mobile because of age, disability or lack access to transport may be more restricted to what is local in terms of food. The question of whether it is more useful to bring food to people, in the form of increasing the numbers of supermarkets/healthy outlets in a certain area, or bringing people to food – increasing subsidised transport options for less-mobile groups – needs to be explored (Robinson, Caraher et al. 2000).

Each country has a specific food retailing environment, which may explain the differences in results between the US, Europe, Australia and the UK. Strong evidence has been found in the U.S. for the effect of access to supermarkets, convenience stores and fast food outlets on fruit and vegetable consumption, overall diet quality and rates overweight and obesity. The evidence elsewhere is mixed and less conclusive indicating that more research should be conducted in this area. While the patterning of food outlets appears to be important in some way to accessing healthy food, less is known about how the quality of outlets affects access,

> The spatial distribution of environmental resources by area socioeconomic status may vary between types of resource, countries,

and time periods. It may also be that the presence or absence of resources is less important than their quality, their social meaning, or local perceptions of their accessibility and relevance (Macintyre 2007: p.1).

Sociocultural, economic, and political barriers to access

The following sections review literature that discusses barriers to access other than those of the physical nature; this includes cultural traditions, attitudes and beliefs, and political and economic barriers such as price and income.

Social and cultural influences

"…where humans exhibit any choice at all in what they eat, what they select is more likely to be socially influenced than the result of a biological craving, environmental determinism, or idiosyncratic whim" – (Leach 2002: p.569).

Eating is an inherently social and cultural practice (James 2004). Sociocultural features of the environment can be significant mitigating factors in an otherwise unsupportive physical food environment (Leach 2002). Conversely sociocultural factors can exacerbate already existing geographical access issues and influence mobility. These sociocultural factors can include but are not restricted to; household composition, knowledge, beliefs and attitudes around food, employment status, culinary traditions and practices, and cultural obligations, all of which may affect healthy food accessibility (Hargreaves, Schlundt et al. 2002; De Castro 2007).

Culture is one of the features that have been identified as a potential influence on food access, availability and food choice (Power 2005; Rush, Puniani et al. 2007; Renzaho 2008). In this sense, culture can be defined as learned values, norm, beliefs and behaviours (Hruschka 2009). Swinburn, Egger et al. (1999) describe the sociocultural environment as including attitudes, values and beliefs of community and society. The influence of cultural factors on healthy food accessibility, such as those described above, is an important area of study but one that has not been widely investigated.

Only a small number of studies assessing cultural influences on food access have been carried out, which may be because culture is difficult to conceptualise and

measure (Kamphuis, Giskes et al. 2006). Some research has suggested that culture is a major factor in food choice and preference but there has been little done to date to illuminate the mechanisms by which this may affect food access. In a qualitative study with Samoan people in New Zealand, culture was described as affecting food purchase and choice in two ways; (1) by limiting money available for food because of the need to contribute donations to the church and sending money back to the Pacific Islands, and (2) by restricting food availability for the week when food needs to be bought or reserved for cultural occasions and family visits (Cheer, Kearns et al. 2002).

Food is often viewed as a way of retaining cultural identity, particularly for indigenous and/or minority populations (Leach 2002). There are few well conducted studies of the barriers to healthy eating for African Americans. Based on results of a comprehensive focus group study, Airhihenbuwa and Kumanyika (1996) suggest that African American food patterns characteristically reflect adaptation to external conditions and therefore propose that change in dietary habits will require changes in the community food environment. This same study reported responsiveness to context as one the recurring themes upon analysis of focus group data. This research also suggests that changes in the food environment may be particularly important for African Americans. More recent U.S. research has also explored how culture impacts on the food choices of African Americans. The barriers to accessibility of healthy foods included: social and cultural symbolism of certain foods, expense of healthy foods and poor taste of healthy food. Among participants of this qualitative research, there was also a perception that eating healthily meant giving up part of their culture or heritage and having to conform to a dominant culture (James 2004). Again, it seems as though what is physically accessible can influence sociocultural attitudes and in turn behaviour.

In New Zealand, focus group studies with Māori, Pacific and low-income people identified cultural factors such as the role of the church and the amount of food at cultural functions as barriers to eating food needed for a healthy life (Lanumata, Heta

et al. 2008). They also raised social barriers such as lack of time to cook, lack of knowledge and skills, and habit. Most research that explores sociocultural influences on food is qualitative, suggesting that this is the best way to identify barriers of this type.

Price

The cost of healthy food has been identified as an important perceived barrier to healthy eating among those on low-incomes. In an Australian qualitative study the cost of healthy food was the most important consideration for low-income women when food shopping (Inglis, Ball et al. 2005). Concern of food cost was also one of the main barriers to purchase of healthy food among low-income households and has been proposed as one of the mechanisms by which SES affects diet (Turrell and Kavanagh 2007).

There have been numerous 'market basket' studies conducted internationally (Donkin, Dowler et al. 2000; Williams, Reid et al. 2004; Friel, Walsh et al. 2006; Palermo and Wilson 2007; Tsang, Ndung'u et al. 2007) and a few in New Zealand (Ling 2005; Ni Mhurchu and Ogra 2007). These are usually carried out as surveys where a list of foods is drawn up and availability and price of each item is recorded and compared to other stores or types of stores. However, there is little consistency in the survey tools and questionnaires used, making it nearly impossible to compare across countries. The Nutrition Environment Measures Survey in Stores (NEM-S) is the only widely validated tool designed to survey food availability and price (Glanz, Sallis et al. 2007).

Food price may be an important influence on food choice and purchasing behaviour and also consequently health outcomes such as BMI and there is some empirical evidence to support these assertions. An increase in price of fruit and vegetables available locally has been shown to be associated with an increase in child BMI with this effect being strongest for low SES children (Powell and Bao 2009). A key strength

of this study is that it is longitudinal rather than cross sectional, one of the few pieces of longitudinal research in this area. The effect of price modification on food purchase has also been demonstrated in settings such as workplaces and schools where price reductions on lower fat snacks increased sales on these items (French 2003).

It has been suggested that healthy food options are often found to be more expensive in deprived areas and also less available within stores making them less accessible for those on low-incomes (MacIntyre, MacIver et al. 1993). Again evidence from the U.S. has supported this (Chung and Myers 1999). A study in New Haven, Connecticut found that prices for healthier options of certain foods were usually higher compared to the cost of the regular alternatives, including staples such as bread and meat (Andreyeva, Blumenthal et al. 2008). Horowitz, Colson et al. (2004) conducted a survey of food availability and cost, comparing contiguous but disparate areas of East Harlem (low SES) with Upper East Side (high SES) in New York. They noted that Upper East Side bodegas (convenience stores) were five times more likely to stock all of the five recommended food items for a diabetic diet. The median price of all food items was significantly higher in the predominantly white, affluent Upper East Side area.

Little work has been done in New Zealand to identify whether price within stores in different areas is a barrier to healthy eating. However, the available research does support the suggestion that healthy food is less available and in some cases more expensive than less healthy options (Maher, Signal et al. 2005; Mhurchu and Ogra 2007; Ni Mhurchu and Ogra 2007). Maher, Signal et al. (2005) observed that a lower proportion of food outlets in low socioeconomic status (SES) neighbourhoods advertised a salad option than outlets in high SES areas. Ling (2005) and Ni Mhurchu and Ogra (2007) have both demonstrated that the price of a healthy food basket was higher compared to a less healthy basket, although the difference was small. The latter analysis did not include the price of fruit and vegetables, which if included

may have resulted in a larger difference in price. Ling (2005) also noted that both a healthy and less healthy basket were more expensive in the supermarket in the lower SES study area than the high SES area, although this was a small, localised study so there may be low generalisabilty.

Store type has been noted as an indicator of food price with smaller grocery and non-chain food stores being typically more expensive than larger chain supermarkets (Cummins and Macintyre 2002; Block and Kouba 2006). As smaller convenience type stores are more likely to be more accessible in deprived areas this may explain the perception of higher prices in more deprived areas.

Affordability of all the foods needed for a healthy diet may be an issue for many groups. The proportion of household/family income that it would be necessary to spend on food may still be out of reach economically for a large proportion of the population (Barratt 1997; Williams, Reid et al. 2004; Tsang, Ndung'u et al. 2007). In areas where the median income is significantly lower than in wealthier neighbourhoods, the cost of a healthier diet is likely to be relatively more expensive and therefore potentially much more difficult to maintain. A study in Adelaide found little difference in food price across neighbourhoods of differing socioeconomic status but did report that the cost of a healthy diet would take up a significant proportion of the weekly income of a family on a benefit or low-income (Tsang, Ndung'u et al. 2007).

A 2006 study of food affordability in Ireland found that the cost of a healthy diet may be unaffordable for those living off social welfare entitlements. This study reported that the cost of a recommended food basket would cost up to 80% of their household income, for a single parent with one child (Friel, Walsh et al. 2006). A study in the U.K. produced similar results. While there was reasonable walking (physical) access to shops, the cost of a healthy diet would still be (economic access) more than 50% of the income of someone on a benefit (Donkin, Dowler et al. 1999). This demonstrates

the value of calculating affordability as well as availability and price as a way of demonstrating the true cost to families of pursuing a healthy diet. Cost should not be considered the single indicator of economic viability of healthy food purchase, affordability as percentage of income should also be taken into account.

Income

Price may not be a barrier to healthy food access unless there is insufficient household or personal income to spend on food. As well as the cost of healthy options, income or lack of income is also a barrier to being able to access enough healthy food. It has been noted that lower income groups articulate less concern with healthy eating than higher income or social class groups and that low-income groups are more concerned with foods that fill you than with whether it is healthy (Caraher, Dixon et al. 1998). It could be that people on a lower income see food as a means of survival rather than an avenue to better health and that this second perspective may be a luxury only afforded by people on higher incomes. This suggests that health may not be foremost in the minds of these low-income parents or adults when making food decisions for the family. This concept is supported by research on 'discounting' decisions made by Pacific peoples in South Auckland (Cheer, Kearns et al. 2002). Other social influences, such as the support of friends and family and the presence of small children has been reported to affect mobility and transport, which can impact the ability to access healthy food (Bostock 2001; Coveney and O'Dwyer 2009).

Review of intervention and strategies to improve access

There have been many suggestions and recommended strategies to improve access to healthy food in communities with poor access to healthy food. However, there is little research examining the effect of interventions that aim to improve access or on assessing the feasibility of particular approaches.

Glanz and Yaroch (2004) provide one of the few overviews of potential strategies to increase fruit and vegetable intake at a grocery store and community level. They

propose using point-of-purchase information, reduced prices and/or coupons and more promotion and advertising of fruit and vegetables within stores. At a community level they emphasise the strength of a settings based approach suggesting churches and child care centres as a possible site for interventions.

Zoning, planning and other regulatory approaches to improve physical or locational access to healthy food have been proposed. Most commonly suggested are incentives to attract supermarkets and regulation restricting fast food (Andreyeva, Blumenthal et al. 2008). This includes capping the number of certain types of venues (such as fast food outlets) permitted in a neighbourhood, a strategy similar to the approach to gambling venues in New Zealand (Ashe, Jernigan et al. 2003; Austin, Melly et al. 2005; Pearce, Mason et al. 2008). At a local level, local government could consider using tax and other financial incentives or subsidies to encourage food retail businesses to set up in locations in need (Powell, Auld et al. 2007; Larsen and Gilliland 2008). Some areas have started taken action in an attempt to reduce fast food consumption among those living in highly deprived areas. Los Angeles in the U.S. has now started to target fast food restaurants with zoning laws in an attempt to reduce their prevalence in low-income and black neighbourhoods and areas around schools (Stephens 2007).

Improving access to healthy food by developing outlets like supermarkets in areas not already serviced by them may have the effect of reducing transport costs for those with and without access to private transport (Clifton 2004; Wrigley, Warm et al. 2004; Coveney and O'Dwyer 2009). This has potential benefits for those on low-incomes in terms of increasing the amount of money available to spend on food if they are able to walk or use public transport, by improving physical activity levels and also reducing car use and moving towards more sustainable ways of obtaining food. Placing supermarkets and/or other sources of healthy food in areas with poor access may have a positive impact on travel mode by causing people to use more sustainable modes of transport such as walking and public transport.

Few intervention or experimental studies have been conducted to date investigating the effect of improved physical access to supermarkets (and other food outlets) and quality of diet (Brug, Kremers et al. 2008). The Leeds 'food deserts' study did observe a small but significant increase in the consumption of fruit and vegetables in people who switched the main food store to a newly opened Tesco outlet near their home from a supermarket further from their home (Wrigley, Warm et al. 2003). The increase was largest in the group that had the worst consumption prior to the intervention and the relationship was also stronger for those who did not have access to private transport and who lived closer to the store (Wrigley, Warm et al. 2003).

Another intervention study, carried out in Glasgow in the U.K., did not find an improvement in fruit and vegetable consumption for those living in an area with a new food 'hypermarket'. There was an increase in intake for those who switched to the new store but these results were not significant (Cummins, Petticrew et al. 2005). The two studies discussed here indicate that the effects of introducing new supermarkets in deprived area may be very small. However, a noted limitation of both these studies is that only fruit and vegetable consumption has been used as a proxy for a healthy diet and it may be that measurement of intake of other foods could yield different results. It seems more work needs to be done on the mechanisms in which supermarket access may influence food consumption.

Natural experiments provide opportunities to examine the impact that the introduction of alternative food sources may have on access to food and food 'choice' in a neighbourhood. A 'before and after' approach was used to determine whether the cost and availability of a healthy food basket was improved after the introduction of a farmer's market in an area of Ontario, Canada, which was previously known as a food desert. The introduction of the farmers market increased availability of the items in the 'Ontario Nutritious Food Basket' and also lowered the cost of the basket by (Larsen and Gilliland 2009).

Improvements in transport systems, support for those less mobile or physically able, and town planning to ensure more of a mix of food choices have also been suggested (Burns & Inglis, 2007). Food delivery is another potential strategy that could mitigate the impact of lack of private transport options faced by some groups; however this has not been investigated in any systematic way (Algert, Reibel et al. 2006; Coveney and O'Dwyer 2009).

Community led initiatives such as food co-operatives, farmers/produce markets and vegetable gardens have been proposed as solutions to access problems. Robinson, Caraher et al. (2000) raise the valid question of whether disadvantaged communities should have to rely on community support to provide better access to food when less disadvantaged areas already receive this from the private sector. Community markets and gardens have been proposed to have wider benefits than just improving access to food including increased community cohesion, increased physical activity and improved mental health (Wakefield, Yeudall et al. 2007; Cattell, Dines et al. 2008).

Limitations of the research reviewed

One of the limitations of the current body of research on food availability and access is the variation in methods used to measure these constructs. For physical access this ranges from density and proximity analyses to measurement of the space that types of food occupy on the shelves of grocery stores (Cheadle, Psaty et al. 1991) and the more commonly used food availability survey tools (Glanz, Sallis et al. 2007; Story, Kaphingst et al. 2008). Different measures are often more appropriate for certain areas or specific research questions, however this does make it harder to generalise findings and determine patterns (Booth, Pinkston et al. 2005; Macintyre 2007).

It also seems more qualitative work needs to be done talking to people who live in low-income and deprived neighbourhoods about the barriers to accessing healthy

food. Merely identifying the factors of the environment that appear to facilitate or restrict healthy food choice is not sufficient. If these factors are not perceived as limiting food choice and access then there may be no value in targeting interventions designed to modify them (Turrell and Kavanagh 2007). A small body of qualitative work in the form of in-depth interviews or focus groups has been conducted to explore the self-reported or perceived barriers to accessing healthy food and influences on food choice but this does need extending (Piacentini, Hibbert et al. 2001; James 2004; Kamphuis, van Lenthe et al. 2007; Coveney and O'Dwyer 2009).

A variety of methods and approaches have been employed to explore food environments and examine food availability and accessibility. Most studies that measure physical access and availability utilise quantitative methods (Beaulac, Kristjansson et al. 2009). The majority of studies that attempt to identify other environmental barriers or influences on food 'choice' also often use quantitative tools like surveys. There are some examples of those that use qualitative methods such as semi-structured interviews and focus groups. Qualitative approaches seem better placed to draw out perceived influences on food 'choice'. The mixture of methods used throughout the literature suggests that no one method or approach is able to illuminate barriers in all environment types.

A small group of mixed or multiple methods studies have combined qualitative and quantitative tools to provide a more comprehensive view of neighbourhood food environments (Latham and Moffat 2007; Coveney and O'Dwyer 2009). Latham and Moffat (2007) examined the food environments of two socioeconomically contrasting neighbourhoods in terms of cost and availability of a healthy food basket. They conducted food outlet mapping, a price and availability survey and also semi-structured interviews with store owners and public health professionals to provide contextual information. This study concluded that food costs were not higher in the less affluent area with prices varying more between store types than study areas but that this did not mean residents could easily purchase food due to potential transport

issues. Density measures of food outlets also found that there were fewer supermarkets (per capita) in the less affluent area. The qualitative component of this study enabled some insight to be gained about the determinants of cost and availability, which may be useful to drive solutions to food access in this area. Coveney and O'Dwyer (2009) examined access to healthy food using both GIS mapping of supermarkets and semi-structured interviews with residents living in previously classified 'food deserts' and areas not considered to have poor access to food.

The few mixed methods study that have been conducted extend beyond the description of neighbourhood food environments by helping to illustrate how certain features of the environment may impact differently on people depending on other social, cultural and economic factors. They can also be especially useful for confirming whether observed features of the environment are in fact perceived as barriers to healthy food accessibility.

Conclusion

In recent years research in public health has started to focus on contextual explanations for disparities in food choice and diet-related disease. The literature review above describes both the objectively measured potential barriers to healthy eating and also those perceived by those most at-risk of consuming a poor diet. While research on locational access to healthy food at neighbourhood level provides mixed results there does appear to be some patterning by deprivation. It is also evident that features of the sociocultural and economic environments may serve to mediate the pathway between geographical location and food accessibility and diet-related outcomes. It is vital to acknowledge the complex interaction between social characteristics and neighbourhood measures and to recognise that these relationships are likely to be interactive rather than linear in cause and effect.

The variation in findings across countries and even different regions also makes a case for examining areas separately to consider the unique physical, environmental, sociocultural and political food environment that the people residing there are faced with. This may help to ensure that the barriers that are uncovered are specific so that appropriate, locally feasible solutions can be identified.

Chapter Three: Methodology

This chapter restates the research questions and gives detail on the research parameters, advisory group and ethics approval. It then outlines the theoretical perspective used to inform the choice of methodology and methods used to answer the research questions. As a mixed methods approach was taken, this chapter will then describe the methods in three sections, (1) food outlet data collection and mapping, (2) survey of convenience stores and supermarkets and (3) focus group study.

Research questions

This research aims to answer the following questions:

1. How does the food environment compare between Eastern Porirua and Whitby in terms of availability of outlets and price and availability of basic foods?
2. What are the perceived environmental barriers to accessing healthy food for residents of Eastern Porirua and Whitby?
3. What are potential points of intervention to improve access to healthy food in this area?
4. How useful is the ANGELO framework for identifying and classifying barriers to accessing healthy food?

Research parameters

Food accessibility and availability have been identified as potential influences on the food 'choice' and consequently diets of people in Porirua by public health professionals at Regional Public Health (RPH), which is an arm of the Hutt Valley District Health Board. However, this was only anecdotal and any action to improve accessibility and availability needs to be evidence based. The study areas were largely pre-determined by Regional Public Health. Eastern Porirua had been previously identified as an area where food accessibility may be an issue. The suburb of Whitby was chosen by Regional Public Health as comparison area for Eastern

Porirua. While it neighbours Eastern Porirua, it is disparate in terms of deprivation and availability of food outlets. It was indicated by RPH in the initial planning stages of this research that they wanted data collected on the views of residents of Eastern Porirua in the form of either semi-structured interviews and/or focus groups.

Advisory group

It was important to bring in key agencies, organisations and people throughout the research to increase their awareness of the potential issues to do with food access and availability in this area. The formation of an advisory group was intended to ensure the research would be carried out in an academically rigorous fashion as well as being relevant to the community and useful to RPH. The research included working with Māori and Pacific groups. As the researcher was not familiar with the study area (Porirua) it was decided that Māori and Pacific advisors as well as someone who was familiar with Porirua should be included on the advisory group.

The advisory group was originally made up of the two research supervisors and four staff members from Regional Public Health (RPH). The members from RPH included; (1) a public health dietitian, (2) the coordinator of the Healthy Social Environments Team, (3) an information analysis and support team member and (4) the leader of the Healthy Porirua Project who also served as a Pacific Advisor. Regular meetings were held with the advisory group in the initial stages of the research. These meetings were used to refine the research aims and provide feedback on the methodological approaches proposed. Various other members of Regional Public Health staff, other researchers and local informants were consulted throughout the research to ensure the methods and research practices were appropriate for the research questions and for the community involved. This included Pacific and Māori health promoters, a Samoan researcher, a policy analyst and the geographical information systems (GIS) manager from the Porirua City Council.

Ethics approval

Ethics approval was gained at the beginning of the study, prior to any data collection (September 2009). Ethical approval at departmental level of a proposal involving human participants (category B) was obtained from the Department of Public Health, University of Otago, Wellington.

Theoretical perspective – A social ecological approach

There are various alternative theoretical or philosophical approaches, perspectives and traditions within qualitative research (Patton, 2002). These are often known as epistemologies – how do we know what we know? The theoretical perspective chosen to inform the current research has its roots in ecological psychology. An ecological approach implies that individuals and the environment are interdependent. In this perspective the 'environment' refers to all things external to the individual. It seeks to understand a person's behaviour in the context of their particular world. Patton (2002) proposes that the foundational question of ecological psychology is, "What is the relationship between human behaviour and the environment?" and "How do individuals attempt to accomplish their goals through specific behaviours in specific environments?".

As discussed in Chapter One a socio-ecological approach implies that physical and social environmental factors influence obesity through their impact on diet and physical activity behaviour (Boehmer, Hoehner et al. 2007). The methodological approach taken in this research is informed by this perspective. Central to any ecological model is the interaction between person and environment; Kurt Lewin was one of the first to present this in his 'field theory' (Lewin 1952). Lewin's theory describes behaviour as a function of both the person and the environment (the field). This theory has progressed and has been applied to health behaviour and more specifically diet and physical activity behaviour (Reidpath, Burns et al. 2002). More specifically Swinburn, Egger et al. (Swinburn, Egger et al. 1999) identify four types of environment proposed to have an influence on how conducive an area is to the development of obesity – socio-cultural, physical, economic and political. This

research uses the ANGELO framework which was designed to 'conceptualise obesogenic environments and to identify potential interventions' (Swinburn, Egger et al. 1999). I chose to use the ANGELO framework to analyse the results of the qualitative section of this study because it seemed to be the most relevant ecological model available to assess environmental barriers to accessing healthy food, which are an important factor in the development of obesity. Use of a framework also ensured that all possible and potential barriers were scoped. This was especially important in the area of neighbourhood food environment where most of the literature investigated only the physical influences on access to food.

Mixed methods approach

A mixed methods approach has been taken in order to provide a contextualised and comprehensive view of Eastern Porirua to identify the barriers to accessing healthy food for residents of this area. Combining methods allows findings to be checked by cross-validating the results of one method with another (Stewart, Makwarimba et al. 2008). This approach can also be used to build up a richer more complete view of a subject area (Daly, Kellehear et al. 1997). Previous research in the area of food accessibility and availability has indicated that while it is important to try and quantify accessibility by measuring travel time, distance and proximity, it is also useful to add qualitative data in the form of the perceptions of residents to this (Coveney and O'Dwyer 2009).

The literature review that examined environmental influences on and barriers to healthy food access presented in Chapter Two was used to identify the most appropriate methods to identify the environmental barriers to healthy food access. Very little New Zealand literature was available in this area so the methods are based on work undertaken in Australia, U.K. and the U.S. While there had been research on physical access to food outlets in New Zealand, there was a lack of qualitative data on how residents view their area and what barriers to access they actually experience.

As described above, a mixed methods approach was used. (1) Data was collected on type and number of food outlets across Eastern Porirua and the neighbouring suburb of Whitby. These outlets were mapped to display the distribution and patterning of food availability in these areas. (2) This was followed by an observational survey of dairies/convenience stores, which gathered data on milk and bread price and availability. (3) The final step was to conduct focus group discussions using a semi-structured interview schedule with residents representing the main ethnic groups in Eastern Porirua. This section provides an overview of the methods and processes used to gather the data.

(1) Quantitative data collection: Food outlet mapping and density measures

Data were collected on all food retail outlets in Eastern Porirua and Whitby. Food outlet density was calculated and is presented in Chapter Four. Types of food outlets were also mapped to provide a visual representation of the distribution and patterning of food availability in Eastern Porirua. The aim of these maps is also to provide contextual information on accessibility when triangulated with other methods.

Geographical areas

Porirua is a city with wide disparities in income, ethnicity and area level deprivation (Porirua City Council 2008). Eastern Porirua and Whitby were chosen as comparative areas because they are two contiguous areas that highlight this diversity. A more detailed description of these two areas was given in Chapter One. The two suburbs were broken into census area units in order to represent 'neighbourhoods'. An area unit is an aggregation of mesh blocks that is smaller than a territorial authority (Statistics New Zealand 2009).

Some of the results are reported by suburb and analyses are presented by census area unit. Census area units typically contain about 3000-5000 people (Statistics New Zealand 2009). Area units were chosen as they represent a natural community and are similar to the population size of areas (census tracts in the U.S.) used in international studies of food deserts and food accessibility (Black and Macinko 2008). Area units included in each case study suburb for data collection were:

Table 1: Census area units of Eastern Porirua and Whitby

Eastern Porirua	Whitby
Cannons Creek North	Discovery
Cannons Creek East	Adventure
Cannons Creek South	Resolution
Waitangirua	Endeavour
Porirua East	Paremata-Postgate
Ascot Park	

Food outlet data collection

Names and addresses of all food outlets across Eastern Porirua and Whitby were collected. These were collated via four sources:

(1) An initial list was obtained from the Territorial Authority (Porirua City Council) through one of the Environmental Health Officers. This list only included those outlets that are registered food premises with the Porirua City Council.

(2) Regional Public Health (Hutt Valley DHB) supplied an additional list of food premises listed with Environment Science and Research (ESR).

(3) A further list was obtained by contacting the GeoHealth research team at the University of Canterbury who supplied names and addresses of food outlets in the

case study areas (Eastern Porirua and Whitby) and also provided a map of petrol stations, supermarkets, convenience stores and fast food outlets, which had been collected in 2004 and 2005. These three lists were combined and checked for duplicates. Any discrepancies in addresses and duplicate entries were resolved and addresses that were not listed were checked using the online Yellow Pages and Google Maps and Streetview.

(4) To ensure that all outlets were still open and had not changed name or business description and also to guarantee that no outlets had been missed, the researcher systematically drove through each street of the two study areas guided by a map, noted outlets and highlighted the roads as they were covered. This method is known as ground truthing - where secondary data is verified on location (Larson, Story et al. 2009). This was done to ensure accuracy of the data as discrepancies between commercial/organisation-sourced lists and actual availability have been identified as a common limitation of this sort of research (Larson, Story et al. 2009). It has been recommended that using a combination of data sources will reduce this type of measurement error (Saelens and Glanz 2009).

Categorisation of type of outlet was also necessary. As no standard classification system exists in New Zealand unlike in the U.S. and U.K., categorisation of food outlets was based on similar research conducted in New Zealand and Australia (Winkler, Turrell et al. 2006; Pearce, Hiscock et al. 2008). Table 2 below shows categories of food outlets. Small grocery stores, petrol stations and dairies were grouped together into the category 'convenience store' as it was determined upon observation that they fit the same definition for convenience store. Number and type of outlets are presented along with density (number per 1000 people) of total outlets in each area and for different types of outlets.

Table 2: Categories and definition of food outlets

Categories	Definitions
Supermarket	Larger store selling a wide range of lower priced products - mainly groceries
Convenience store	Locally operated smaller outlet that sells narrower range of mostly groceries often at a higher price (includes service station convenience stores)
Meat and fish shop	Mainly sells fresh meat, poultry and or fresh fish and seafood
Greengrocer	Mainly sells fresh fruit and vegetables
Fast food/takeaway	Mainly engaged in preparation and sale of meals and snacks ready for consumption
Bakery	Mainly sells bread, biscuits, cakes and pastries with or without packaging

Adapted from Winkler, Turrell et al. (2006) and Pearce, Hiscock et al. (2008).

Mapping

Geographical information systems (GIS) are used in health research and planning to assess accessibility to health services and are being increasingly employed to investigate availability, proximity and density of other types of health promoting (and otherwise) resources including food retail (Pearce, Witten et al. 2007). They have been used extensively internationally to determine access as measured by distance or travel time to types of food outlets (Morland, Diez Roux et al. 2006; O'Dwyer and Coveney 2006; Burns and Inglis 2007). GIS has been used in the present study as a descriptive tool with the aim of presenting a snapshot of the case study areas to highlight the potential physical differences in access and availability of food. This

provided a context for the qualitative data, which explored the food accessibility and availability experiences of the residents that was only collected for Eastern Porirua.

Once addresses of all types of food retail had been obtained and verified by the researcher, they were geo-coded using GeoStan NZ, a geo-coding application which assigns census mesh block and x, y coordinates to each address. A business analyst from Regional Public Health then entered this data into ArcGIS Desktop 9.3 – a geographical information system – that was then used to create maps. This process was guided by the researcher.

Density

Food outlet density – number of outlets per 1000 people – has been used as a measure of food outlet availability and accessibility in studies of areas of varying deprivation in the U.K., and Australia (Reidpath, Burns et al. 2002; Cummins, McKay et al. 2005). Population density was calculated, per 1000 people, by census area unit and by suburb to allow for comparison between Whitby and Eastern Porirua. Density was calculated for each area and each type of food outlet and also for all food outlets in each area.

Retail food environment index

In order to examine how accessibility may be influenced by the mix of different types of outlets available in a neighbourhood, a ratio of 'unhealthy' to 'healthy' outlets was calculated. This has become known as the Retail Food Environment Index (RFEI). The method for calculating RFEI was adapted from two previous studies that have used RFEI (California Center for Public Health Advocacy 2007; Spence, Cutumisu et al. 2009). The formula used was:

RFEI = (F+C)/G

F = the number of fast-food restaurants within each census area unit (CAU)

C = the number of convenience stores (including convenience stores, service stations with convenience stores and convenience neighbourhood stores that also sell selected grocery items) within each CAU

G = the number of supermarkets, greengrocers and meat/fish shops within each CAU

In line with methods used by Spence, Cutumisu et al. (2009), in the absence of any G type outlets a constant of 1 was added so that an RFEI could be calculated for the particular CAU.

(2) Quantitative - Milk and bread availability survey

The aim of this part of the study was to describe the types of food outlets and food available in these stores across both areas in order to identify possible physical and economic barriers to healthy food access.

Survey tool

A search of the literature was conducted (presented in Chapter Two) in an attempt to find a suitable food survey tool, as there is no standard tool used in New Zealand to measure food availability and price. Although food availability questionnaires were available and have been used in a number of studies internationally, there is little consistency in what is measured and how this is done (Saelens and Glanz 2009). Other countries have started to develop such tools and validate them in an attempt to produce a standardised method of measuring food availability and price (Glanz, Sallis et al. 2007). Many of the studies also consisted of collating several lists of ethnically acceptable foods (sometimes up to 150) and measuring price and availability for all of these (Dowler, Blair et al. 2001).

It was decided that the researcher would develop her own survey tool to use to provide some observational data on the availability of certain foods in the outlets in the two areas. A food availability survey was developed using the National Nutrition Guidelines – specifically those referring to dairy products and bread - published by the Ministry of Health (Ministry of Health 2003). Price was recorded for two items that the researcher, in conjunction with the advisory team (including a registered dietician), decided upon. Bread and milk were chosen as indicator foods, these have been shown to be two of the most frequently consumed food items by New Zealanders and particularly by Pacific communities - who make up a large proportion of the Eastern Porirua population (Rush, Paterson et al. 2008). The decision to record price for bread and milk was also made as within these two categories there are healthy and less healthy options; multigrain, wheat and white bread and blue top and green top milk options. Standard (blue top) milk was used as

a proxy for a 'less healthy' option and reduced fat (green top) as a 'healthy' option, based on national food and nutrition guidelines which recommend reduced or low fat options for dairy products (Ministry of Health 2003). The aim was to investigate the retail food environments to assess whether there was a difference in price and availability between these options and if so whether there is a difference by area or type of food outlet.

Data collection

The food availability survey was conducted between 16 and 19 December 2008. It was carried out over the same week in both areas to minimise seasonal or any other externally motivated variation in prices. All data collection for supermarkets was carried out on the same day (16 December 2008) to ensure that any weekday variation would be accounted for. The researcher entered each store and presented herself to the person at the counter, explained that she was a university student conducting a research project of all the food outlets in Eastern Porirua and Whitby and wanted to conduct a brief food availability survey. The researcher also carried an information sheet about the research project, which outlined the aims and methods and also gave contact details if the store owner required further information. The store owner was notified that their store would not be named. If the store owner gave consent then the researcher proceeded to carry out the survey. There are 19 convenience stores across Eastern Porirua and Whitby. Petrol station convenience stores were combined with regular conveniences stores as, upon observation, they sold a similar range of products including bread and milk. Of the 19 convenience stores five stores declined to participate in the survey. These stores did not appear to be markedly different to any of the stores that gave consent, however this cannot be definitively assessed so it is not known what effect the exclusion of these stores has on the results.

There are three main types of bread typically sold in dairies, supermarkets and petrol stations – white, whole wheat and grain. Data were collected on the availability and price of a standard 700g loaf of each type of bread in stores across Eastern Porirua

and Whitby. For milk, price and availability of a two litre bottle of standard (blue top) and reduced fat (green top) milk were collected. Where the price was not listed on the product, the retail staff member was approached for the price. This happened frequently as it was not always easy to find the price as there was often no price tag. The three supermarkets in Porirua Central were also surveyed as they have been identified as a main supplier of food for residents of the two case study areas. Once consent was obtained the researcher systematically walked through the shop identifying whether the food groups and items in the survey were sold and prices gathered for the relevant items. In all cases the lowest, non-sale, everyday price of the item was recorded.

Analysis

All food availability items and prices were entered in Microsoft Excel and stores were numbered to ensure anonymity. Due to the small number of stores in Whitby compared to Eastern Porirua, it was not appropriate to conduct any tests of statistical significance. Availability of both types of milk (blue and green top) and the three varieties of bread (white, wheat and grain) were recorded along with price for each store. Average prices were then calculated using Microsoft Excel for all stores in Whitby, all stores in Eastern Porirua and the city supermarkets in Porirua Central to allow comparison between areas and between types of stores, convenience and supermarkets, these are presented in Chapter Four.

(3) Qualitative data collection: Focus group study

There is already New Zealand national data on accessibility in terms of distance and travel time to food outlets (Pearce, Blakely et al. 2007), however little work has been done to give this data context and assess how residents actually viewed their neighbourhoods and local areas in terms of food availability and accessibility. Further, research on food deserts, discussed in Chapter Two, has emphasised a need to conduct local assessments of food accessibility and to provide information on the perceived quality of food resources not just the presence of them (Pearce, Witten et al. 2007; Beaulac, Kristjansson et al. 2009). In order to answer the research question "What are the perceived environmental barriers to accessing healthy food for residents of Eastern Porirua and Whitby?" and "What are the potential points of intervention to improve access to healthy food in this area?" a focus group study was decided on as an appropriate method.

Focus group research

A focus group "essentially involves an intensive group discussion 'focused' around particular issues" (Waldegrave 2003: p.231). Focus groups can be useful to investigate why people think the way they do, exploring knowledge and experiences (Kitzinger 1995). This is particularly pertinent to the research questions of this study. This method is also useful in that data from the focus groups may lead to change in the way problems or issues are explored. In turn, this may follow on to solutions or recommendations that were previously not contemplated (Morgan 1997) . This was especially important to this study, as I came into the community as an outside researcher. I was particularly aware of not imposing my views on what the main barriers to access are or what the best solutions may be. So, focus groups were used to ensure the views of the residents were heard and other precautions such as employing ethnic specific facilitators were taken.

Advantages and disadvantages of the use of focus groups

There are various disadvantages and advantages to using focus groups as a data collection tool (Morgan 1997). Advantages include the ability to gain the views of a number of participants in a short amount of time saving time in both interviewing and analysis of data (Patton 2002). However, there are obvious logistical issues to consider when conducting focus groups including trying to arrange for six to eight participants, facilitator, supervisors, equipment and a venue to be available at the same time (Morgan 1997). Apart from these practical issues there are also strengths and weaknesses in type of data that can be obtained from this type of interview. Participants are able to agree, argue, discuss and build upon the experiences and opinions of others. This interaction often provides much richer data than would be obtained by conducting separate interviews (Stewart and Shamdasani 1990). However, the influence of the group setting may also produce conformity of responses and restrict the involvement of some participants depending on the topic (Patton 2002).

Relevance to this research

It is also important to determine whether focus groups are an appropriate method for any particular research project by examining whether participants will be able to easily discuss the topic of interest (Morgan 1997). Focus groups have previously been used in similar research. Internationally, focus groups have been used effectively in research that examines cultural beliefs about food and cultural influences on food choice (Airhihenbuwa and Kumanyika 1996; Hargreaves, Schlundt et al. 2002; James 2004). In New Zealand, focus groups have been used to investigate the perceptions of Māori, Pacific and low-income groups in relation to nutrition information labels (Signal, Lanumata et al. 2008), and also in food security research (Reid, 1996). Focus groups have also been used to supplement quantitative data in studies of food deserts in the U.K. and Australia (Whelan, Wrigley et al. 2002; Coveney and O'Dwyer 2009).

Sampling and recruitment

"Most qualitative research is based on trust and open communication" (Morgan 1997: p.10). This is an important consideration in any qualitative study but especially focus group research as the aim is to provide an open forum where participants can to share with others, who they may not necessarily be comfortable or familiar with. So, it was important to create an environment where this could happen. The researcher was not known to or familiar with the community in Porirua, so the researcher recruited participants in collaboration with the staff from the Health Promotion team at Regional Public Health (RPH), some of whom were part of the research advisory group, and Porirua Healthlinks who used their existing community links in the form of opportunistic and purposive sampling.

The cultural environment had been identified as a potentially important influence on healthy food accessibility. It is feasible to assume that people from different ethnic groups may share cultural behaviours and that these may influence the cultural food environment impacting on food accessibility. Eastern Porirua is an ethnically diverse area with a majority Pacific population. In order to be able to assess whether the perceived barriers to healthy food accessibility varied by culture or ethnicity, the focus groups needed to represent these groups.

The focus groups were sampled to reflect a cross section of the main ethnic groups drawn from the geographical study area (Eastern Porirua), which consists of 56.6% Pacific, 31.1% European and 25.8% Māori (Porirua City Council 2008). There are seven main Pacific groups in New Zealand: Samoan, Tongan, Cook Island Māori, Niuean, Fijian, Tuvaluan and Tokelauan (Statistics New Zealand 2006). People from many different islands in the Pacific are often grouped as one for statistical, measurement and reporting purposes. However, it was advised early on in planning of the methods that it would be inappropriate and less successful to conduct one Pacific focus group, as different Pacific groups have varying backgrounds and cultural practices and so may experience different barriers (Sione Feki, personal

communication, 2008). Due to time and resource constraints it was decided that one Samoan focus group and one Pacific group would be conducted as Samoan people make up the majority of the Pacific population in New Zealand (Statistics New Zealand 2006) and Porirua (Porirua City Council 2008). Therefore, one Māori, one Pākehā and two Pacific groups (one mixed and one Samoan) were decided on.

Purposive sampling - one of the most commonly used qualitative strategies - seeks to select participants on pre-determined criteria, which are relevant to the research questions (Stewart and Shamdasani 1990). Other sampling strategies were used over the course of the focus group study including opportunistic sampling and in one case (Māori focus group) the use of a naturally occurring group. Opportunistic sampling was used when some participants failed to show up at a focus group appointment. This type of sampling is widely established as an acceptable form of participant selection in the context of social and health research in local community groups (Whelan, Wrigley et al. 2002).

Direction was given to recruiters that the groups should be homogenous in terms of ethnicity but both males and females involved in the food shopping for their whānau were to be sought, although it was expected the majority of participants would be female due to this criteria. Homogeneity of participants allows for more free-flowing discussion and also means between-group analysis can be conducted (Morgan 1997).

Originally, it was intended that one to two focus groups would also be run with residents of Whitby. This would have allowed comparison between residents' perceptions of healthy food accessibility by area. Extensive efforts were made to recruit participants for focus groups in Whitby. This included contacting a number of early childhood centres in the area, contacting churches, the local residents association, placing an advertisement in the local community newspaper and posting flyers at various locations including the shopping centre. Ultimately, there was not enough interest to run the focus groups in Whitby and implications of not collecting

focus group data from this area are discussed in Chapter Five. It is possible that the type of suburb that Whitby appears to be, dormitory and commuter, may mean that there are less social links between people making snowball recruitment more difficult. Higher levels of employment in this area could also mean people are less willing to give up their time outside of work hours to participate in research.

Participants

Four focus groups were held with residents of Eastern Porirua – Cannons Creek, Porirua East and Waitangirua in March/April 2009. Table 3 identifies the key characteristics of the focus groups. There were 28 participants (23 female, five male) in total, with focus group size ranging from six (Pacific and Samoan) to eight (Māori and Pākehā). Most of the participants were the main food shopper in the household or were involved in food shopping for their household. The majority of participants were born in New Zealand (n=20) with the remaining originating from Samoa, Tonga and Australia. Most were not in paid work at the time the focus groups were conducted (n=19), four worked full time and three part time. Twenty participants lived in a household with more than four people. There were six participants between the ages of 23-30 years, five between 31-40 years, five between 41-50 years and twelve participants over 50. Household income ranged from below $10,000 to over $50,000. Twelve participants reported household income of $20,000 or less, nine participants lived in a household where income was reported as $30,001-$40,000. Four earned over $40,000 and three declined to respond.

Table 3: Focus group characteristics

Ethnicity	Gender	Recruitment strategy
Samoan	5 female, 1 male	Recruited from church and social networks of Samoan researcher
Māori	8 female	Recruited by Māori health promoter through exercise group at a Māori health provider
Pākehā	8 female	Recruited from community health worker's neighbours and social network
Mixed Pacific	4 male, 2 female	Recruited from social networks of Pacific health promoters

Interview schedule

The interview schedule (see Appendix A) for the focus groups consisted of a series of questions and associated prompts that aimed to draw out the perceived barriers to healthy food accessibility. Questions were also included at the beginning of the focus group interview schedule regarding what healthy food means to residents, where participants buy food from and how they travel to get food. This was done to gain a sense of the participants' understanding of healthy food and to provide some context for the remaining questions. The interview schedule was constructed following the literature review of the barriers to healthy food accessibility. It was designed to generate conversation about not only physical barriers but also economic, sociocultural and political barriers to healthy food accessibility that may exist, based on the environment types of the ANGELO framework (Swinburn, Egger et al. 1999). The interview schedule was drafted then revised on the advice of both research supervisors, and the Samoan research facilitator, who also translated the schedule, demographic questionnaire and information sheet into Samoan. The interview schedule was amended to improve clarity of the questions and prompts.

Facilitators

The four focus groups were conducted by four different research facilitators. A Tongan public health researcher with focus group moderation experience conducted

the Pacific group. A Samoan health researcher conducted the Samoan focus group (in Samoan), she also translated all materials including the interview schedule, information sheet, consent form and demographic questionnaire into Samoan and transcribed the recording of this focus group and translated to English and did an initial analysis of this transcript. A Māori health promoter, who had good links to the Māori community in Porirua, conducted the Māori focus group and the lead researcher conducted the Pākehā focus group. Te Reo was used as appropriate by the facilitator and participants in the Māori focus group; however all materials were presented in English on the advice of the Māori facilitator. Prior to each focus group the researcher provided each facilitator with the focus group materials including the interview schedule so they could become familiar with them. The researcher also had discussions with each facilitator to ensure that she understood the aims and objectives of the research. The researcher was present at each focus group and had a de-brief with each facilitator following each focus group.

Consent

Participants were provided with an information sheet and given time to read this and ask any questions prior to the commencement of each focus group. Key points were re-iterated verbally to the participants including that the focus group would be recorded and that they were free to withdraw at any point, and that their anonymity would be ensured in the writing up of the research. They were then asked to sign the consent form. In the Māori focus group, one of the participants who had been identified as the unofficial 'leader' of the group read the information sheet out to the participants. This was conducted in English for each group except the Samoan group where this process was conducted in Samoan.

Conducting the focus group

Each focus group took place in Porirua at a venue convenient to the participants. All focus groups lasted between 40 – 90 minutes. Each was recorded in full using an audio recorder. The researcher and one of her academic supervisors were present at each focus group with the consent of the focus group participants. Notes were taken

alongside the focus group recording by the researcher or the research supervisors to complement the audio recording. A light meal or snack and tea/coffee were provided for each focus group. A gift/koha in the form of a $30 supermarket or petrol voucher was also given to each participant at the end of each focus group as thanks for being part of the research. The Samoan focus group was opened and closed with a prayer and conducted in Samoan and English. All other groups were conducted in English. Once participants were seated and ready a brief summary of the research was given and the information sheet and consent form explained. It was also made clear that there was no right or wrong answer for any particular question. At the end of each discussion participants were thanked and any leftover food shared. The researcher also gathered details and arranged to send a brief summary of results to participants who indicated they would like this.

Analysis

As described above a full recording of each focus group was taken. Following this, the researcher transcribed each interview verbatim supplementing any gaps with notes taken during the focus group. This was done with the exception of the Samoan transcript as no notes were taken due to the group being conducted in Samoan.

Content analysis was chosen to understand the focus group data in order to identify the main themes and barriers across the focus groups and also determine whether there were differences between groups. Content analysis is the process whereby raw qualitative data is reduced to codes and themes, which are used to make sense of it (Patton 2002). Qualitative software packages are often used for thematic or code based analysis, however it is often time-consuming and unnecessary to use these packages (Ryan, 2004). For the purpose of this research, given the small number of transcripts (4), a simpler cut and paste technique (using Microsoft Word) was used.

It was not possible for the researcher to arrive at the qualitative data analysis or even data collection stage without some prior knowledge, theory, assumptions, or tentative hypotheses. The process of reviewing the literature, surveying stores,

becoming familiar with the case study area and even construction of the interview schedule meant a truly inductive analysis would not be possible. The transcripts were analysed using a two-stage coding process. The first coding process was a deductive analysis – data is analysed according to an existing framework (Patton 2002). This deductive coding process used the four environment types of the ANGELO framework – physical, sociocultural, political and economic (Swinburn, Egger et al. 1999). Some quotes were assigned to more than one environment type, as some comments represent the influence of more than one type of environment. This was not seen as an issue as no quantitative analysis (counting) was being performed on the amount of data in each environment type, however the implications of this are discussed in Chapter Five.

The second analysis was an inductive one – where themes and categories emerge from out of the data rather than from a previously determined framework or theory (Patton 2002). Each document was reviewed and coded for patterns and themes that arose from within each environment type. This was completed for each of the four environments.

A third search through the transcripts was then conducted. Not only are barriers to healthy food accessibility important to document but also the suggested solutions. So, the texts were again reviewed and the suggested solutions to improve healthy food accessibility were also recorded for each group.

Chapter Four: Results

In this chapter the research results are presented. These results are separated into three sections consistent with the methods section. Each section addresses the research questions posed in Chapter Four.

(1) The results of the food outlet data collection are displayed showing the availability of food: number and type of food outlets across Eastern Porirua and the comparison suburb of Whitby. The density of food outlets – number per 1000 people – is also shown in table format. A Retail Food Environment Index (RFEI) has been calculated for each census area unit across both Eastern Porirua and Whitby and is displayed in Table 5. This section aims to answer research question one by describing the food environments of Eastern Porirua and Whitby.

(2) Bread and milk price and availability are presented for convenience stores and supermarkets across the two areas. This part also addresses research question one by adding an economic layer to the data collection presented in the first section of results.

(3) The results of the focus group data analysis are also presented. This section examines what the participants perceive to be barriers to healthy food accessibility as residents of Eastern Porirua. Solutions to improve access to healthy food suggested by the focus groups are also presented. These results will address research questions two, three and four.

(1) Food outlet data collection and mapping

This section presents the number and type of food outlets across Eastern Porirua and the comparison suburb of Whitby. The aim of this method was to answer the research question, "How does the food environment compare between Eastern Porirua and Whitby in terms of availability of outlets and price and availability of foods?" Maps of these areas are displayed to provide a visual representation of the local food environment and the potential physical barriers to healthy food access that may exist. Density per 1000 people has been calculated for each census area unit and suburb. A Retail Food Environment Index has been calculated for these areas representing the ratio of 'unhealthy' to 'healthy' outlets.

Food outlet data collection

There were 35 food outlets identified in total across the area units that make up Eastern Porirua. In comparison, six outlets were found across the area units that make up the neighbouring suburb of Whitby. While the population of Eastern Porirua is approximately twice that of Whitby, there are still a disproportionately higher number of food outlets in Eastern Porirua than Whitby. There are also differences in the number of types of outlets. These have been categorised (see Chapter 3: Methodology), and the density of each type of outlet per census area unit is shown in Table 4 below. There were no multi-national fast food outlets in either area (e.g. McDonalds, KFC, and Pizza Hut). There are 11 fast food outlets in Eastern Porirua compared to two in Whitby. There are 17 dairies and two petrol stations located in Eastern Porirua compared to two dairies and one petrol station in Whitby. It should also be noted that there are three bakeries across Eastern Porirua, which also sell fast food type items (e.g. hot chips and pies), one at each of the main village shopping centres/malls while there are none in Whitby.

Maps

Figure 2 (Map 1) displays all food outlets across Eastern Porirua and Whitby. The NZDep2006 score of each census area unit is also presented on this map. While there are

more food outlets located in Eastern Porirua, it can be seen that these are mainly fast food outlets and convenience stores (dairies, small grocery and petrol stations). It is interesting to note the three clusters of food outlets in Porirua East, Cannons Creek and Waitangirua in contrast to Whitby where there is only one. In addition to the three clusters across Eastern Porirua there are also various convenience stores scattered across the area. This map also shows the major arterial roads that weave through Eastern Porirua and Whitby and the major highway and large roundabout that separate Eastern Porirua from the urban centre of Porirua Central.

The three supermarkets in Porirua Central (city centre) are also shown on this map. It should be noted that there are many more food outlets in Porirua Central (fast food outlets, bakeries, restaurants) than those these three. This is because people typically travel outside their neighbourhoods to reach large food stores and this was also found to be accurate for residents of Eastern Porirua, as discussed later in this Chapter. It was important to be able to present the potential physical barriers to reaching these supermarkets as their own residential areas do not have a supermarket.

Figure 3 (Map 2) shows the number and location of stand alone convenience stores and petrol station conveniences stores across Eastern Porirua and Whitby. It can be seen that there are noticeably more of these stores in the neighbourhoods that make up Eastern Porirua (19) than Whitby (3). Map 2 also shows that the more deprived areas (red) contain the highest number of food outlets (see shading key).

Figure 4 (Map 3) shows 'unhealthy' outlets – fast food outlets and bakeries - across Eastern Porirua and Whitby. Similar to the pattern with convenience stores, there are far more of these outlets in Eastern Porirua (11) than Whitby (2).

Figure 5 (Map 4) below shows the distribution of 'healthy' outlets – supermarkets, greengrocers, meat/fish stores - across the two areas and in the city centre. There are three supermarkets located across the motorway from Eastern Porirua in the city centre and there is also one located in Whitby. The next most proximal supermarket to these areas is the one shown in the top right of the map in Paremata, which is also on the other side of the motorway from both Eastern Porirua and Whitby.

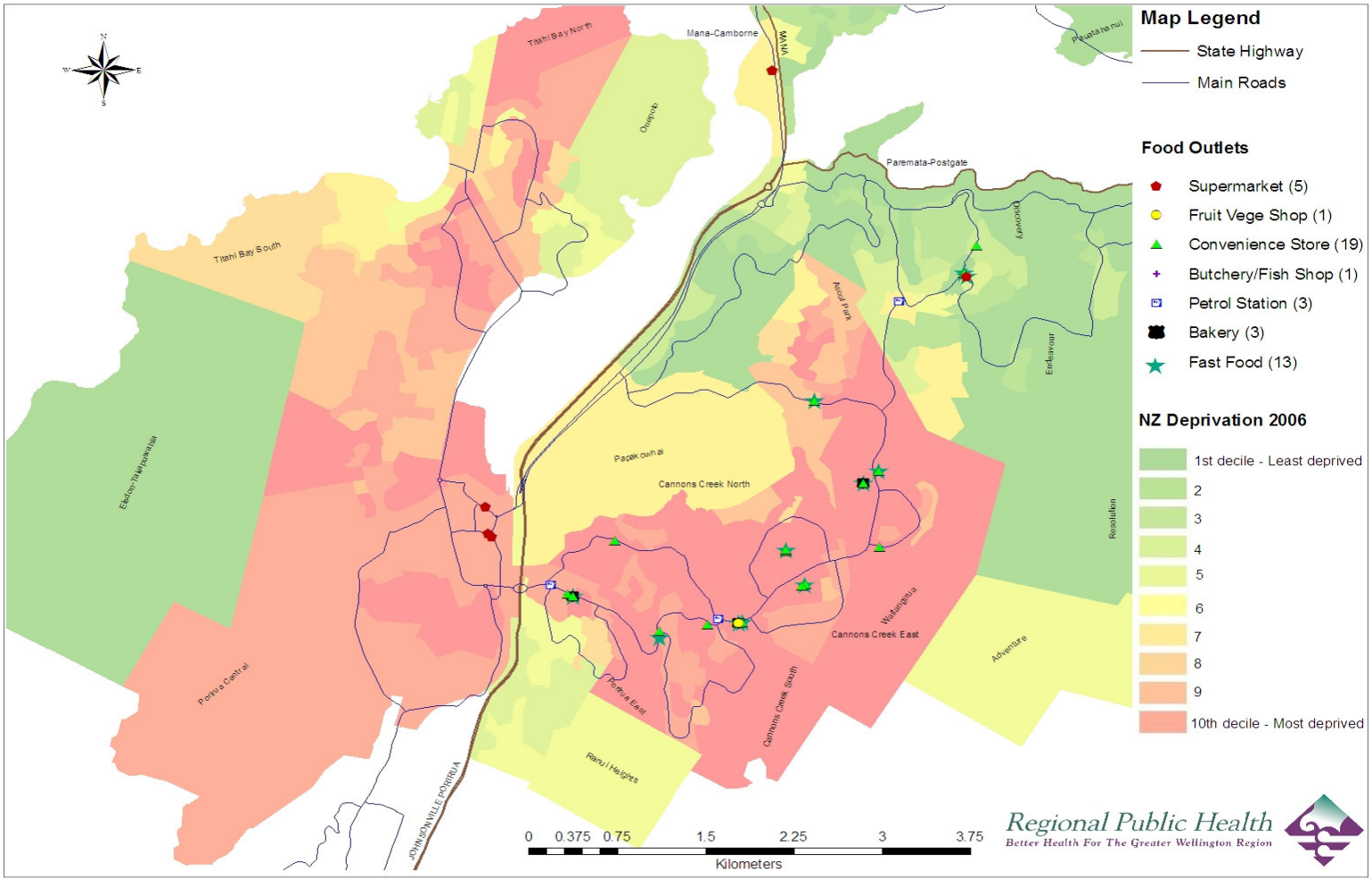

Figure 2: Food outlets across Eastern Porirua and Whitby

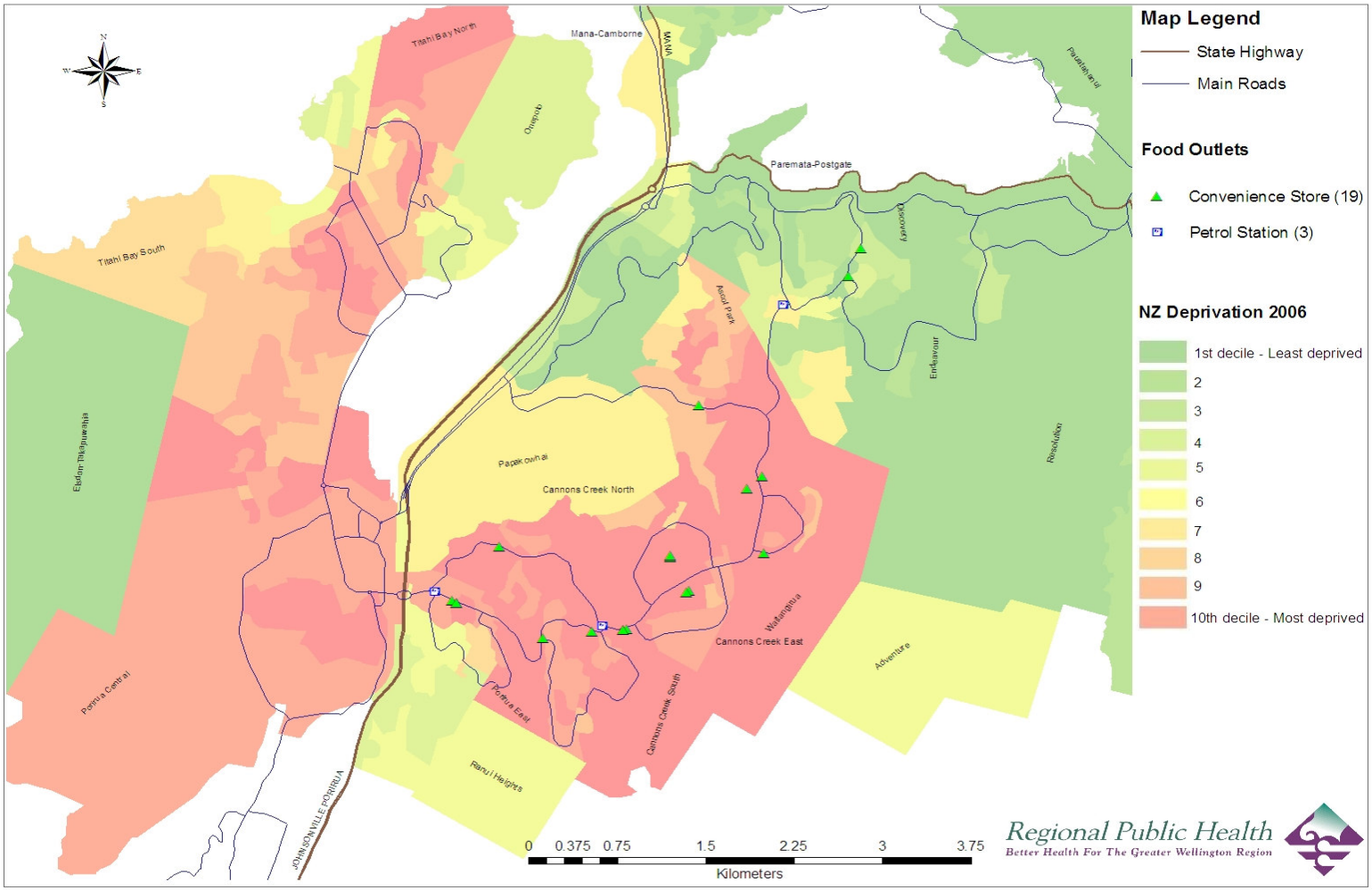

Figure 3: Convenience store and petrol station distribution across Eastern Porirua and Whitby

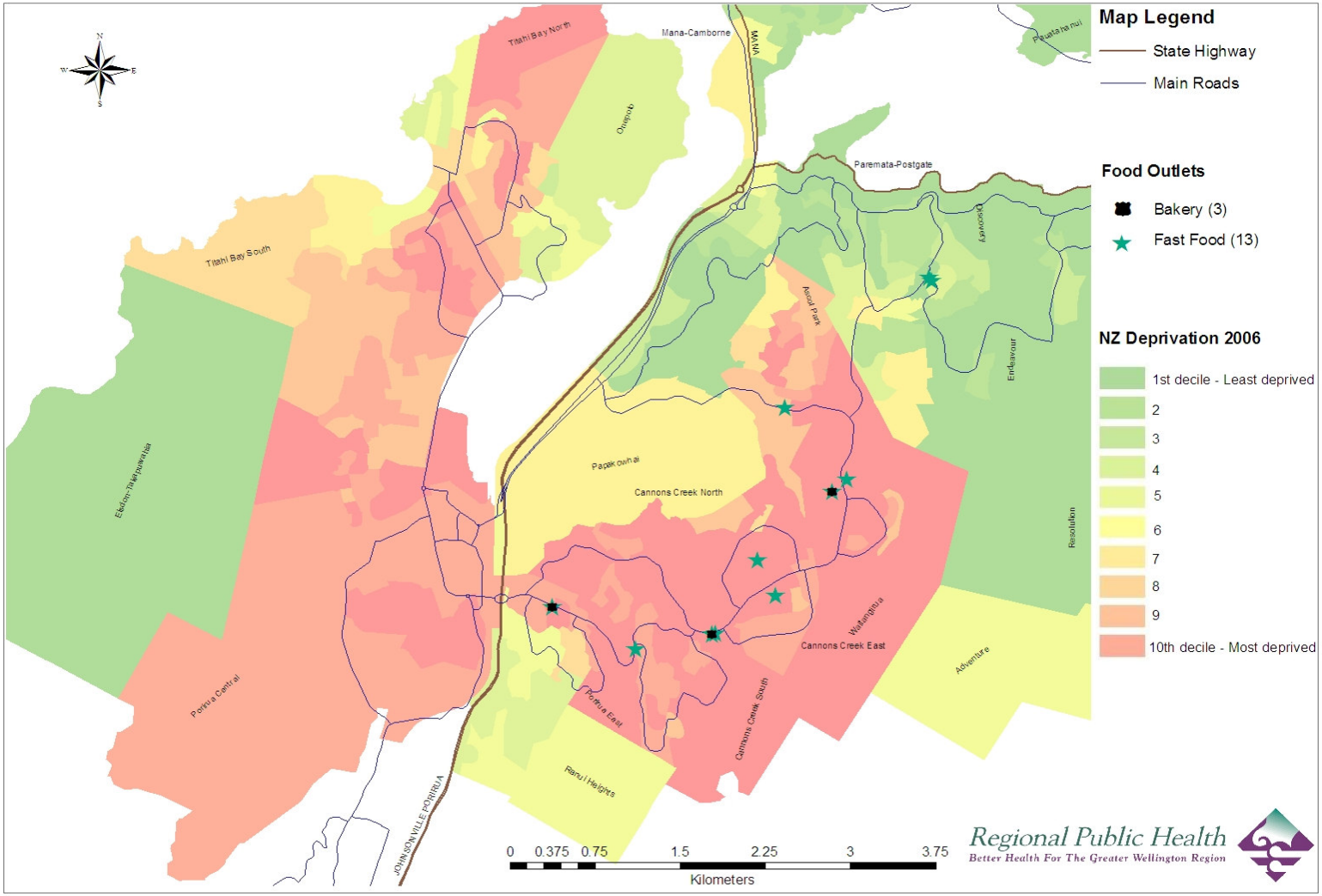

Figure 4: Fast food outlets and bakeries across Eastern Porirua and Whitby

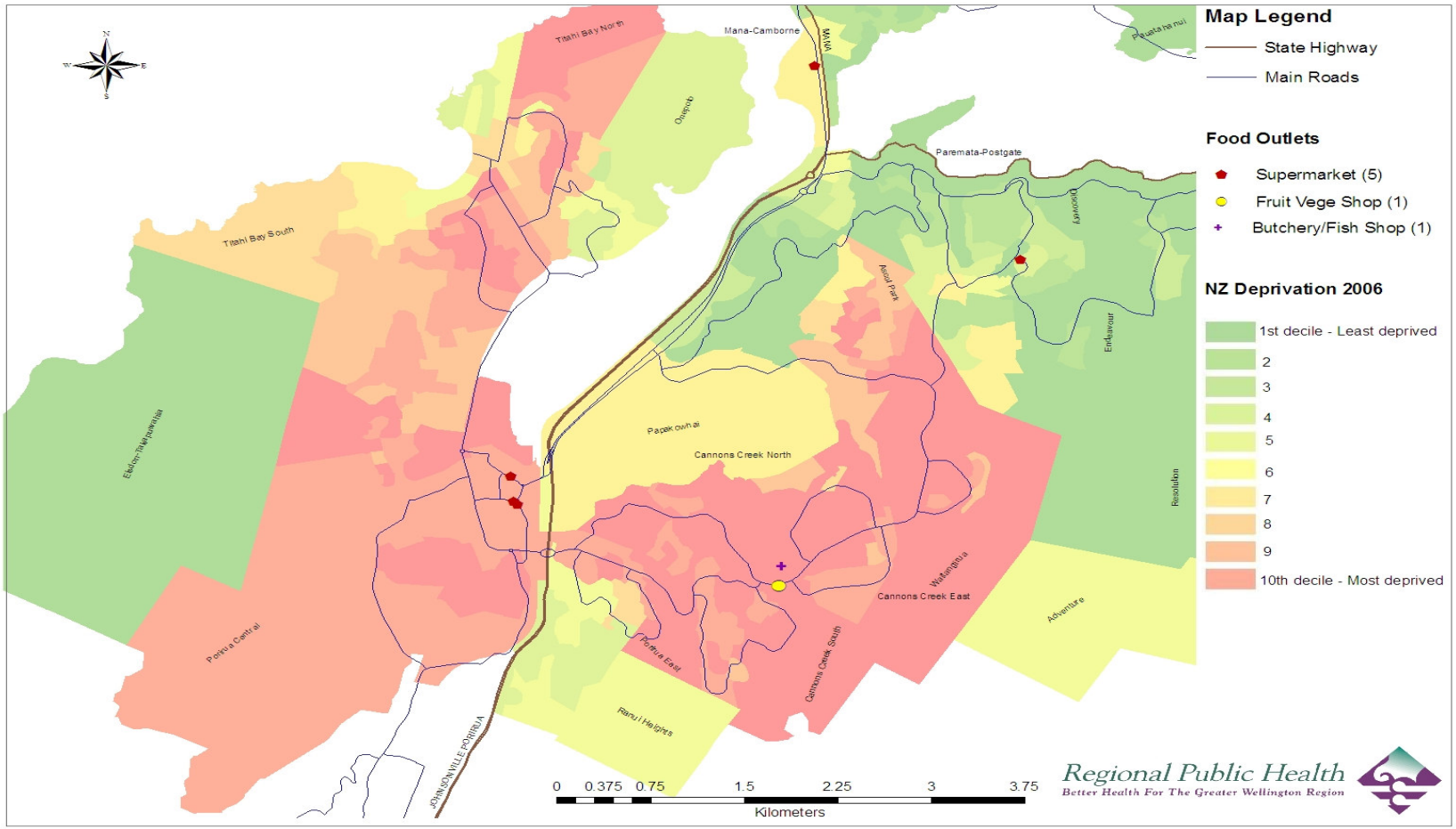

Figure 5: Supermarkets, greengrocers and meat/fish store across Eastern Porirua, Whitby and supermarkets in Porirua Central

Density

Table 4 presents the density of types of outlets per 1000 people in each census area unit across Eastern Porirua and Whitby. It can be seen in Table 4 that the area units of Porirua East and Cannons Creek North have the highest population density of fast food outlets. The density of convenience stores is higher than or equal to any other type of outlet in all areas. Cannons Creek North is the area unit with the highest density of total food outlets and with an NZDep2006 score of 10, is also one of the more deprived areas. Not unexpectedly, when looking at the two areas as a whole the total density of outlets for Eastern Porirua was 1.59 per 1000 people compared to 0.60 per 1000 people for Whitby. This suggests the exposure to certain types of food, particularly less healthy types sold in fast food and convenience stores is higher for residents in the more deprived area of Eastern Porirua than for residents of Whitby.

Table 4: Density (outlets per 1000 people) of fast food, convenience stores, supermarkets and total food outlets in each census area unit

Eastern Porirua	Fast food	Convenience stores	Supermarket	Total
Cannons Creek North	0.91	1.51	0	2.42
Cannons Creek East	0.53	1.06	0	1.59
Cannons Creek South	0.64	1.28	0	1.92
Porirua East	0.97	1.95	0	2.92
Ranui Heights	0	0	0	0
Waitangirua	0.49	0.74	0	1.23
Ascot Park	0.37	0.37	0	0.74
Total	**0.58**	**1.01**	**0**	**1.59**
Whitby	**Fast food**	**Convenience stores**	**Supermarket**	**Total**
Discovery	0.71	1.06	0.35	2.12
Adventure	0	0	0	0
Resolution	0	0	0	0
Endeavour	0	0	0	0
Paremata-Postgate	0	0.42	0	0.42
Total	**0.20**	**0.30**	**0.10**	**0.60**

Retail food environment index

A Retail Food Environment Index (RFEI) was calculated for each census area unit (see Table 5) based upon the ratio of the number of fast food outlets, and convenience stores

to supermarkets and other sources of fresh healthy food (green grocers, meat and fish stores). The higher the RFEI, the higher the ratio of less healthy outlets to healthy outlets in any given area. These calculations (see table 5) show that even the area in Whitby with the highest RFEI (Discovery) is still lower than many areas in Eastern Porirua. These results imply that there is a far higher ratio of less healthy outlets to healthier outlets or a lack of balance of food options available within Eastern Porirua.

Table 5: Retail Food Environment Index (RFEI) by census area unit and suburb

Eastern Porirua	RFEI
Cannons Creek North	4
Cannons Creek East	6
Cannons Creek South	3
Porirua East	7
Ranui Heights	0
Waitangirua	6
Ascot Park	2
Average	**4**
Whitby	
Discovery	4
Adventure	0
Resolution	0
Endeavour	0
Paremata-Postgate	1
Average	**1**

In summary, the results of the food outlet data collection and mapping section show that the retail food environment in Eastern Porirua is markedly different to that of Whitby. Tables 4 and 5 show that there are more food outlets in total in the areas that

make up Eastern Porirua than Whitby and that there are more 'unhealthy' outlets than 'healthy' outlets. There are higher densities of both convenience stores and fast food outlets in Eastern Porirua than Whitby. Although there is a green grocer in Eastern Porirua there is no supermarket, while there is in Whitby. Areas in Eastern Porirua also have a higher RFEI than most areas in Whitby. These findings indicate that the distribution of different types of food outlets is not equal across both areas and that the food environment in Eastern Porirua may be less supportive in terms of healthy food choice than Whitby, due to the higher average ratio of less healthy outlets across Eastern Porirua.

(2) Food availability survey

Overall bread and milk were more expensive in convenience stores than supermarkets and the 'less healthy' options for both were always either the same price or cheaper than the 'healthy' options. This section displays availability and price data for bread and milk in convenience stores (including petrol stations) in Eastern Porirua and Whitby and compares this to data from supermarkets located in Porirua Central (city centre). Differences in price and availability of standard (blue top) compared to reduced fat milk (green top) and white bread compared to wheat and whole grain bread is also presented.

Availability and price of milk

All stores surveyed had both options (standard and reduced fat) of milk available. Both standard and reduced fat milk were the same price in the city supermarkets but not in convenience stores. In both Whitby and Eastern Porirua the average price of standard milk was lower than the average price of reduced fat milk. Not surprisingly, both types of milk were more expensive in all convenience stores than supermarkets. Whitby convenience stores were more expensive than Eastern Porirua stores, however milk was available in the supermarket in Whitby, which was cheaper than all convenience stores.

Figure 6 shows the difference in average price between standard and reduced fat milk both within areas and between them. Interestingly there were differences between suburbs in the price differential between milk types. The average price difference between the two types of milk in conveniences stores is greater in Eastern Porirua ($0.80) than Whitby ($0.46).

Figure 6: Average price ($) of a two litre standard compared to reduced fat milk in Eastern Porirua, Whitby and Porirua Central

No convenience store in Eastern Porirua sold reduced fat milk cheaper than standard milk. Figure 7 shows that 11 out of the 14 (78%) of stores sold standard milk at a cheaper price than reduced fat milk. However, in three stores (21%) in Eastern Porirua, both types of milk were the same price.

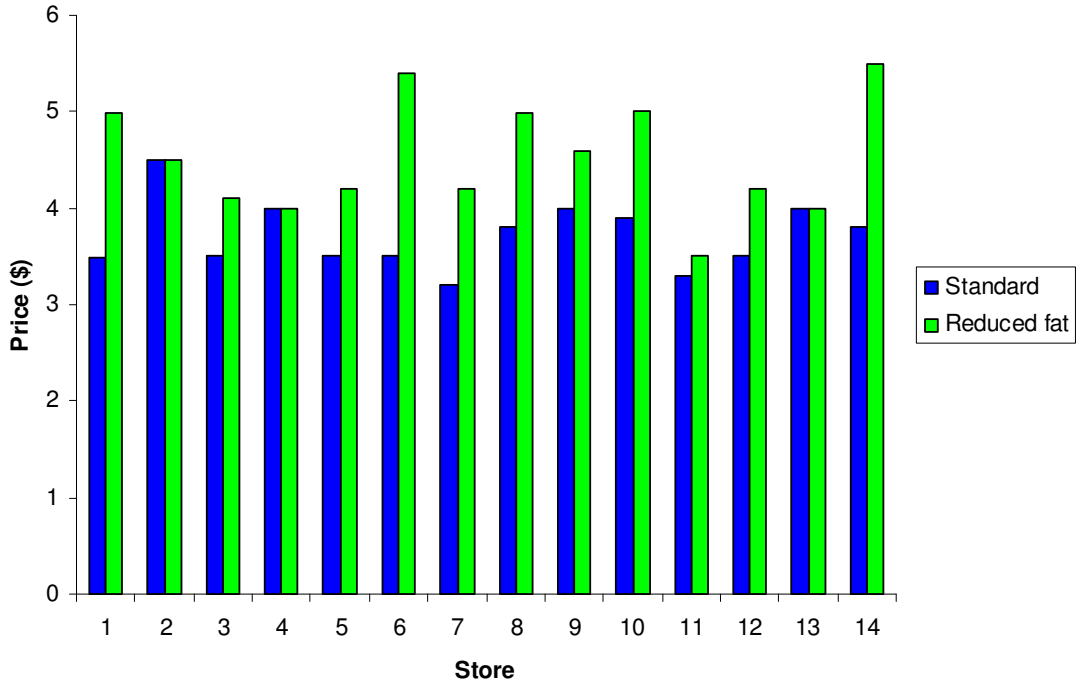

Figure 7: Comparison of price of a two-litre standard and reduced fat milk in convenience stores in Eastern Porirua

Figure 8 shows that the price differential between standard and reduced fat milk varied – sometimes quite markedly – between stores in Eastern Porirua. In some convenience stores the price of reduced fat milk was over $1.00 more than standard while some sold both types for both the same price.

The findings of this price and availability survey suggest that the majority of convenience stores in both Eastern Porirua and Whitby make it more attractive by price to purchase standard (blue top) than reduced fat (green top) milk. This suggests that while 'healthy' options are equally available the price of a 'healthy' option compared to 'less healthy' option makes the 'healthy' option less economically accessible.

Availability and price of white, wheat and grain bread

Of these 14 convenience stores, ten sold all three varieties of bread. Only five of the 14 stores sold multigrain or wheat bread or both at the same price as white bread. In the

remaining nine stores white was sold cheaper than the other two varieties, or white was the only option; this is displayed in Figure 8. Again as would be expected the average price of each variety of bread was cheaper in the city supermarkets followed by convenience stores in Eastern Porirua and then Whitby. Figure 8 also shows that there was no marked difference in price of white and wheat and multigrain varieties in the city and Whitby supermarkets. However, in Eastern Porirua and Whitby convenience stores there was a difference in price between white and wheat and also white and multigrain. Interestingly, in contrast to results for milk price, these differences were greater in Whitby than Eastern Porirua. Although due to the small sample size (2) not a lot can be inferred by this difference.

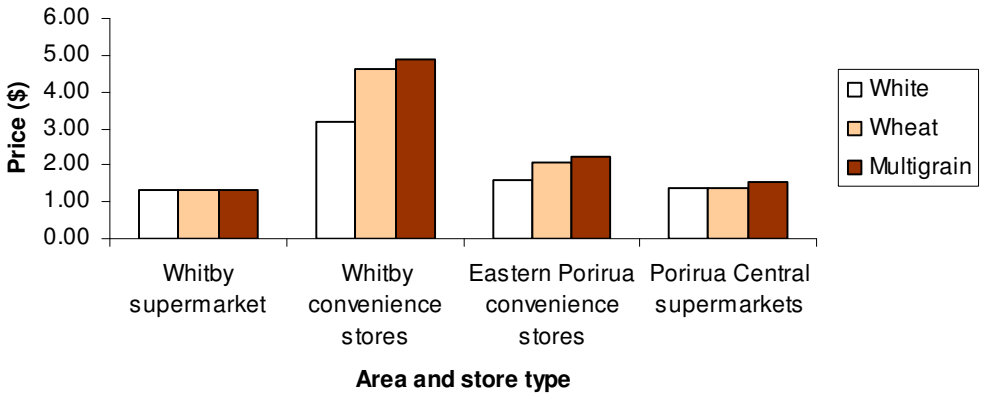

Figure 8: Average price ($) of one (700g) loaf of white, wheat and multigrain bread in convenience stores across Eastern Porirua, Whitby and Porirua Central

The average price (in Eastern Porirua) of white bread ($1.57) was the lowest of the three varieties, followed by wheat ($2.08) and then multigrain ($2.23). No store sold wheat or multigrain bread cheaper than white bread. In some cases wheat and/or multigrain was more than twice the price of white bread in the same store. Again it was fascinating to note the range of difference in price and availability between convenience stores in this area. Figure 9 shows that not all stores sold all three varieties of bread meaning availability was not equal across the area. The price of all three bread types varied with some stores selling 'healthier' breads (wheat and multigrain) for over $2 more than the

'less healthy' white option. Some stores sold all three varieties, all for the same price. This may be related to the brand of breads or the availability at any one point in the day.

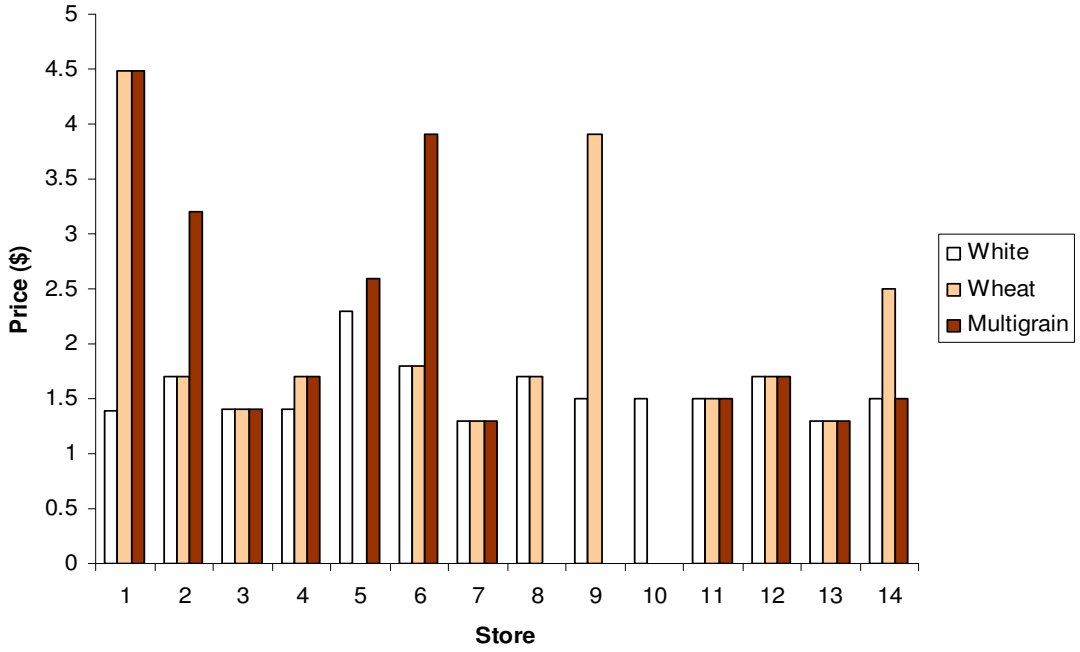

Figure 9: Comparison of price and availability of one (700g) loaf of white, wheat and multigrain bread in convenience stores across Eastern Porirua

Similar to milk the results presented in this section suggest that the majority of convenience stores in both Eastern Porirua and Whitby make it more attractive by price to purchase white bread than wheat or multigrain, although it is possible to find stores that sell all three at the same price. Findings for bread also suggest that 'healthy' options are less available compared to 'less healthy' options, which may make them physically less accessible.

Summary of quantitative results

There is a marked difference between the physical food retail environments of Whitby and Eastern Porirua. The high number of fast food outlets and convenience stores in Eastern Porirua and the absence of a supermarket in this area demonstrate this. The RFEI or ratio of 'unhealthy' to 'healthy' outlets was higher for the majority of areas in

Eastern Porirua compared to Whitby. The food availability and price survey showed that, for bread and milk, convenience stores were always more expensive than supermarkets. In most cases in convenience stores across both areas the 'less healthy' option was cheaper than the 'healthy' option; however the difference in price between the two options varied widely. The price differential for milk was markedly larger in Eastern Porirua while this was the case for bread in Whitby. Prices in convenience stores in Eastern Porirua were cheaper than in Whitby however the absence of a supermarket in Eastern Porirua means residents may be more restricted to the price and availability of items in convenience stores compared to Whitby residents.

(3) Focus group results and analysis

The results of this section aim to answer research questions two and three which seek to identity the perceived barriers to healthy food accessibility and possible ways of improving access to healthy food. This section presents a summary of the four focus group discussions held with residents of Eastern Porirua. Responses to the initial discussion points regarding food shopping behaviour are presented highlighting common themes across groups and the main differences between groups.

Quotes are used to illustrate the points made by focus group discussions. These quotes have been presented verbatim, [sic] has not been used to indicate where sentences are not grammatically 'perfect'. It would have been difficult and perhaps inaccurate to scatter this through the quotes, given that they reflect the way residents of Eastern Porirua speak and are still easily understood without the intrusion of [sic]. Each quote has been assigned the gender of the participant of the response and also the focus group they belonged to. Quotes are assigned to participants and groups using the labelling outlined in Table 6 below.

Table 6: Focus group key

Abbreviation	Focus group
MāG	Māori focus group
PG	Pākehā focus group
PacG	Pacific focus group
SG	Samoan focus group

The main perceived barriers derived from the initial deductive content analysis are then presented in Table 7 and are separated into the ANGELO framework environments – physical, sociocultural, economic and political (Swinburn, Egger et al. 1999). The result of the inductive analysis are then presented where the barriers are described in more

detail to attempt to describe how different features of the neighbourhood/local food environment influence access to healthy foods. The solutions suggested by the residents of Eastern Porirua are then displayed in Table 8 and discussed.

Perceived barriers

The topics and questions in the focus group discussion guide attempted to draw out the main environmental barriers to accessing healthy food as a resident of Eastern Porirua. All the focus group participants lived somewhere in Eastern Porirua and were involved in food shopping for their family/whānau (if they were not the main food shopper). The main perceived barriers are presented below in Table 7 and each barrier is addressed in more detail below.

Table 7: Main perceived barriers to accessing healthy food as a resident of Eastern Porirua resulting from analysis of focus group transcripts

Physical	Socio-cultural	Political	Economic
Access to transport	Attitudes and beliefs about food	Welfare policy	Cost of food
Lack of a neighbourhood supermarket	Promotion of food	Lack of consumer information	Income
Prevalence of fast food outlets	Cultural values/obligations	Church food policies	
	Fast food is a societal norm		
	Availability of skills, knowledge and training		

Physical environment

Participants in all focus groups identified the physical food environment of Eastern Porirua as a barrier to being able to access enough healthy food. Participants raised access to transport, not having a neighbourhood supermarket, the high number of fast food outlets and the availability and quality of neighbourhood food stores as physical barriers to accessing healthy food. They also identified the availability of skills, knowledge and training in the area of food and nutrition as a barrier.

Access to transport

All participants in the focus groups talked about access to transport in regards to food shopping. It was clearly a major consideration in deciding when to shop, how much to buy and what can be transported back home. Good access to private transport seemed to be a food shopping "facilitator", specifically use of to a car or van was the preferred method for most participants across all four groups. Participants reported using a combination of strategies to access food outlets. These included taking the bus to the supermarket in the city centre then returning home in a taxi, waiting for other family members with access to a car to drive them, and trip-chaining by shopping to or from dropping a partner at work. Most participants, as mentioned above, use a car to travel to their main source of food. Few participants reported not being able to drive. Participants in the Māori focus group reported using the bus more than participants in any other group. This was likely because they were older and so were eligible for age-related discounts such as the Gold Card[1]. There was some talk about this mode of transport being relatively affordable but unsuitable for carrying shopping bags. While public transport seems economically accessible it is not always an acceptable or adequate way to access food.

[1] The Super Gold Card is a discount card that New Zealand citizens become eligible for when they reach the superannuation age of 65. Among other discounts it allows over 65s free public transport use during off peak hours.

Pākehā focus group participants talked about transport for longer and in more depth than any other focus group. There seemed to be more variation in travel mode for these participants than any other. Conversely, the Samoan group did not seem to see transport as a barrier to accessing healthy food; with most having access to private transport. This meant they went into little detail about how transport options affected their food shopping behaviour.

The Pacific focus group participants described access to transport as important for being able to enjoy specials or bargains on certain food items, specifically meat. This was also brought up by other groups but was talked about most frequently by this group. Although participants did seem to have access to private transport for food shopping most of the time, there were limits to how far they would travel to obtain good prices as demonstrated in the quote below,

> We wouldn't travel to the Hutt to buy some meat; there are heaps of cheap stuff local. I just wouldn't go that far out to get prices but you know I would travel round Titahi Bay and Elsdon to look but not that far out. (Samoan male, PacG)

When the facilitator questioned the participants about being willing to travel for bargains and whether petrol is a consideration, the reply was,

> I don't reckon we think about petrol, like when we go to buy (meat), we just think of buying a cheap thing, I think we realise another day and go oh the petrol has gone down. (Samoan male , PacG)

Not all participants in this group were willing or able to shop around in this way however - one Tongan participant from the Pacific group said,

> I mean I save up for doing shopping, for petrol. For me it is better to go straight to the Pak n Save. It doesn't matter for me if bit more expensive veges. (Tongan, male, PacG)

This may indicate that while in some cases access to private transport certainly makes food shopping easier, merely having a car is not always sufficient; it is also necessary to have enough money to run a car.

Availability and quality of neighbourhood food retail environment

Each of focus groups was prompted to comment on the quality of food available in neighbourhood food outlets. Participants across all focus groups described the availability of food outlets in their neighbourhood and the quality of the food sold in these stores as a barrier to accessing healthy food. While all groups discussed aspects of food stores in the neighbourhood, the emphasis was different for each group. Common to all groups was particular dissatisfaction with the quality of fruit and vegetables sold in the neighbourhood and price of basics such as milk and bread (especially compared to the price in supermarkets in the city centre). This is unsurprising considering that the only source of these items in this neighbourhood is convenience stores, which as shown earlier in this chapter, appears to price basic food items higher than supermarkets.

Participants also spoke of the loss of what were perceived to be good quality food outlets in the neighbourhood. While only participants in two of the focus groups – Māori and Pacific – spoke in detail of the loss of certain types of food outlets in their neighbourhood, both of these groups discussed this at length. Participants in both these groups described how there used to be a supermarket in the mall at Waitangirua; this was a Write Price, an everyday low price type supermarket chain, which preceded the Pak n Save chain. Not only did they comment on the historical presence of a supermarket but also the historical quality of other outlets. They spoke of how the greengrocer (Cannons Creek Fruit Shop) in their neighbourhood used to be of better quality along with some of the other stores in the area. Interestingly, the loss of

neighbourhood outlets was described not just as a loss of sources of affordable food but also as loss of community facilities,

> That used to be a really busy mall with people shopping. It was really busy and you could do all your shopping in one area and then they closed it. For some reason it all filled up with rubbish. (Female, PG)

Pākehā and Māori participants both commented on the availability and promotion of junk food and confectionery in convenience stores in the neighbourhoods. One participant in the Māori group observed,

> The thing with the dairies and that is that they put all the chippies and the lollies in the front, so when the kids go in its all there, instead of being spread around the shop, it's all right there in the front. (Female, MāG)

Similarly, a Pākehā focus group participant commented, "I think, like for me at Cannons Creek shops there is a bigger emphasis on cheap stuff, there is a bigger emphasis on junk food, you know supplying that to the kids". (Female, PG).

Not only did participants talk about the proliferation of unhealthy food in the neighbourhood, they also commented on an absence and the poor quality of healthy food stores. Participants in the Pākehā focus group discussed the quality of fish shops in Cannons Creek. One female participant said, "One of the things I think is really great about Cannons Creek is having the fish shop", (Female, PG). Yet this was followed by discussion on aspects of the fish store that discouraged participants from patronising this particular outlet. Several women in the group shared a similar viewpoint, "The fish shop really stinks, you don't go in", (Female, PG) and one also remarked, "I wouldn't go in there", (Female, PG). So while emphasising positive aspects of availability in the

neighbourhood food environment, participants also expressed dissatisfaction with the quality of what is available.

Participants in the Māori focus group also articulated their discontent with the availability of fish in their neighbourhood. It was not clear whether they were not content with the fish store in Cannons Creek but it did not appear they frequented this store. They indicated that there were fish stores available locally (in Porirua Central), but acknowledged having to travel to reach them, "It's a long way to go to fish shops", (Female, MāG).

Lack of a neighbourhood supermarket

Participants across all focus group reported using supermarkets as their main source of food. As there is no supermarket in Eastern Porirua, this required the participants to travel outside their neighbourhood for the majority of their food shopping. Participants acknowledged that while there was no supermarket in their neighbourhood any longer, there was a range of options locally with three supermarkets present close to or located in the city centre. Some also reported using the Moore Wilson's store located in Kenepuru (near the city centre but across the motorway from Eastern Porirua). There seemed to be a consensus among all participants that Pak n Save was the best option for most of their food shopping, based on price and availability of commonly purchased items. Despite this, "shopping around" between the three main supermarkets in the city centre appeared to be common practise for most participants in all groups. The relatively low cost of food in supermarkets compared to conveniences stores in their neighbourhood seemed to be the biggest motivator for this behaviour. Price was also the most commonly cited motivator for using one supermarket over another for each group. Convenience and layout were also mentioned as reasons for choosing one particular supermarket over another by participants in the Pākehā group. A Samoan focus group participant reported, "I shop at all three supermarkets in Porirua; Pak n Save,

Countdown and New World, because I always hunt for bargains and food that are on special", (Female, SG).

Although supermarkets are commonly reported to be the cheapest source of healthy food, they are also filled with aisles of unhealthy options too. For this reason relying on supermarkets as the main source of food was also explained as a barrier to accessing enough healthy food by some participants. One Pākehā participant explained that it was a risk to go to the supermarket more frequently than once a week, "'Cause when you go once you buy what you need and I buy nice things as well, so when you go three times you do that three times", (Female, PG). Temptation to buy other things on offer at supermarkets was also raised in the Pacific group, "They [Pak n Save] got a lot of variety, things that you shouldn't be looking at but you chuck them in your trolley anyway", (Female, PacG).

Prevalence of fast food outlets in the neighbourhood

In each focus group there was discussion of fast food and fast food outlets. The pervasiveness of fast food both in the neighbourhood and locally was noted by all focus groups but to varying degrees. It was more common in each group for younger participants to initiate discussion on fast food outlets. Participants in the Pākehā and Pacific groups made note of the fact that there are numerous fast food outlets in their neighbourhood. When asked what physical aspects may prevent them from accessing healthy food, one Samoan participant reflected, "…I don't do it very often, and when I buy fast foods, I don't go to a particular one because there are lots of fast foods in Porirua, so I tried different ones" (Female, SG).

However, while participants from all groups acknowledged the prevalence of fast food outlets in their neighbourhood, some had come up with ways of coping with this by trying to improve the quality of the food available. Another Samoan participant

described how she chose one particular outlet as she preferred the type of oil they cook with,

> I think now days you can ask the fast food shop the kind of oil they use for their chips because it helps and I go from there. I do trust them because I always ask them and they show me at the back what oil they use for cooking chips. And as a regular customer they tend to trust you too. (Female, SG)

This suggests that physical availability of outlets has a role in food access but that this can be mediated by health knowledge and skills.

The Pākehā and Māori focus group participants did not discuss the presence of fast food outlets in great depth. They did describe occasionally purchasing these sorts of food. It was not clear whether there was less discussion in these two groups of fast food because they consumed less, because they did not see this as a barrier to accessing healthy food or alternatively were not comfortable talking about their behaviour in relation to fast food. An interesting and revealing comment was made by one of the younger Pākehā focus group participants when she compared the price it would cost to cook a meal with fresh vegetables or to purchase a Chinese stir fry meal with vegetables from a fast food outlet, "Yeah well, not so healthy food is a lot cheaper, now you can buy at Countdown $4 for one cauliflower and you can basically buy a whole meal of that from the fast food", (Female, PG). This suggests that not only is convenience a reason for choosing fast food over home-cooked meals but also price and insufficient income/cash flow issues. It would appear that in this case the participant perceived it was cheaper to get vegetables in fast food food than it is to purchase them fresh.

Participants in the Pacific group discussed the availability and easy access to fast food both in Eastern Porirua and in the city centre. Not only did they describe the path from the bus stop to the supermarket as problematic due to the number of fast food outlets

but members of this focus group also made powerful comments about the prevalence of fast food in Porirua in general. Their comments indicated that the prevalence of fast food affected Pacific participants in both the neighbourhood where they lived and also the places they worked. They described the physical layout of the local fast food outlets in Porirua Central (city centre),

> Like where I work in town, to get to the supermarket you gotta walk past McDonalds, KFC, and um Pizza hut and you will get through there to get to New World. So your like 'oh no stop here because it's closer'. So it doesn't really help if you got fast food stores like two metres away from you. (Samoan male 1, PacG)

> And another McDonalds just down there, on the main street. Then you go to the food court and you have another McDonalds and heaps of other fatty food. I think just the sushi place would be the only healthy place there. And then you go around that side and you got another McDonalds somewhere. (Samoan male 2, PacG)

This participant then went on to comment on the physical availability of fast food in his neighbourhood and also mentioned the co-location of these with dairies,

> Around the streets the whole make up of Porirua its um wherever there is a dairy, a local dairy, there is a fish and chip shop…The whole makeup of Porirua is just full of it! (Samoan male 1, PacG)

> Every corner there is fast food. There is no escaping it! (Samoan male 2, PacG)

They then went further into conveying how they perceived the presence of these outlets may influence food choice and consumption by increasing their 'social' accessibility,

> The thing is because of that make-up it is normalised,
> fast food is normalised into our life and there is no way to break it. (Samoan male 1, PacG)

> Except for moving out, and then even when we do move out, what is the bet that we move into another place that has more fish and chip shops? (Samoan male 2, PacG)

These comments also suggest that these participants are aware they may continue to be exposed to this sort of food environment even if they move away from this neighbourhood. While this discussion presented some interesting observations by residents of Eastern Porirua, it is hard to generalise these comments because this section of the conversation was dominated by two participants who were younger and a different demographic to other participants, however the other participants did not actively disagree with these comments. This implies that there may be value in further research including varying demographic groups.

Sociocultural environment

Elements of the sociocultural environment were important factors in food accessibility for participants in all focus groups. The availability of skills, knowledge and training in food preparation, nutrition and gardening was raised. Participants were very aware of general attitudes and beliefs about food and the way these have changed in recent times, many believed this had an effect on the type of food now eaten by themselves and their families. These beliefs and attitudes were linked to cultural values and obligations, which were identified as barriers for some focus group participants. The majority of participants seemed to feel that fast food had become a very normal part of society and that this was a barrier to healthy food accessibility. The promotion of food was also seen as a sociocultural influence raised by participants in some focus groups and one that could be used to encourage or facilitate healthier eating habits.

Availability of skills, knowledge and training

Lack of availability of nutrition education, food preparation skills and gardening skills and knowledge were presented as a barrier to accessing healthy food across all focus group but most frequently discussed by the Pākehā and Samoan focus group

participants. While this barrier has been included in the sociocultural environment it could also be categorised as a physical barrier in that this particular geographical area lacks these opportunities.

Specifically, participants in the Pākehā focus group talked about home gardening as a source of vegetables or a supplement to those bought at the supermarket. Some participants stated that they had little knowledge of gardening. One Pākehā participant remarked, "Even you know gardening, I would like to do gardening and I know the basic skills of doing it but there is probably lack of knowledge there" (Female, PG). Māori focus group participants also described how they relied on their gardens as a source of food and that they believed there was a lack of this knowledge in younger generations that acted as a barrier to them being able to access enough fresh vegetables.

Participants in the Samoan focus group talked about the importance of health awareness programmes and courses that some of them had attended and how this had affected their food purchasing and consumption. They also expressed a desire to see more of these programmes in their communities and churches. They seemed to view lack of availability of these programmes in their area as a barrier to more people being able to easily identify and consequently access healthy food.

Attitudes and beliefs about food

Attitudes and beliefs about food were discussed as barriers by all focus groups but were expressed differently by participants in each group. All groups described how they believed attitudes towards food production, preparation and purchase have changed over time and that these have become a barrier to accessing healthy food. They discussed how eating out and the use of convenience food (both food eaten at home and out of home) had become far more acceptable and normalised by this generation, which may compromise attitudes towards other foods.

The Māori focus group participants spoke of the difference in their behaviour (as older women) compared to their children and grandchildren. They talked about changing preferences for certain types of food and also the role of women in providing food for the family, which may have made healthy food less accessible, "It's changing all the time; the mums are out working now" (Female, MaG). At times some participants were even critical of choices made by younger generations, one such comment was, "Why would you have a garden when you can go down to McDonalds and buy it? It's the attitude aye, yeah that is their attitude" (Female, MāG).

The Samoan group discussed a generational shift in attitudes towards food in the context of migration. Their attitudes were expressed in contrast to participants in the Māori group, in that they believed it may be easier for younger generations (who were born in New Zealand) to adapt to the food environment here. They also spoke of the change in food gathering and production practices from living in Samoa to living in New Zealand. The traditional Samoan life including food gathering practices are more labour intensive than here in New Zealand, "Our lifestyle in New Zealand is far different from our lifestyle in Samoa. In New Zealand, we do not do any more physical work, we do not walk too far and our diet has changed a lot" (Female, SG). They described trying to continue to eat the same foods and often in the same quantities here in New Zealand as they had in Samoa. Participants did seem to be aware that this contributed to health concerns as there was much less physical activity involved in food preparation here compared to Samoa,

> The food that we used to eat such as taro and pork are our favourites. We come here and realise the healthy and unhealthy food but it is very hard to change the habit of buying taro and pork. These foods tasted delicious. So the sudden change of our attitude towards the kind of food that we used to eat is not going to be easy...I believe the young generation like the New Zealand

> born are those who could easily choose healthy food over taro and pork, because they never experience the usual diet that their parents used to have in Samoa. (Female, SG)

Similar views were expressed by younger Samoan participants in the Pacific focus group who discussed a lack of enthusiasm from his Samoan born parents in trying new foods,

> …So it's like kinda hard, especially in my family, in my house 'cause you've got, my parents. They were born in Samoa so they just used to the way they cook things, the way they eat. If you try introduce something new, they will be like, nah. (Male, PacG)

> ...'Cause change is a form of getting modernised and it is like you being colonised all over again, you know parents; they would rather stick to what they know. (Male, PacG)

The Pākehā focus group also spoke about the loss of skills from generation to generation. They talked about memories of their parents bottling fruit and preparing meals from nothing. One participant summed this up well, "We have lost those skills so much because we live in such an "open the tin, open the packet society" (Female, PG).

Promotion of food

Media, and specifically marketing, were discussed as barriers across all focus groups. It was discussed in terms of the way the media shaped what was viewed or perceived as healthy food and also how this influenced access to healthy food and also how the media could be better used to serve this purpose.

The Pacific group participants brought up the media early on in the discussion as an influence on food choice. One of the first comments that indicated this was when this group was asked "What does the term 'healthy food' mean to you?" one participant

responded, "Healthy food is what is persuaded by the TV…they'll go eat five of this a day and we have to eat that because it is healthy" (Male, PacG).

Participants in this group then went on to discuss the way healthy food is framed by the media. It seemed that they viewed framing of what healthy food is in the media as a barrier to access for Pacific people, particularly children. Specifically they suggested that celebrity role modelling could be used to promote healthier options for children and that healthy food needed to be framed in a more Pacific way, "You have to change it, you have to switch what is healthy food, change it for island food and teach them how to cook their food, show them that is it, changing the whole way it is framed, healthy food isn't greens isn't just greens..." (Male, PacG).

Cultural values/obligations

Food was described by Pacific participants in a far more culturally loaded manner than the Pākehā and Māori groups. Cultural values and obligations were also discussed as a barrier to accessing healthy food most explicitly and at length by the Samoan focus group. This concept also ran through the other focus groups, but to a lesser extent.

Participants in the Samoan focus group spoke about wanting to continue to eat the same food they had eaten in Samoa such as pork, taro and green bananas. They seemed to see their desire to keep eating this food both in their homes and at church and family functions as a barrier to accessing a healthy diet. One participant remarked:

> Yes it is the aspect of our cultural values; I believe that is an environmental factor that influence our food choices. Our people put too much weight on traditional Samoan culture where they spend a good portion of their income. This means the maintenance of our health is insufficient because we cannot afford to buy what we see as healthy food because half of our income has gone to cater for our fa'a-Samoa [Samoan way of living]. So what I think is

> that we have to live according to the contemporary environment that we are now, we need to give preference to our health not our cultural norms. (Female, SG)

So for this group cultural values and obligations impacted on access to healthy food in two separate ways. The desire to continue to eat the same cultural food in the home and often in the same quantity was seen as a barrier. Anther barrier was feeling the need to provide adequate quantities of certain cultural dishes at church functions. The reduced amount of money left to spend on food (resulting from the fa'a Samoa), which in turn likely means cheaper and less healthy food is purchased was seen viewed as an additional barrier. This sense of culture being more important than health was also expressed by one of the older Samoan participants in the Pacific focus group, who said,

> You know when we go to our church and are making food over there, we don't care about healthy food…You are there to feed people and make sure everyone is satisfied. Healthy food is the last thing on their mind. They want to make sure everyone is eating. (Male, PacG)

The Māori group also discussed specific foods as being tied to their culture, "I suppose if you are Māori you eat aye, fish heads things like that...mutton flaps, things we can't really afford, paua" (Female, MaG).

Fast food is a societal norm

Fast food was a topic of discussion in each focus group; however some groups discussed it in much more detail than others. All saw the relative cheapness of fast food as a barrier to accessing healthier food. Younger participants across the groups seemed to talk about fast food in more detail, which has implications for marketing of this type food and prevalence and placement of the outlets that sell it, possibly indicating the success of this industry in targeting certain groups. While many participants talked of eating fast food, it did not seem to be a regular source of food for most participants. Buying fast foods was talked about as a normal response to busy lives, participants

across all groups spoke of heading to the neighbourhood fish and chip shop, local fast foods and other multinational fast food outlets situated locally when they did not have time to cook or were feeling like something easy.

The Pacific group participants had the most to say about their view that fast food is a societal or cultural norm. They identified fish and chip shops and pies as foods that "represented" New Zealand food culture, "…it's our culture now for NZ, we're fish and chips, we're pies and that is the thing, you don't actually know until you actually leave NZ" (Male, PaG). It seemed they also believed that the physical prevalence of outlets selling this food in their neighbourhood was contributing to these attitudes and beliefs.

Some participants in the Pākehā focus group echoed similar views and indicated that they believed restricted income may play a part in normalising food. One participant in this group described how many Porirua families would find it hard to switch to buying healthier food even if they had increased income as they had "acquired a taste" for fast foods and other less healthy options as this is what they had bought for so long due to the lower price. In addition however, another participant in this group also remarked that income was not the only thing that influenced access to food or food choice. She spoke of members of her family that had two incomes yet still chose to eat out rather than preparing potentially healthier options. Her point appeared to be that even people with adequate income may still choose to eat fast food.

The Māori focus group participants also spoke of fast food being a part of normal life for many and seemed to view this as detrimental to accessing healthy food. However, instead of viewing this as a result of a proliferation of fast food and fast food outlets locally or otherwise, they framed it as poor choice by individuals of the younger generations. However, they did acknowledge it was not always choice but that income often acted to restrict food accessibility.

Political environment

While features of the political environment were not raised as barriers to healthy food accessibility as frequently as the other types of environment, comments were scattered through the discussions that related to this environment. Three barriers categorised as 'political' were highlighted by focus group participants. However, these barriers are all closely linked to other environment types. Welfare policy was raised as a barrier, which could also have been placed in the economic environment. Church food policies and a lack of consumer food information were also barriers raised by participants in some focus groups.

Welfare policy

All groups identified income as the most important barrier to being able to access healthy food. Although we did not ask for information on main source of income, it appeared that several of the participants across all of the focus groups relied on a benefit as their main source of income. Welfare policy was spoken about by all groups in terms of identifying being on a benefit as a barrier to being able to afford and therefore access healthy food. The benefit, as a barrier, is also linked to the economic environment section of this thesis but only discussed in detail in this section. When "the benefit" is discussed this refers to a range of government-provided benefits including but possibly not limited, to the unemployment benefit, the domestic purposes benefit and the invalids' benefit.

The Pākehā group talked extensively about the impact that being on a benefit had on what they could afford in terms of food and other household expenses. Some participants felt that a benefit had previously allowed for provision of all household needs but that this was no longer the case. Having to rely on a benefit as income has become a barrier to accessing basic needs, food included. They described the effect of the benefit cuts in the early 1990's and how this had reduced money available for food and other expenses dramatically. Rents for social housing were also discussed by some

participants in this group. Essentially the participants believed that the amount of the benefit was not enough to meet all household bills as well as supply them and their families with enough healthy food. They also expressed doubt that this would improve especially under the current National government, as one woman noted,

> ...and the way inflation keeps going up, the benefit is not keeping up with inflation are they? Your money stays the same and everything else creeps up. National are definitely not helping us. They are gonna get richer and we are gonna get poorer and that is exactly what it is. (Female, PG)

Not only did being on a benefit restrict access to enough healthy food, in terms of affordability. Participants also said that it restricted when they could do their shopping. Some of the Pākehā focus group participants often had to wait for multiple sources of income to accumulate before they could do a food shop. Participants in the Samoan and Pacific groups also made similar comments and had experienced the same restrictions.

Participants in the Māori focus group also identified relying on a benefit to be a barrier to being able to access enough healthy food, but there was not always agreement on this topic. One participant in this group described often buying food for her daughter that she could not afford as she "struggles" on a benefit. There were some conflicting views in the discussion of benefits. Other participants in this group had the view that if people could afford to buy "flash cars" then they should be able to afford enough healthy food.

Lack of consumer information

Participants in all focus groups seemed to view a lack of consumer information (from the commercial food system or as regulated by governments) as a barrier to accessing healthy food. Discussion around this was focused on food signposting and food labelling.

Food system transparency and lack of consumer control over this was raised as a barrier to having full knowledge of and access to healthy food. Participants in the Māori, Samoan and Pākehā focus groups talked about how they felt the food system determined what they ate and their access to food in terms of affordability and availability. In the Pākehā focus group, one participant explained that if prices of certain foods were to be reduced for them as consumers that the shop owners would need to also have their prices reduced by suppliers. The participants in the Pākehā focus group also talked about how one of the Four Square stores in Cannons Creek was known to raise the price of bread in the evening to take advantage of the fact they were the only neighbourhood store open at that time.

The Samoan group participants spoke of not really knowing how healthy the food they bought in shops is. Their comments seemed to indicate that they felt they did not have sufficient information at both point of purchase (in stores and food outlets) and available in the community to make healthy food choices. This was summed up by one participant who said, "...what we buy from the shop is the end product but the production and what's in it is beyond anyone's knowledge. So to me I am not sure whether what I bought are the best foods for my health" (Female, SG).

Food signposting was also commonly discussed in most of the focus group discussions. The Pākehā and Samoan groups reported using the Heart Tick to choose healthy food for purchasing. The Heart Foundation 'Pick the Tick' programme is a food signposting system that assigns a Tick to foods that meet certain criteria for saturated fat, salt and sugar (National Heart Foundation, 2009). Some Pākehā participants described how they were unsure whether foods were awarded the tick and so were careful about how they used it and only used it for some foods. They were unsure if it was based on only fat and salt or whether sugar was also taken into account. A number of participants in the group agreed on this and so it seemed there was not full confidence in the Tick, which

may act as a barrier to being able to make fully informed food choices. A Samoan focus group participant remarked that she started using the Heart Tick after learning about this at a health seminar. This suggests that there may be a lack of knowledge among some people on how to use the Tick in order to access healthy food. None of the participants across any of the four focus groups mentioned using the nutrition information panel (NIP), although this was not specifically asked about by the facilitators.

Participants in the Māori focus group discussed how the quality of cheaper alternatives such as home brand ranges, that they often needed to buy, was very poor. They described not knowing what was in these products. Some participants also spoke of how they were unsure of how healthy 'lite' products were and also mentioned that so often they were more expensive that they could not afford them anyway, "Things like, you buy something that has low fat or low salt, and its all dearer, you think it would be cheaper", (Female, MāG). This may indicate that health claims on food products can confuse consumers and act as a barrier to accessing healthy food. Lack of regulation of health claims and also lack of useful signposting seemed to be a barrier to accessing healthy food for members of some groups.

Church food policies

Church food policies were identified as a barrier by the Samoan and Pacific focus group participants, as these groups were particularly aligned with churches. In contrast, the church as a facilitator of access to healthy food rather than a barrier was raised in the Pākehā focus group.

Even though food at church functions did come up as a barrier in terms of what is available there, it did not seem as though all participants believed this should change. As discussed earlier, participants in the Pacific focus group did not feel the church was the place for healthy food promotion. Other participants in this group also described

previous attempts to promote healthy food in the church context. They did not seem to think this had worked as summed up in this quote,

> Facilitator: Why does it not work?
> Participant: 'Cause people are not there for that, they are there for church, not there to be educated. You have to find an institution in which people are solely there to learn how to eat. (Male, PacG)

This seemed to echo the view of other participants in this group who did not think that the church was the vehicle for health information. This conflicted with the views of participants from the Samoan focus group who advocated for more work to be done to raise awareness of health, particularly food and nutrition related issues in churches. So while food policies or traditions may be a barrier to accessing healthy food, not all are supportive of the church as a setting for health promotion.

Economic environment

While there were only two main barriers identified as elements of the economic environment, they were the two spoken about with the most intensity and most frequently across all focus groups. The cost of food and the recent increases in the cost of particular foods, including those deemed healthy by participants, was raised as a significant barrier to being able to access enough healthy food. Closely related to the cost of food was not having enough income available to purchase healthy food. This barrier was identified as the most important barrier to healthy food accessibility and likely has an influence on the effect the cost of food has on participants.

Cost of food

Across all focus groups and most participants it came through strongly that many participants believed the price of food inhibited having access to enough healthy food. Cost of food affected access in many ways but particularly with respect to the perceived expense of fresh fruit and vegetables and the cost of lean meat. Less healthy options were also perceived to be cheaper than their healthier counterparts (milk and bread as an example). In general, participants felt that because the price of food in general has risen disproportionately to their income, this restricted what they were able to buy meaning that less healthy options were often purchased. The cost of food seemed to influence all aspects of shopping behaviour including where participants shop, how often they shop, what they buy, how much they buy and whether or not they shop around for specials and bargains.

Participants in all groups described going to considerable effort to obtain affordable meat for their family/whānau. The price of meat can be considered a barrier to accessing healthy food in various ways. Cheap meat is often fattier and less healthy than leaner cuts of meat. Some people were aware of this, "Like the

cheap meats, have got all the fat. So you're buying rubbish actually" (Female, PG). The desire/need to buy meat means there is less money for other food. Samoan participants emphasised the importance of eating pork and taro and seemed to be aware of the impact this had on their pocket and also their health. Participants in the Pacific group also identified meat as a priority purchase.

'Shopping around' for meat increases transport costs. It became evident throughout all focus groups that participants were willing to shop around for specials and bargains, often driving and rarely gave thought to money they may be spending on petrol. This was particularly salient for meat.

The price of fruit and vegetables seemed to be a big influence on how much of these foods were purchased and consumed and therefore a barrier to access. Participants seemed to feel that it was a risk purchasing a lot of fruit and vegetables in case they went off. It was seen as 'safer' (less risky in economic terms) to try and buy frozen vegetables. They were also concerned that the nutritional quality of frozen vegetables was not the same as fresh even though this is not true,

> I mean before I used to buy heaps of broccoli and now it's, I think, $1.92 at Pak n Save, and that is one I get, I mean that doesn't go very far with six [people]. So I think your cheapest thing is to buy your frozen ones. And they last longer as well. (Female, PG)

Some participants were also aware that even when they could afford to buy vegetables, they still may not be able to afford the choices they believed would be best for their health. Participants in the Māori and Samoan groups discussed how organic options were almost always more expensive but they saw these as being

better for their health. So again, the price of these fruit and vegetables restricted participants' access to them.

Participants also felt that there had been a shift towards promoting "healthy" food in supermarkets, which meant these products could be marketed as "healthy" and then sold at an increased price. Participants in all groups made remarks such "Healthy food is just too expensive" (Male, SG). Most participants seemed to concur with this but each group identified different foods they felt were healthy but too expensive. For Māori this was fish and paua and bread, for Pākehā it was grainy bread, vegetables and meat, for Pacific it was fruit, and for Samoan, it was organic fruit and vegetables.

The Pacific group also raised price as a major barrier to accessing healthy food. Most participants in this group reported being sensitive to pricing of food, especially those that did the food shopping for their household. This meant their diet varied depending on what they could afford each time they shopped.

The Māori focus group also identified foods such as fish and paua being expensive along with being physically hard to access. They described how they used to be able to access these for little or no cost by going out and fishing or gathering them.

The Pākehā focus group spoke extensively about the difference in price of varieties of bread. They reported wanting to buy brands such as Freya's "because they are good for our health", but being very aware that these were more expensive than cheaper less healthy options such as white and budget brands. One participant spoke of how the children she had living with her now ate mainly white bread as that is all they could now afford and she was aware of the health effects this was

having on them, "I mean everyone has put on weight since we not buying that, it's the white bread 'cause they eat twice as much of it" (Female, PG).

Summary of perceived barriers

A variety of barriers to being able to access healthy food were raised by focus group participants. These included physical barriers that were specific to living in Eastern Porirua but also political, sociocultural and economic barriers that were important influences for the focus group participants. Political barriers were not as salient for focus group participants as other types of barriers, perhaps because they do not perceive to have much control over these. However, many of the other barriers seem to be related to policies of various types. Economic barriers appeared to have the most significant influence on participants in all groups and this is reflected in the following section, which outlines the solutions to improving access that were suggested by focus group participants.

Suggested solutions

At the end of each focus group participants were asked "Is there anything you think would make it easier for people living in your area to get healthy food or food for a healthy diet?" The groups also made suggestions for improving the local food environment throughout the rest of the discussions. All four focus groups suggested a range of solutions that are presented in Table 8 below. These are again separated into the four environment types.

Table 8: Suggestions for improving accessibility of healthy food in Eastern Porirua

Physical	Socio-cultural	Political	Economic
Market in Eastern Porirua	Better promotion of healthy food for children	Improved food labelling	Lower price of basic foods
Neighbourhood supermarket	Community/church health promotion programmes		More income
Help with home gardening	Free healthy food in churches		Vouchers for healthy food
Healthier fast food options			
Community gardens			

Physical environment solutions

Four main interventions were categorised as physical environment solutions. These involved community and home gardening and improving the quality and 'healthiness' of fast food available within outlets. Participants also wanted a supermarket and a weekend produce market available closer to their homes.

Market in Eastern Porirua

There were some participants in all focus groups who reported using a nearby Saturday market located in Porirua Central (city centre). A market in Eastern

Porirua was suggested by Māori focus group participants as a way of improving access to healthy food in this area. Participants in this focus group discussed how they found the Saturday morning market in Porirua Central a good source of food however some found it difficult getting there. As participants stated, "They could have a market up here, instead of always having it in the centre all the time", (Female, MaG) and "That's what I was saying, they should have markets here on the weekend. It would be cheaper, instead of travelling down there" (Female, MaG). The market is relatively early, starting around 4am and finishing at 10am, which can hinder some families who are tied up with sport. Being able to transport the whole family there was also raised as a barrier, with some women in this group saying some children were left at home so their parents could get to the market, which creates safety issues. Participants in the Pākehā group also made comments about the market. They identified it as being useful in making their overall shop cheaper. As one woman said, "I go spasmodically. I always am thankful when I do go as it does make a huge difference". (Female, PG)

Neighbourhood supermarket

Although participants did not always explicitly list transport as a major barrier to accessing healthy food, when asked to suggest possible solutions to food accessibility issues, many proposed bringing what they saw as good sources of healthy food (supermarkets, fresh produce markets) closer to their homes. Nearly all participants in the Pākehā and Māori focus group participants expressed the desire for a supermarket closer to their homes. All participants used the supermarkets in Porirua Central as their main source of food. While participants were not optimistic about Eastern Porirua being able to attract a supermarket. As one women explained, "You won't get a supermarket but you might be able to get a market up here" (Female, MaG) they still identified it as a possible way of improving access to healthy food.

Help with home gardening

Help with home gardening was raised by Pākehā focus group participants as a potential solution to improving access to more fruit and vegetables. While some participants in this group were keen gardeners and valued their home gardens as an affordable source of healthy food, others felt they did not have the skills or knowledge to benefit in the same way. Some participants in the Māori focus group also placed a high value on their home gardens as a source of food and felt that more people should have them. Samoan and other Pacific focus group participants did not discuss home gardening as a way of improving access to healthy food in their area.

Healthier fast food options

Introducing fast food options that are healthier was identified by young Pacific focus group participants. They said that for them to still want to buy healthy fast food options they would need to be fast and hot as these were the things they enjoyed about the current fast food options. One participant in the Samoan focus group also spoke of making her fast food choice by the type of oil she knew that particular outlet used. This indicates that there may be a market for either healthier fast food outlets or a variety of healthier options within the existing outlets.

Community gardens at Waitangirua

Developing a community garden was a solution discussed by the Māori focus group participants. This was not surprising as gardening was a strong theme throughout this discussion. As discussed above, many of these participants saw their gardens as a source of healthy food and saw the empty space in Waitangirua as a good site for a community garden. Some participants in this group even mentioned that they would share their gardening skills, "…if they don't know how to make a garden, I go help them". (Female, MaG)

Sociocultural environment

Solutions included in the sociocultural environment section are closely linked to the barriers raised in this environment. Participants in some groups suggested better and more culturally specific promotion of healthy food would be appropriate for children. Other suggestions were focussed around the church and included more church based health promotion and also use of the church as a site for introducing different, new healthy food items free or at a low cost.

Better promotion of healthy food for children

Better promotion of healthy food for children was identified by the Pacific focus group participants. They believed, especially for children, that healthy food was not marketed in an attractive way. One participant suggested the use of role models, "I think it is the framing of its [healthy food] aye. You have to frame healthy food as cool, but it's hard. You need somebody like Sonny Bill, somebody up there to say, man, this is all I eat; look at me, bang there is 8 abs. You know. That's what you need. To frame healthy food as cool."

Ongoing community/church health promotion programmes

Participants in the Samoan focus group expressed strong feelings about the need for more programmes promoting the benefits of healthy eating within church and community settings. When asked by the facilitator about what would make it easier to get healthy food in their area, the response was summarised by one participant when he said,

> Ongoing health related programmes to be held at the communities, we believe there is lack of health initiatives and programmes to raise awareness amongst the Pacific community. Spread the word because the more you talk about it people would understand it further. So by exposing it through health programmes and research, we believe that is how we educate the community. (Male, SG)

Free healthy food in churches

Another suggestion to improve access to healthy food in a church setting was to provide free healthy food in churches. Arguably this solution could also be categorised as part of the economic environment. Free healthy food was seen as a way of introducing people to different foods they may not have tried without having to buy it. One Pacific participant thought that this should be something done in addition to just promoting healthy food in churches,

> I think if the church has healthy food to give out, because when they were promoting healthy food it was the Minister they were using. But I think if they start giving out free healthy food that is the only way Islanders will listen. It has to be for free. (Samoan male, PaG)

Political environment

Again, few suggestions of a political nature were raised by focus group participants. Easier to use food labelling and more information about the production and origin of foods were identified by some participants as a way of improving access to healthy food.

Improved food labelling

Improved food labelling was raised as a solution by participants in the Samoan focus group but food labelling was also discussed in the Pākehā focus group interview. Samoan focus group participants felt that they did not know if the food in stores was healthy or not as they had no indication of how healthy these foods are. When the facilitator asked if they thought their local shops were a good source of healthy food, one participant replied,

> Well I think that's a secret that no one knows, because what we buy from the shop is the end product, but the production

> and what's in it is beyond anyone's knowledge. So to me I am not sure whether what I bought are the best food for my health. (Samoan female, SG)

It seemed that these participants felt that provision of better information in the form of signposting or labelling would aid in making healthy choice. As one women said, "I think if they labels every single item in the shop including fruits and vegetables that might help. I mean the bottom line is your choice", (Samoan female, SG). As described earlier in this chapter, participants in the Pākehā group also felt that current forms of food labelling were not always sufficient suggesting they would also benefit from an easier to read and interpret system and enable better access to healthy foods. This was also briefly spoken about in the Māori focus group.

Economic environment

Economic solutions appeared to be the most popular among participants in all focus groups. The most resounding message, in terms of both barriers and solutions, was that the participants believed if they had more money available for food, healthy food would be much more accessible to them and their families/whānau. Lowering the price of basic foods and some form of voucher system for food, while variations on the same idea, were both raised as interventions to improve the economic accessibility of healthy food.

Lower the price of basic foods

Participants in all focus groups identified price as a barrier and consequently mentioned that lower prices of certain items such as bread, milk and vegetables would improve access to healthy foods. Participants in the Pākehā focus group were particularly concerned about the price difference between white bread and grainy bread. Participants knew that grainy bread were better for them. Taking GST off foods was mentioned briefly by participants in the Māori focus group as a

way of lowering the price of food. There were no prompts about the removal of GST on foods.

More income

As already described in this chapter not having enough income was raised as a barrier to being able to access healthy food by nearly all participants in all focus groups. This was the most important and most frequently discussed barrier. One women in the Pākehā group summed this up with, "That is the main thing, if we had more money, we would be fine", (Female, PG). This also extended beyond being able to access enough food, to issues such as rent and electricity.

Vouchers for healthy food

Giving out vouchers for healthy food was a suggestion made by participants in the Pacific focus group when discussing what sort of healthy food promotion would work in a church setting. This potential solution is linked to giving out free food in churches, with the aim of getting people to try new, healthier foods without the risk of spending money on something they are not sure of. Although no other focus groups discussed this option they all mentioned expense of foods such as bread, milk, vegetables and meat and so would potentially benefit from some sort of voucher or subsidy system.

Summary of solutions

It is clear from the research results of all methods that no one solution or intervention will ensure access to healthy food for residents of Eastern Porirua. However, suggestions have been made that recommend modification of features of all four environment types. Some solutions would seem to benefit all groups, such as access to more income and lower food prices. Other solutions may be more ethnic-specific such as church based health promotion programmes for Samoan communities and gardening interventions for Māori and Pākehā.

Chapter Five: Discussion

This chapter discusses the findings of the research. The key findings are summarised and then examined in relation to the literature on food environments, environmental barriers to accessing healthy food and potential solutions/interventions to improve access to healthy food. This chapter discusses the strengths and restrictions of application of the ANGELO framework that has been used to divide barriers by type of environment. Key strengths and limitations of the study are then identified. The implications for policy and research are explored and recommendations made before the thesis is concluded.

Overview of research findings

Although there are a wide variety of food options available in terms of convenience stores, fast food outlets and a greengrocer in Eastern Porirua, this has not guaranteed healthy food accessibility. The results also show that there are noticeable and considerable differences in the number and patterning of food outlets between the neighbouring suburbs of Eastern Porirua (high deprivation) and Whitby (low deprivation). Residents of Eastern Porirua have no choice but to venture outside of their neighbourhood to access a supermarket. Residents of both areas have to cross a motorway to reach large supermarkets, however residents of Whitby do have a New World supermarket located at their local shopping centre. Maps 2 and 3 (Figures 3 and 4) in Chapter Four display the proliferation of convenience stores and fast food outlets across Eastern Porirua, suggesting a concentration of potentially less healthy foods in this area of high deprivation.

In order to assess economic differences in the food environments across Eastern Porirua and Whitby, price and availability data for milk and bread were collected from convenience stores and supermarkets across both regions. Data were also

collected from the supermarkets located in Porirua Central. Results were similar for bread and milk price and availability where less healthy options are often more affordable than healthy ones. Across all areas, milk and bread were more expensive in the convenience stores than supermarkets.

The most important perceived barriers to being able to access healthy food across all focus groups were elements of the economic environment – price and income. Most participants expressed a desire to purchase more healthy food than they currently do, however they cited the cost of healthier options and their income as the most significant barriers to access. Economic barriers were most salient for all groups, regardless of ethnicity. Other important environmental barriers were the lack of a neighbourhood supermarket, societal norms, and a lack of useful consumer information. Various solutions were suggested to improve healthy food accessibility including a neighbourhood supermarket and produce market, lower prices of food and increased income. However, findings of this research highlight that there is more to healthy food accessibility than availability of food outlets.

Barriers to healthy food accessibility for residents of Eastern Porirua

The descriptive and quantitative data provided by the food outlet data collection and food availability and price survey aimed to give context to the qualitative focus group discussions. This section combines the quantitative and qualitative results discussing the main environmental barriers to accessing healthy food. It also compares these results to the literature on physical, sociocultural, economic and political environmental influences on access to healthy food.

Prevalence of unhealthy options compared to healthy options

Parts of Eastern Porirua have been described by some as a 'food desert'; an area where healthy food is physically impossible or very difficult to access (Cummins and Macintyre 2002). However, as results of the food outlet data collection and

mapping show, based on provision of outlets, healthy food is available in parts of Eastern Porirua. Despite the absence of a supermarket, there is a fruit and vegetable shop, and fruit and vegetables and other basics such as bread and milk are sold in dairies and other convenience type stores across the area.

It could be argued that rather than being a 'food desert', Eastern Porirua could be better described as a 'food swamp'. The term 'food swamp' was recently introduced by Rose et al (2009) to describe areas with an abundance of unhealthy food options: where these options outweigh the opportunities to buy healthy foods. This term seems to better describe Eastern Porirua with its disproportionate number of opportunities to access unhealthy food in the form of fast food outlets (9) and also fast food in convenience stores (19) and bakeries (3).

Better physical access is the commonly proposed direct mechanism by which closer proximity to food outlets may affect food choice (Brug, Kremers et al. 2008). It is common for research on influences on diet choice and barriers to healthy eating to be based on the assumptions that people act in 'direct' response to environmental cues (Kremers, De Bruijn et al. 2006). For example, research on built environment features and their association with food-related behaviour assumes that people use certain outlets or sources of food because they are the easiest to get to; the most geographically accessible. Kremers et al. (2006) suggest that this is not the only way the built or physical environment may influence energy-related behaviour, that there are indirect and direct influences on energy related behaviour (food choice). Environmental features may also have an influence by contributing to the systematic building up of beliefs and decisions. Certainly some of the focus group results indicated this could be one mechanism by which people in deprived areas tend to have less healthy diets (Ministry of Health 2008). For example, the prevalence of outlets makes them not only more physically accessible but also

more socially acceptable and accessible. Areas where there is a higher density of outlets selling less healthy food, such as fast food and convenience stores, may promote or normalise these types of food. Food advertising, in the form of physical signage around the neighbourhood, may also play a role in this. Although, no data was collected on this, it would be valuable to investigate whether there were any significant differences in the type and amount of food advertising between the two areas.

Previous studies have not explored the absence of certain types of outlets as an influence on the social food environment in addition to the physical food environment. This may have particular impacts for children. For example, if a child grows up in a neighbourhood where most outlets are convenience stores that stock junk food (confectionery, pies, soft drink) and fast food outlets and there is a lack of healthy food options then this may be what they come to think of as normal. This may again influence the social accessibility of food – knowledge of and motivation to try healthy foods may be compromised. A key strength of the current research is that the qualitative component enabled this possible mechanism to be uncovered, something that would not be possible in a study that solely uses quantitative mapping and distance data.

Other sources of 'unhealthy food', such as convenience stores, may compromise healthy food accessibility. In New Zealand it has been that people living in areas with close physical proximity to convenience stores are less likely to meet the national guidelines for vegetable consumption (Pearce, Hiscock et al. 2008). A study of four census tracts in New Orleans found a positive association with vegetable availability in stores within 100m and reported vegetable intake (Bodor, Rose, Farley, Swalm and Scott, 2007). Eastern Porirua (19) has a high density of convenience stores compared to Whitby (3) and likely to a number of other areas. It

is possible that increased physical access to convenience stores for residents of Eastern Porirua also affects their vegetable consumption although the mechanism by which this acts is still yet to be uncovered. The influence that this concentration of convenience stores may have on food choice and purchasing needs to be explored further.

The density of local fast food outlets in neighbourhoods across Eastern Porirua is higher than that of more affluent neighbourhoods of Whitby and this prevalence may contribute to the normalisation of fast food and in turn influence consumption. High density tends to mean there are also a wider range of options implying that these residents are also exposed to a greater variety of 'unhealthy' options. There was a greater density of fast food outlets in the more deprived neighbourhoods that were investigated in this study, in line with previous New Zealand research that measured density of outlets per 10,000 people (Pearce, Day et al. 2008). Internationally, access to food outlets in deprived areas varies somewhat between and within countries, however a number of studies have observed that there are more fast food outlets in deprived neighbourhoods compared to more affluent areas (Seliske, Pickett et al. 2009). In the U.K., Cummins et al., (2005) observed a significant association between density of multinational food outlets and neighbourhood deprivation. The relationship was 'broadly linear' with the density of outlets increasing as neighbourhood deprivation decreased. Similar patterns have been observed in the U.S. (Block, Scribner et al. 2004) and Australia (Reidpath, Burns et al. 2002). Because countries differ in whether they look at the distribution of multinational, local fast food or both, it is difficult to generalise or compare the results of the current study.

It may not only be the density of outlets that is an important feature of the neighbourhood food environment but also the combination or ratio of 'unhealthy'

outlets compared to 'healthy' outlets. A Retail Food Environment Index (RFEI) was calculated for each neighbourhood (CAU) in Eastern Porirua and Whitby. Neighbourhoods in Eastern Porirua generally had higher RFEIs (with an average of 4), than neighbourhoods in Whitby (with an average of 1). One Eastern Porirua neighbourhood has seven times as many 'unhealthy' outlets as 'healthy' outlets. These results are similar to those of a recent Canadian study that calculated RFEI in 800m and 1600m buffers around residents' homes. They observed an association between rates of obesity and RFEI with higher RFEI linked to higher rates of obesity (Spence, Cutumisu et al. 2009). Although this study calculated RFEI around a person's home, if obesity rates were compared for the neighbourhoods of Eastern Porirua and Whitby it would be interesting to see if the same patterns were observed.

It would be useful to use the data collected as part of the Community Access Resource Index New Zealand (CRAINZ) study to calculate RFEI (Pearce, Witten et al. 2007). It could then be determined whether RFEI is associated with diet (fruit and vegetable consumption) and BMI (overweight and obesity) at a national level in New Zealand. If RFEI was shown to be associated with rates of obesity, overweight and or BMI then it could be determined that density or the ratio of outlets rather than proximity of outlets is the key environmental feature. This would provide very useful data for advocating for local or even central government policy on the type of food available and accessible in communities.

Price and availability of healthy varieties of basic food items

The results of the price and availability survey indicated that, except in supermarkets, reduced fat milk and grainy bread were more expensive than their healthier counterparts. Grainy bread was also less available across Eastern Porirua than white bread. These results are similar to those of research conducted in New

York of the availability of food in bodegas (convenience stores), which found healthier options for bread and milk to be less available and more expensive in lower income areas than high income areas (Horowitz, Colson et al. 2004). However, the present study did not find bread or milk to be more expensive in Eastern Porirua than Whitby. Previous research in New Zealand has indicated that the price of some products may be higher in more deprived compared to less deprived areas however this was a relatively small study which only examined the price of foods in supermarkets between two areas (Ling 2005). The results of the present study found that price did not differ by area level deprivation, with the average price of milk and bread in convenience stores being similar for Whitby and Eastern Porirua. This suggests that it may be store type that is important for determining the price of basic items such as bread and milk rather than area. The availability of a food store is not sufficient to ensure that these food items are economically accessible.

However, price did differ between store type with convenience stores being more expensive, for milk and bread, than supermarkets in each area. Price also differed between healthy and less healthy options making less healthy options more attractive. As Eastern Porirua has more convenience stores than Whitby and no supermarket it is easy to see how availability of affordable healthy options becomes a barrier to access. It was important to assess the availability and economic accessibility of milk and bread as these basic food items have been found to be the two most frequently consumed items by Pacific families (Rush, Paterson et al. 2008). Pacific people make up the majority of the population in Eastern Porirua, with 56.1% being of Pacific origin (Porirua City Council 2008). According to Rush, Paterson et al. (2008) standard (blue) milk (77%) and white bread (85%) were the most common choices for families compared to reduced fat milk and grainy breads. The Ministry of Health, Food and Nutrition guidelines recommend

that people eat plenty of breads and cereals, preferably wholegrain, and also, have milk and milk products in your diet, preferably reduced or low-fat options (Ministry of Health 2003). This indicates an important opportunity to make it more achievable for low-income families to make healthier choices when it comes to milk and bread, which are evidently a major source of dietary energy. The results of this small observational study make it clear that when income and cost of food are important barriers to access, recommended varieties of milk and bread may be out of reach for many people.

The perceived affordability of certain foods was a barrier to accessing healthy food for participants across all focus groups. There was consensus among participants in most groups that healthy food items were too expensive. Items such as grain and wheat breads were perceived as too expensive to buy on a regular basis. They did however acknowledge that many people did seem to be able to afford these foods where they could not. The issue then is not only that some foods are relatively more expensive than others, but that low-incomes, average wages and welfare payments appear to not always be sufficient to ensure the affordability of a healthy diet.

While numerous international studies examine the cost of specific foods in the form of 'healthy food basket' studies, where a list of recommended foods are priced in different types of stores and across different areas, the affordability of these baskets are not often compared to actual income. There has been no comprehensive national study that looks at the cost of a healthy food basket in New Zealand across different types of stores and different areas (and levels of area deprivation).

As price has been identified as one of the most important perceived barriers to accessing healthy food ensuring at least equal availability of whole grain breads and also making sure these varieties are the same prices if not less than white bread would seem to improve accessibility of healthier bread options. In New York, price-gouging laws prevent stores from selling milk at disproportionately high prices by setting a state threshold (Department of Agriculture and Markets 2009). In New Zealand, the price of milk as sold to consumers used to be fixed and subsidised by the government to ensure milk was available to the population at a reasonable price. However, price fixing was discontinued in 1976 and subsidies in 1985 (Smith and Signal 2009). Recent New Zealand research has been conducted that investigated a number of options for improving food security (including healthy food access). A number of economic instruments were presented. These included reducing the price of food items by removal of GST, regulation of prices, and some form of financial nutritional assistance such as a smart card (Bowers, Carter et al. 2009). The findings of the present research support the need to investigate all these options in more detail.

Absence of a neighbourhood supermarket

There is no supermarket in Eastern Porirua. The maps in Chapter Four (Figure 2 and 5) show the divide of the motorway between the closest supermarkets (those in Porirua Central) and participants' homes in Eastern Porirua. Despite this lack of physical access, all participants reported travelling to one or a combination of these food stores to do their main food shopping on a regular basis.

The relationship between food choice and purchasing behaviour and access to supermarkets is complex. This research and counterintuitive findings from other national and international research suggest the link between access to healthy foods and supermarkets is not as clear as it may initially seem. Supermarkets have

been described as 'gatekeepers' of the food supply (Hawkes 2008). This implies they have a certain level of control over the food choices of consumers. The focus group participants identified supermarkets as a source of healthy food but acknowledged that they also saw supermarkets as places to access less healthy food too such as biscuits, sweets and other 'treat' food. Some participants said that the more often they visited the supermarket the more often they were tempted to buy 'treat' foods in addition to the groceries they had made the trip for. This is an interesting point and may provide an insight into how supermarkets not only seem to provide physical and economic access to a range of healthy food, they also provide the same physical access and sometimes better economic access to less healthy foods. In an intervention study in the U.K., where a supermarket was constructed in a low-income area not previously serviced by one, some low-income consumers reported not switching to shop there, even though it was closer, for fear of being tempted by things they could not afford (Wrigley, Warm et al. 2004). This indicates that outlets where consumers have more control over or input into what is stocked, such as a food co-operative, may be an option that would increase the availability of healthy food without also introducing another source of junk food into the neighbourhood.

Many focus group participants reported shopping around supermarkets for specials and bargains and often made decisions based on price and advertising of certain products. Supermarkets may exert more influence over food purchasing decisions than many consumers are aware of (through the promotion, layout, stocking and pricing decisions) (Hawkes 2008). The mechanisms by which supermarkets affect access to healthy food should be further considered. Again, easy access to less healthy options may compromise or reduce access to healthy options, especially if less healthy foods are cheaper than healthy foods and just as readily available. Recent New Zealand research on the price of beverages in

Wellington supermarkets suggests that less healthy beverages are discounted more often than healthier beverages (Pollock, Signal et al. 2009).

Although the nutritional benefits of having a neighbourhood supermarket are not conclusive there may be other health benefits to the location of these stores in low-income/deprived neighbourhoods. Apart from physical and economic benefits to having a neighbourhood supermarket, focus group participants seemed to enjoy the prospect of the more social aspects of having a large food store within their shopping centre. Berkman and Kawachi (2000) suggest one of the ways social capital may be related to health at the neighbourhood level is through access to services and amenities, and supermarkets may be included in this. Local supermarkets may enhance social connectivity and social capital, as they are places for meeting, chatting, and may also be local employers. In this way, food stores are more than mere sources of nutrition/food; they are also social resources.

Poor quality of neighbourhood food stores

As can be seen in Figures 2 and 5 (Chapter Four) there are more fresh food stores – meat, fish, fruit and vegetables in Eastern Porirua than in Whitby. However, comments from focus group participants indicate that provision of a certain type of store is necessary but not sufficient to improve access to healthy foods. The 'in-store' environment was also important in determining whether fresh food stores were utilised. The focus group research suggested that the quality of the food, cleanliness, appearance, and smell are also essential to ensuring these stores are visited. A limitation of previous research is that most studies only use quantitative data to describe the food environment, while there is no exploration of whether these stores are used or how residents feel about the quality of the food sold there. If the stores in a neighbourhood do not meet the needs of the residents then they

may be compelled to travel outside the neighbourhood or rely on other sources of food available there.

The view was expressed that having to travel outside the neighbourhood to source fresh, healthy foods was an unavoidable part of daily life due to dissatisfaction with the neighbourhood food outlets. Participants in all of the focus groups made comments that indicated that they would like to be able to source more food locally. An area may seem as though it is a 'food desert' if you can not access foods in the way you have become accustomed to in the past or in previous areas of residence. This is not to say that food is not available but it may be harder to find traditional food or more difficult to access it in culturally accepted or preferred ways. This may mean different things for different groups of people. For Pākehā participants this was being able to walk to a local supermarket, and for Māori participants this was gardening and accessing food from the sea.

The participants regarded having to rely on convenience stores within the neighbourhood as a barrier to healthy food accessibility. Typically, the stores classified as convenience stores in both case study areas did sell bread, milk, some fruit and vegetables and also groceries. However, they also sold ice cream, confectionary, pies, chips, soft drink and many also sold fast food like hot chips. Focus group participants expressed some dissatisfaction with the food sold and the environment in these types of stores suggesting that perception and quality of what is available is also important in determining accessibility. There is some evidence to suggest that 'healthy corner store' and 'healthy bodega' projects, that aim to increase the promotion and availability of healthier foods in small independent grocers and convenience stores, are having some success (Song, Gittelsohn et al. 2009). In these initiatives, corner stores were supported to promote healthy foods were promoted at the point of purchase and owners were given

nutrition education. To date there is no New Zealand example of this type of intervention but it could be useful in an area like Eastern Porirua where there are so many of these stores and a lack of any other option.

Transport

Residents of Eastern Porirua that participated in the focus group discussions did not view their neighbourhood as a good source of healthy food. Poor quality of food resources may mean that transport can also become a barrier to being able to access enough healthy food if stores in the neighbourhood are not sufficient to meet residents' needs. If affordable healthy food was available in local outlets (rather than concentrated in the city centre) then access to private transport and/or suitable public transport may not be necessary. Conversely, if access to transport (including the resources necessary to run a private vehicle at all times) was not an issue then a lack of outlets selling affordable healthy food in the neighbourhood would not be such a barrier to access. Amongst all groups there was a sense of dissatisfaction with local stores but this was combined with an acceptance of these surroundings. This could be interpreted in two ways: that access to transport is truly not a barrier for residents, or that coping mechanisms are so embedded that they are no longer recognised or perceived as barriers. The latter seems to be the case in Eastern Porirua.

Transport may not have been raised as a barrier frequently in the present study as participants already seemed to have in place a set of coping mechanisms for times when a car was not available or accessible. Car ownership statistics do not always tell the whole story. Good access to transport means not only possessing a private vehicle but also having the resources to run the vehicle and being able to have access to this at convenient times to shop. By this definition many participants in the focus groups did not have good access to transport – citing the need to share

cars with other family members and restricting how far they travel for food based on petrol costs. In this way social and economic environment factors appear to influence or interact with elements of the physical environment like transport and food store availability. In other studies of low-income shoppers, transport features as an important barrier to being able to access food (Bostock 2001; Coveney and O'Dwyer 2009). Social support seemed to play a large role in mediating the effects of being unable to access private transport with many participants relying on family members to drive them.

Income

Income was cited as the most important barrier to accessing healthy food for participants across all focus groups, regardless of ethnicity, age or gender. This supports the findings of New Zealand (Lanumata, Heta et al. 2008) and international research (Caraher, Dixon et al. 1998) that examines the barriers to accessing food for those on low-income or those living in deprived areas. Although income is not strictly an environmental feature or barrier, it is influenced heavily by elements of the political and economic environment. Many of the focus group participants reported that living on a single wage, a low-income or some sort of government benefit represented a major barrier in being able to purchase enough healthy food for their whānau. It is often noted that lower socioeconomic groups and those living in deprived areas have poorer quality diet and are more likely to develop nutrition-related disease (Parnell 2002). However, there is not always a direct or complete relationship found between income and poor access to food or food insecurity, suggesting that while income is a major barrier to access, it does not provide the full explanation (Gorton, Maddison et al. 2008). It is important to note that focus group participants were fully aware that income was not the only barrier to accessing healthy food. They also emphasised that even if their income did increase, preference for certain types of food would still be an influence on

choice. However, they did feel that more income would offer them increased freedom of choice and also more room to shift with price rises and income shocks. This highlights the interaction between environmental and individual influences on food choice.

There were various ways in which income was described as impacting on access to healthy food for the focus group participants. Cost of transport, household expenses, low level of government benefits, not receiving full benefit entitlements, childcare costs, and having to live on one income were all raised as reasons that income available for food was reduced. The literature also describes how food is often the most flexible expense as there are no debtors or fixed payment schedules/ bills to comply with as there is with mortgage/rent, electricity and phone (Cheer, Kearns et al. 2002; Lanumata, Heta et al. 2008). This was reflected in the responses of some focus group participants who indicated that the amount available to be spent on food was dependent on what else needed to be paid that week, fortnight or month.

The ability (or lack of ability) to accommodate price shifts and unexpected expenses and shocks as a result of living on a low-income was also discussed. One participant in the Pākehā focus group made particular mention of the effect that the benefit cuts of the 1990's had on her ability to provide for her family. There was also discussion about knowing what you are eligible for and feeling that a benefit advocate was sometimes necessary when applying to ensure that full benefit entitlements were met. This was not a common theme across focus groups in this study but has been raised as a barrier to being able to access income more generally (Signal, Martin et al. 2007).

In terms of addressing this issue with appropriate solutions, New Zealand appears to be lagging internationally. It was evident that most focus group participants believed some form of financial assistance would improve their economic access to healthy food. New Zealand does not have a nutrition assistance programme similar to Healthy Start in the U.K. or supplementary nutrition assistance policy - SNAP (formerly food stamps) - in the U.S. (USDA, 2009). If families or individuals are unable to purchase food for their family then their options are to rely on the voluntary sector by visiting a food bank or apply for government assistance in the form of a Special Needs Grant (Work and Income New Zealand 2009). It has been argued that the long-term existence of these programmes is an indication of systemic failure (Brodie 2007). While providing relief short term, these sources do not address the actual determinants of poor access to food nor do they provide an acceptable way for people to access food.

Lack of easily accessible food labelling information

Nutrition education is often promoted as the primary solution to helping people make healthier food choices (Gregson, Foerster et al. 2001). It was clear that the focus group participants in the present study knew what they were looking for in terms of healthy foods. They had a good understanding of what healthy food is, identifying fruit and vegetables, low fat dairy products and grainy breads specifically. However, they spoke of having difficulty discriminating between options within food stores and outlets and seemed to want assistance with decision-making at the point of purchase. Participants in all groups described how they made use of food signposting like the Heart Foundation 'Tick'. They also expressed reservations about relying on this to classify foods as they were unsure of the criteria used. Specifically whether it was salt, fat, and/or sugar that determined whether or not the food got the 'tick'. Focus group participants pointed out that they have little control over how nutrition information is

presented, what is presented and consequently have less control over the quality of the food they choose based on this information.

The research suggested that the present mandatory requirement for packaged food – the nutrition information panel (NIP) - did not improve access to healthy foods. When asked whether they felt that the stores in their area were a good source of healthy food participants spoke of not being able to tell how healthy this food was. They also described not knowing where produce was from or how it was made. This was particularly important to some participants in both the Samoan and Pākehā groups. Many participants also felt that produce they had grown themselves or which came from a market was better for them. This may have been because they know how fresh it is, where it came from and the production methods used. This research indicated that the participants are looking for more than just nutritional benefit when it comes to food. However, they are not provided with the information to be able to make these decisions confidently. Country of Origin Labelling (CoOL) may be one way of addressing this perceived lack of information. Mandatory country of origin labelling (CoOL) has been introduced in the U.S. and is presently voluntary in New Zealand (New Zealand Food Safety Authority 2008).

Previous research in New Zealand indicates that the NIP does not meet the needs of consumers because it does not provide an easily accessible form of information to enable them to make healthy choices (Signal, Lanumata et al. 2008). A simpler form such as traffic light labelling, as has been implemented in the U.K. (Food Standards Agency 2007), may be a more suitable option along with mandatory CoOL to provide all consumers with sufficient information to enable people to make more informed food choices. Introduction of CoOL may have wider benefits

in that greater demand and purchasing of local produce may lower prices, increase availability and stimulate local economies.

Cultural barriers

Various social and cultural barriers were identified by all focus groups. Some barriers seemed consistent across all ethnic groups while others were specific to certain groups.

The church and the cultural obligations that are often associated with it in relation to food were brought up by both the Pacific and Samoan focus groups. This is again similar to sentiments raised by African American groups in related research (James 2004). Pacific and Samoan participants in the current focus group research remarked that supplying healthy food was not a priority when preparing for feasts and some also thought that church was not the place to be trying to promote healthy eating. However, other participants felt strongly that the church was the right place to be raising awareness of the benefits of healthy foods. This suggests there may not be consensus among Pacific groups as to whether the church should be a site for health promotion or not, in contrast with findings from U.S. research (James 2004). This highlights a contradiction which would need to be thoroughly explored before any church health promotion is considered. New Zealand research also confirms that income disablers such as cultural expenses are a major barrier particularly for Pacific people (Cheer, et al, 2002). Certainly, participants in the Samoan focus group felt that their 'fa'a Samoa' (Samoan way of life) contributed to health outcomes via reduced income to purchase healthy foods.

The influence of the church on access to healthy food is a sociocultural feature as well as a political one. This exemplifies that the interaction between environments cannot be well explained using the ANGELO framework in isolation. Often the

social and cultural practices or traditions of a certain group become so entrenched and linked with an institution (such as the church) that they become micro-political influences. Tavila (2007) discusses the politics of the preparation and selection of food in regards to Pacific churches. Women are the 'key kitchen people' and make choices about the food served, however this is governed by rules and norms which the minister of the church will have the final say on (Tavila 2007). The present research indicates that the church is an influence on access to healthy foods for many Pacific people and so it seems working with those in authority positions within the church (typically ministers and minster's wives) may hold promise in influencing both the social and political environment of the church.

For the Pākehā participants, family seemed to dominate food choices rather than religious or ethnic influences. However, the church was also raised as a facilitator of access to healthy food in one case, where it was mentioned that the church promoted sharing of food and gardening. This implies that the church can be a place where modelling of healthy practices takes place making it a supportive environment for healthy eating.

In regards to the literature on cultural influences on food choice, many of the cultural barriers identified by Māori and Pacific participants echo the responses of African American focus groups that have explored influences on food choice (Airhihenbuwa & Kumanyika, 1996; James, 2004). Comments on the cultural value of certain foods or patterns of eating were made by young Pacific participants about their parents' reluctance to adopt certain healthy foods. This theme bears similarity to research conducted with African American groups in the U.S. who also seemed to view food as a way of preserving cultural identity (Airhihenbuwa and Kumanyika 1996). Foods such a pork and taro for Pacific peoples and fish, puha and mutton birds for Māori seemed to have cultural importance. It may be

that Indigenous and minority ethnic groups such as Māori and Pacific peoples feel that retaining certain foods or food preparation practices is a form of resistance against being absorbed into the dominant western ways of New Zealand Europeans. This view was expressed by some participants in the Pacific focus group who explained that they saw the way their parents tried to retain eating habits of their native Samoa as retention of their culture. As the church has been identified as a significant influence in the lives of Pacific people then role modelling by those in positions of power within the church may have the potential to influence eating practices.

Solutions to improving access to healthy food

The third research question was to identify potential points of intervention to improve access to healthy food in Eastern Porirua. There were a number of options suggested by focus group participants as ways to improve their neighbourhood food environment. These included physical, economic, sociocultural and political solutions which closely reflected the perceived barriers that were identified. The following section discusses suggested solutions with reference to the literature on interventions that aim to improve access to healthy food.

Fresh produce market

Having a market closer to home or within the neighbourhood was a desirable option for many focus group participants. This was identified as a solution to improve access to healthy food as it would make fresh, affordable healthy food more available closer to peoples' homes. This would reduce transport costs and be more convenient to those who do not have time and/or resources to get to the early morning market in Porirua Central.

There is little research on farmers markets or community markets as a source food, and they are rarely included in studies of neighbourhood food environments. This

is presumably because they are harder to collect data on (not likely to be on a commercially sourced list) and cannot be classed as a regular source, as most only operate one day a week. However, one recent Canadian study did observe an increase in the availability of items in a healthy food basket following the introduction of farmers market in a city that did not previously have one (Larsen and Gilliland 2009). The price of these foods may also be lower than that of the convenience stores in Eastern Porirua, which are presently the most accessible sources of fruit and vegetables. This suggests that, even if only held one day every week, a produce market may have the potential to improve access to healthy foods by increasing availability and lowering price. The results of this research suggest that any market that is organised in Eastern Porirua would have the support of the community.

Markets may also have wider impacts than just improving access to healthy food. They can serve as a community social event and may contribute to social cohesiveness. They also have the potential to increase the economic capacity of residents if they are able to participate as stallholders (Cyzman, Wierenga et al. 2009).

Supermarket

Participants also identified a neighbourhood supermarket as a possible way of improving access to healthy food in Eastern Porirua. Intuitively, a supermarket would seem an obvious way of increasing the availability and affordability of healthy food. It would also appear to be a good option for less mobile people – elderly, disabled, and those lacking access to transport. There have been a small number of intervention studies conducted in the U.K., where a supermarket or hypermarket is opened in an area not previously serviced by one (Wrigley, Warm et al. 2003; Cummins, Findlay et al. 2005). Improvements in diet quality as measured by increase in fruit and vegetable consumption have been observed with

the biggest increases for those who switched from shopping in other stores, however these improvements were modest and perhaps lower than expected. The improvements were largest among those with poorest intake of fruit and vegetables prior to introduction of the supermarket, which may suggest it reached those most in need of increased access (Wrigley, Warm et al. 2002). Overall diet quality cannot be solely measured by fruit and vegetable consumption and so it may be that participants improved diet with other foods. So, although the impact of these interventions was relatively small, supermarkets should not be discarded as an option for improving access to healthy foods.

The research presented in this study showed that basic food items like bread and milk were always cheaper in supermarkets than convenience stores so it is feasible to assume that money would be saved on these items alone if residents of Eastern Porirua were able to frequent a neighbourhood supermarket. Again, similar to markets, supermarkets may have non-nutrition related advantages including increased opportunities for employment that could increase household income. However, a supermarket may also reduce revenue of other neighbourhood shops eventually putting them out of business.

Lower food prices

The relative expense of healthy food compared to less healthy foods was consistently raised by the majority of focus group participants as a barrier to access. This compares with the literature that explores healthy eating where the price of items such as fruit and vegetables are frequently raised as barriers (Kamphuis, van Lenthe et al. 2007). New Zealand research also supports these findings. The ENHANCE study, discussed earlier, identified price as a significant factor in determining food security (Lanumata, Heta et al. 2008) Given this, lowering the price of certain food items is a potential solution to increasing the

accessibility of healthy food. Intervention studies that reduce the price of healthy options in settings such as school cafeterias and workplaces have indicated that this does influence food choice, with more healthy options being chosen when the price is discounted (French 2003).

Various mechanisms of lowering the price of food items have been suggested. These include removing GST, targeted food voucher system or 'smart card' (Mhurchu and Ogra 2007; Gorton, Maddison et al. 2008), and subsidies for certain food items or options. Conversely food taxes have also been mooted as a way of making unhealthy options less attractive (Caraher and Cowburn 2005). There is a lack of experimental research on these options in New Zealand. The SHOP (Supermarket Healthy Options) trial is currently examining the influence of price discounts on certain items in supermarkets (Ni Mhurchu, Blakely et al. 2007). Results of this study are presently unknown but should be followed to determine whether price interventions will have a significant impact on food choice.

Voucher/subsidy for healthy foods

This option is related to lowering the price of foods which is described above. Vouchers for healthy foods were raised by focus group participants in the Samoan focus group as a way of increasing accessibility of healthy food. These were also suggested as an incentive to try new, healthier foods they may not have been eaten before. Participants in this group suggested that a reason people may be unwilling to buy some healthy food is that it is a risk to spend what little money there is on something that may end up being wasted because the family does not enjoy the taste.

Food labelling

As raised earlier in this chapter, participants indicated throughout the focus group discussions that better food labelling would enable them to make more informed choices when it came to certain food items increasing their access to healthy foods. Research in New Zealand has indicated that the current labelling system, the nutrition information panel (NIP), is not well understood especially by Māori, Pacific and low-income people (Signal, Lanumata et al. 2008; Gorton, Ni Mhurchu et al. 2009). These studies both explored the ability to determine whether foods were healthy choices or not and found that Multiple Traffic Light (MTL) and Simple Traffic Light (STL) systems were more effective than NIP and the Heart Foundation Tick. The MTL is used in the U.K. as part of a voluntary system and preliminary evaluation indicates that sales of healthier products have increased since it was introduced (Hignett 2008). This indicates that these systems may be successful in improving access to healthy foods for priority populations.

Better promotion of healthy food especially for children

Some Pacific focus group participants identified the cultural appropriateness of healthy food promotion as a barrier to access. From comments made by Samoan participants across both the Samoan and mixed Pacific groups it seems that many people may believe that in order to be healthy they have to switch to a 'western' or 'Pākehā' diet to eat healthy food. Participants were aware of healthy foods as promoted by nutrition guidelines however they seemed to have difficulty in aligning this advice with their traditional diets. This indicates that there is a need to have a more Pacific emphasis on the promotion of healthy food.

Some participants in the Pacific focus groups indicated that they felt Pacific foods were not always promoted. They felt that for children, role modelling was particularly important in increasing access to healthy foods. Some Samoan participants suggested that healthy foods could be promoted by role models such

as sporting stars (League/Rugby/Boxing athlete Sonny Bill Williams was given as an example). This approach has been suggested before in similar New Zealand research. Participants in focus group research examining perceptions of nutrition labels suggested that ethnic specific sports 'stars' were used to symbolise healthy bodies (Signal, Lanumata et al. 2008). Currently fast food chains use sporting stars to promote their products e.g. Sarah Ulmer and Hamish Carter for McDonalds, and it is assumed they would not do this if it was not an effective strategy. The same types of campaigns could be launched for healthy food groups such as such as fruit and vegetables, low fat dairy and grains.

Healthier fast food options

Participants in the Pacific focus group identified the prevalence of fast food outlets in their neighbourhood and locally (Porirua Central) as barriers to accessing healthy food. The quantitative section of this study found that there are on average four times as many unhealthy outlets as healthy outlets in the neighbourhoods (census area units) of Eastern Porirua, based on the RFEI calculations. Some participants in the Samoan focus group said that they based their choice of fast food outlet on how healthy they perceived the food in each outlet to be. Healthier fast food choices were suggested as a way of improving access to healthy food.

One way of addressing this would be to try to balance the number of healthy to unhealthy options across Eastern Porirua by encouraging healthier outlets and restricting the introduction of any more fast food outlets. Use of planning tools such as zoning has been suggested as a way of implementing this (Dinour, Fuentes et al. 2008). A limiting factor of this solution is that to date, there has been a lack of interventions that aim to limit the number of certain types of outlets in a set residential area (with the explicit purpose of reducing obesity). The only known exception is that of South Los Angeles who have placed a moratorium on all new

fast food outlets for two years (Los Angeles City Council 2007). No evaluation on the effect of this has been carried out as yet, but this intervention should be followed to determine whether capping the number of fast food outlets does have an impact on health outcomes.

There is likely to be some opposition to the idea of reducing density of fast food outlets including that this is a 'nanny state' approach. More research may be necessary before this is seen as an appropriate strategy for the Porirua City Council to pursue, although the recent long term council community plan (LTCCP) submission process indicates that community support is building for such options to be explored (Kuresa 2009). Other options include working with local government to introduce incentives for healthier outlets and sources of food (supermarkets, markets, community gardens, fruit and vegetable stores) to open up in neighbourhoods where there is an imbalance of unhealthy to healthy options. Use of the RFEI would be a practical way of identifying areas to implement these strategies.

An additional mechanism to improve the nutritional profile of fast food options in Eastern Porirua (and similar areas) would be to encourage operators to modify the type of food available. Even if the number or density of fast food/fast food outlets is not addressed immediately, the number of healthy options within the outlets can be increased. Price will be an important factor in an intervention of this type, as this research indicates that if less healthy foods remain cheaper than healthier options, purchasing behaviour is unlikely to change. Even if healthier options become more available they must still be more economically accessible and attractive.

Gardens - Community and home garden support

Gardens were frequently discussed by participants in most focus groups as a cheap source of fresh healthy food. People who had gardens expressed the benefits of being able to supplement their shopping with food from their garden and other participants shared the desire to know more about how to garden. Both home and community gardens were raised as solutions to improving access to healthy foods.

There is some international research to support the ability of community gardens to improve the consumption of fruit and vegetables (Alaimo, Packnett et al. 2008). Home gardens have been identified in the literature as a facilitator of access to fruit and vegetables. Other types of health benefits have also been identified including community cohesion and improved mental health (Wakefield, Yeudall et al. 2007). Local authorities and government departments could support home gardening by ensuring soil quality is adequate in new and existing housing developments. Other organisations could increase the availability of knowledge about home gardening and even subsidise tools, seeds and training. While there is no New Zealand evidence to support community gardens as a way of improving access to healthy food, a number of viable gardening sites have been established recently around the country.

Healthy eating programmes in churches

Health eating programmes in churches had support from Pacific participants in the Samoan and mixed Pacific focus groups. Although, as already discussed here, some participants did voice the opinion that they felt this approach had been tried before and was not successful. Church based health promotion may improve access to food by modifying aspects of the sociocultural, physical and political environments within the church. By engaging the minister and others in positions of authority this may influence the political food environment of the church (Tavila 2007) . This may in turn impact on sociocultural factors within the church and the

wider community. Health promotion in a church setting may also increase the physical accessibility of healthy foods by making them more available at functions and feasts.

The idea of health promotion in churches is not new; the Health Promoting Churches programme has been running for the past 10 years in some churches in Auckland and a few in Wellington. Evaluation suggests that these programmes are a success in terms of reduced consumption of fatty foods (Simmons, Fleming et al. 1998). However, results from a later study suggest that improvements in health outcomes are not always uniform across church groups. In the Samoan intervention group weight, waist circumference and exercise improved while no significant change was seen in a Tongan intervention church who received the same programme (Simmons, Voyle et al. 2004). A lack of participation and perceived utility in the Tongan church group was suggested as the most likely reason the results were so different.

As the majority of the population of Eastern Porirua are Pacific - 56.1% (Porirua City Council 2007) - and 90% of Pacific people are affiliated with a church (Cheer, Kearns et al. 2002), this area would be a suitable place to look at running a Health Promoting Church programme focusing on increasing accessibility of healthy food. However, the results from the church intervention imply that measures to maximise participation and ensure that participants perceive the programmes to be useful may be key to success of these types of interventions. Results from the focus groups in the current study suggest that there is support for this from some churches.

As for other cultural groups it may be useful to examine what sorts of settings bear similarity to the church environment. The same sorts of social and political

processes are likely to operate in other groups or settings such as workplaces, schools, and marae.

More income

For participants in all focus groups being able to access more income was the most commonly suggested solution to increasing access to healthy foods. Specifically, relying on a benefit and living on one income were identified as significant barriers to having enough money to purchase sufficient healthy foods for the whole family. As described earlier, income inequalities are often related to diet-related inequalities (Robertson 2001). People on lower incomes are more likely to have poorer diets and suffer from diet-related conditions like obesity, CVD and diabetes (Dowler 2008). Interventions that aim to increase income would then be expected to improve diet quality through the increased ability to purchase more nutritious food. However, increasing access to income assumes that any increase would be directed to the food bill. This may not be an accurate assumption as research indicates that food is often the last thing money is directed towards after more fixed costs like housing and heating, as outlined earlier.

There is a lack of research that examines what happens when those on low-incomes experience an increase in income. One promising study simulated a 25% increase in income available for food with low-income women. They found that the women chose more foods from the 'healthier' category than the 'less healthy' category suggesting that increased income may improve diet quality (Inglis, Ball et al. 2009). In this same study women on a high income were also given 25% less money than they would usually have, these women chose less food in the 'healthier' category than when they shopped with their usual income.

There are a variety of options for interventions to increase income. These include welfare solutions such as: raising basic benefit entitlements, measures to ensure all beneficiaries receive their full benefit entitlements, and increasing Special Needs Grants. Other interventions have been considered such as raising the minimum wage (Bowers, Carter et al. 2009). At present there does not appear to be enough information to recommend this option though (Bowers, Carter et al. 2009). This current research suggests that people are indeed cut off from living a healthier life as a result of income-related poverty and that they are fully aware of this.

Application of the ANGELO framework

This following section discusses the effectiveness in applying the ANGELO framework for identifying and classifying barriers to accessing healthy food. The ANGELO framework was initially designed as a tool for identifying obesogenic factors in the environment. It allows classification of potential factors into four environment types – physical, sociocultural, economic and political (Swinburn, Egger et al. 1999). Obesogenic factors are described as barriers to maintenance of healthy weight while lepotogenic (opposite of obesogenic) elements are enhancers or facilitators for controlling weight. ANGELO has been used in a small number of studies in New Zealand, notably the APPLE study of school environments (Williden, Taylor et al. 2006) and the ENHANCE study which examines food security and physical activity (Bowers, Carter et al. 2009).

In this research it was useful to apply ANGELO in order to categorise barriers and ensure the environment was widely scoped. Application of ANGELO prompted consideration of non-physical barriers to accessibility, which ensured this research moved beyond merely looking at the availability and proximity of food outlets. It also increased awareness of the potential effect that other types of environmental features may have. The use of this framework also enhanced this research by

ensuring it had a sound theoretical base, which is not always the case in studies of food environments. As Swinburn et al., (1999) note, ANGELO appears to be an effective tool for needs assessment and prioritisation of issues.

However, ANGELO was more problematic when it came to the analysis of the results. Application of the ANGELO framework often made it seem forced to separate features discretely into one type of environment. For example, some of the barriers that were classified as elements of the economic environment such as being on a benefit could also be included in the political environment as welfare policy. The ANGELO framework does not propose to explain the mechanisms by which environmental features influence food choice. In order to be able test theories and develop interventions, the pathways or mechanisms by which environmental features influence accessibility, and in turn behaviour, need to be developed. Extension of this model is needed so that interventions can be developed and tested to provide more evidence based solutions to improve healthy eating.

Swinburn and Egger et al. (1999) not only distinguish between types of environment but also environment size. Microenvironmental settings are usually small and geographically distinct. These include neighbourhoods, schools, homes and churches. Microenvironmental sectors consists of transport systems, food production, distribution and marketing systems, the health system and urban development (Swinburn, Egger et al. 1999). I found that most barriers were not strictly macro or micro as the ANGELO framework suggests; rather they seemed to fall somewhere on a continuum between the two. For this reason I did not think it would add anything to the qualitative analysis to separate the barriers into macro and micro and therefore did not in this study.

ANGELO can lead those applying it to assume that all types of environmental features have a discrete and direct influence on behaviour. However, this research suggests this is not the case. For example, I felt that while the political environment was an important influence on other types of environmental features, such as pricing (economic), it does not directly influence behaviour itself, but rather, is mediated by these other environments. For example, political rules, laws, and regulations often influence behaviour mediated by economic (pricing, income) or sociocultural (changing public perception and attitudes) elements.

The ANGELO framework has been valuable in guiding the theoretical approach to this research. It was also useful for identifying barriers and solutions to healthy food accessibility. The effectiveness of its use in this research suggests that it may also be useful to apply in a similar way for other populations comparable to Eastern Porirua. However, there needs to be awareness that this framework is most helpful during needs assessment and more work could be done to further unpack the specific mechanisms by which each environment interacts with each other and how they may influence behaviour.

Research strengths and limitations

There were a number of strengths and limitations to the present research which are discussed below. Many of these limitations were unavoidable given the scope of the present study. Some are also the result of a lack of consensus in the literature on the best way to measure constructs such as 'access' to food, and proxies for healthy and unhealthy food. These weaknesses are discussed below along with the attempts made to mitigate the effect of these and the influence they may have on interpretation of the results.

A key strength of this research was the multicultural approach taken with the qualitative study. People of five different ethnic groups participated in the running of the focus groups, which represented the diverse nature of the Eastern Porirua population. This provided insight into the varying and culturally specific issues relating to healthy food accessibility. The use of ethnic specific facilitators was important and attempted to create an environment that was as comfortable as possible for participants to share their thoughts and feelings. Although this meant each focus group was conducted by a different facilitator, all facilitators were thoroughly briefed for the focus groups by the lead researcher and by being familiar with the interview schedule and research aims and goals. The researcher was also present at all focus groups and also met with each facilitator following each focus group to debrief, clarify responses, and add anything they felt may be missing.

The use of multiple sources of information for collecting data for food outlets increased the robustness of the research and differentiates it from other similar national and international research. This included data from local authorities, research institutes and data previously used by other university groups. Validation

of this data by systematically driving through the areas (ground truthing) and cross referencing with the white and yellow pages further enhanced the accuracy of the data. Many other studies of this kind rely on large (often commercial) databases; these may not be updated regularly causing problems with accuracy. This study also found that official sources of data were not always accurate.

Combining quantitative and qualitative data is an obvious and important strength of this study. Often barriers to healthy eating or food accessibility are identified solely with objective measures of environmental features and rarely are they compared to reported or perceived measures of barriers by residents or observers of areas. Without the focus group data in this study there would be no sense of how residents value (or did not value) what was available in terms of food outlets in their area. This was important in that it allowed the concept of accessibility to be extended beyond availability and proximity of outlets to include quality, perception and use. Gathering both objective and perceived barriers allows for richer and more detailed information about how people view their neighbourhood and the influence it may have on food accessibility. It provided information on whether or not the objectively measured features of the environment (such as the lack of supermarkets) acted as barriers for the residents or not. For these reasons mixed methods approaches are being increasingly recommended for research that explores food environments (Beaulac, Kristjansson et al. 2009).

As mentioned earlier, the researcher became a staff member of Regional Public Health during the course of the research. This potentially has both advantages and disadvantages. Bias may have been introduced into the analysis of the qualitative data as the researcher became more aware of what sort of strategies were being explored to improve access to healthy food in Eastern Porirua. However, I attempted to analyse the data fully reflecting the views as expressed by

participants. Two levels of data analysis assisted this process by allowing for careful checking that nothing was misinterpreted or missed. It is unknown how this knowledge may have influenced the themes that were drawn from the transcripts and the subsequent analysis and development of recommendations. However, it is also likely to mean that the recommendations and implications of this research are more relevant, practical and useful for Regional Public Health and other similar organisations, which is ultimately one of the objectives of this research. An additional benefit of the researcher being a staff member of RPH is that the findings may be more likely to be incorporated into existing and new healthy eating projects. The research is likely to be more accessible to the organisation and has the potential to be presented and promoted by the researcher more easily than if conducted by someone external.

In retrospect, testing and further refinement of the interview schedule may have produced different results. Unfortunately, there was little discussion on milk as an individual food item and it would have been sensible to specifically query the perceived barriers to access in relation to milk and bread as they were the only items that quantitative data had been collected on. However, there was unprompted discussion on bread in almost all of the focus groups. The semi-structured nature of the interview schedule allowed for a variety of topics to be discussed and gave participants freedom to raise barriers not previously identified with quantitative measures of the environment.

This study also highlights the difficulties with assuming that fixed boundaries (census area units) represent actual neighbourhood boundaries or that they reflect where people live their lives. This has implications for the design of interventions that aim to improve healthy food accessibility. Those with less exposure to their neighbourhood may benefit more from programmes aimed at modifying other

settings such as schools or workplaces – if this is where they spend more of their time or make food choices. On the other hand, there may be high exposure to the neighbourhood but if the neighbourhood has not been accurately represented (by census area units) then key features may be missed. This is a commonly identified weakness of studies that explore the role of place or context in health and one with no easy solution. It was also not always clear whether focus group participants were talking about Eastern Porirua generally or their specific neighbourhood. This may have been mitigated by allowing people to draw or describe the boundaries of their neighbourhood. More information outlining the census area units that were of interest could have been provided to participants at the beginning of the focus group discussions. These are important points to consider in further research.

The use of audio-recording – while being invaluable in the transcription/analysis phase – appeared to have an influence on some participants in the focus groups. Some participants were visibly uncomfortable with this, even though they had given consent. One participant in particular, who was previously identified as a potentially vocal member of the group became noticeably less vocal during the actual focus group and absent from much of the focus group discussion. The advantages and disadvantages of the use of this equipment should be examined thoroughly rather than assuming it is the most appropriate option for all groups.

It was initially intended that two focus groups would be run with residents of Whitby in addition to the four conducted with participants from Eastern Porirua. This would have enabled comparison of perceptions of access to healthy food by area (high versus low deprivation). Unfortunately, despite considerable effort I was unable to get enough participants from Whitby to be able to conduct these focus groups in the time frame available. It is possible that the recruitment strategies (detailed in Chapter Four) were not appropriate or were insufficient to

generate support in this area. It may be necessary for future research efforts to examine the type of incentives used to encourage engagement in more affluent areas. The difficulty in being able to arrange a focus group in Whitby may be a reflection of the degree of social cohesion in this area and there may also be implications for the importance (or lack of importance) of place for this area.

While the main ethnic groups of Eastern Porirua were represented – Samoan, Māori, Pākehā, Tongan – the views of other populations may not have been expressed. There was one Tokelauan participant, but no Cook Island, Fijian, Tuvaluans or Asian participants present at any of the groups meaning that barriers specific to these communities may have been missed. However, this is only an issue if the mechanisms by which the environment influences access to healthy food are different for the groups not represented. This would present a risk that any intervention designed to improve access to healthy food based on this research may not take into account the views and perceptions of a proportion of the residents of this area. However, many of the barriers that were identified for focus group participants were issues for all groups regardless of ethnicity. This suggests that there may not be major differences in barriers by ethnicity and so many of the interventions identified would benefit groups that were not part of the focus group study too.

Although all attempts were made to create as inclusive and comfortable an environment as possible and diverse range of participants was a strength, the cross cultural nature of the research may have inhibited some participants from responding as they would have if a researcher from their own culture/ethnicity has been conducting the research. The researcher and both research supervisors are Pākehā which varied from the ethnicities of three out of the four focus groups. We tried to minimise the effect of this by including Pacific and Māori advisors on the

Advisory Committee and also training and recruiting culturally specific focus group facilitators. Te Reo and Samoan were also used for all or parts of the Māori, Pacific and Samoan focus groups.

Although external validity was not one of the main concerns in designing this study, as it was to be an in-depth assessment of a particular local area, it is useful to be able to consider the implications of these findings for areas with similar physical and social features. It would be inappropriate to assume that the focus group results represent the feelings, beliefs and opinions of all people of Eastern Porirua. Similarly, it would be unwise to generalise all findings to other areas of high deprivation. However, some of the processes that were explored in this research such as the potential link between density of fast food outlets and normalisation of this type of food may also be common to other settings.

There may be bias due to the sampling strategies employed to recruit focus group participants. Participants were recruited using purposive and opportunistic sampling methods. These methods were not uniform across groups with some participants being recruited days or weeks before the focus group while others were called in on the day of the discussion. Bias may also be present in the quantitative results due to the non-inclusion of the stores that declined to be part of the food availability study. It cannot be known whether these stores or their prices would have been different to the stores that did participate in the study. However the number of stores that declined was relatively low (26%) and the study was fairly robust in that all convenience stores were contacted rather than a sample of the stores in the area.

Research implications and recommendations

This study has identified a number of areas and highlighted many questions that require further research. Further research should include more local level analysis and consultation to determine which solutions and how these should be implemented to improve access to healthy food for residents of Eastern Porirua. There are also opportunities for national research to be conducted that may help to inform policy to improve access to healthy food. These include:

- The price of food was identified as one of the main environmental barriers to healthy food accessibility for focus group participants in this study. Internationally many localities have conducted healthy food basket studies, which allowed them to compare the cost of items across areas and between types of stores, much as the present study did for bread and milk. It would be useful to conduct this sort of study in New Zealand including a range of supermarkets and other convenience type stores. This would provide further information on whether a healthy diet is more expensive depending on where foods are purchased.

- Results from the present research and other New Zealand research with low-income families indicates that a healthy diet is economically out of reach for many. More research on the affordability of an adequate diet should be conducted to investigate whether it is possible to not only survive, but also ensure enough healthy food for the whole family/whānau can be purchased on a government benefit. Research in Ireland and Australia has demonstrated that the percentage of income required to provide a healthy diet can be as high as 80% (Friel, Walsh et al. 2006; Tsang, Ndung'u et al. 2007). If results were to show that the basic requirements of a healthy diet cannot be fulfilled on current entitlements (as suggested by the current research) then this could be used as

advocacy for increased benefit entitlements and or expansion of social programmes such as Working for Families.

- Although the physical environment is not the only influence on healthy food accessibility more research may be needed to determine the mechanisms by which it affects nutrition related health outcomes. Food outlet data from the CRAINZ research should be updated and used to calculate a retail food environment index for all meshblocks and census area units across New Zealand. RFEI should then be compared to rates of overweight and obesity to determine whether there is any association between the mix of outlets and this health outcome. This data could be used by public health units in programme planning, public health advocates and local authorities for planning decision making.

- Public health nutrition researchers need to start investigating the wider political and economic influences on food cost. These should be published and disseminated widely in order to begin to build an evidence base and put pressure on policy makers.

The findings of this study emphasise the potential advantages of collaboration across not only the public sector in terms of policy making but also across different disciplines in research. While there are many examples of multidisciplinary studies, this research demonstrates that bringing disciplines together would strengthen research on issues like obesity, food accessibility and food security. Public health researchers will need the assistance of specialists in economic, geography, politics, nutrition and even planning to further investigate the mechanisms by which contextual features may interact with the individual to create unsupportive environments for accessing healthy food.

Policy and practice implications and recommendations

The findings of this thesis have important and useful implications for public health organisations and specifically health promotion projects and programmes that aim to improve healthy eating and food security. However, they also have strong implications for those working at a policy level and also those working outside the public health field because many of the potential ways to improve the food environment cannot be enacted by those in public health.

Access to healthy food is a prerequisite for good health and so is typically considered a public health issue. However, many of the actions that may improve access to healthy food are outside the scope of the public health sector. It is being increasingly recognised that many public health issues (e.g. housing, physical activity) require collaboration with local authorities, as they seem to be the gatekeepers to modification of the built environment. Public health professionals may not be able to immediately change features of the environment but they can try to mitigate potentially unsupportive impacts. At the very least public health organisations should take into account the health promoting or health damaging features of particular settings when designing programmes or interventions. Usually when needs assessments are carried out risk factors, demographics and other individual factors are scoped. This research emphasises the importance of exploring the context in which the behaviour of the target population occurs.

One theme that seemed to be present across all groups was a sense of diminishing control over access to healthy food. Participants in each group expressed this in one form or another. Collaboration with community groups and local health providers may help to address some of the environmental barriers to healthy food accessibility. A social ecological approach to health promotion implies that it is not only the environment that influences behaviour and consequently health, but that people can also influence the

environment and take control of their own health (Stokols 1996). Taking this approach empowers people, by acknowledging that they can play a part in modifying their environment to improve their health.

Increasing community awareness of the role their environment may play in food choice and access to food would enhance their capacity to play a role in the solutions. Communities such as Eastern Porirua may not be wealthy in material resource but have huge potential in terms of people as resources and the same may be true of other areas of high deprivation in New Zealand. Taking a strengths-based approach rather than applying a deficit model is likely to be far more successful in engaging people in local solutions (Hufford, West et al. 2009). This approach is also grounded in health promotion best practice, enabling people to take control over their health is the core of health promotion as expressed in the Ottawa Charter for Health Promotion (World Health Organization 1986).

Despite this, not all action to improve access to healthy food can be taken at a community level. Sen (1981) refers to the distribution of food on a global level as a political dilemma, with the issues of malnutrition in developing countries and 'over-nutrition' becoming growing problems. When examining the origins of many of the barriers that focus group participants identified and discussed, it became evident that the same was true for access to food issues in New Zealand. Although aspects of the political environment were not often explicitly named as barriers to access, it seems many of the main barriers have a political origin or determination. This has implications for public policy, not only in health but potentially food, welfare, agriculture, and economic policy too. This research suggests public health units need to consider ways they can advocate for policy options that would address the political influences on healthy food accessibility. On a population basis this may have the greatest potential to improve the food environment. For example, a policy that ensured

reduced fat milk is sold at the same price as standard milk may improve the economic accessibility of this 'healthier' option.

This research makes the following recommendations:

- Regional Public Health could support interested community groups, PHOs and health and social service providers to establish a community market located somewhere in accessible in Eastern Porirua. This market could have vendors selling similar goods to the central market in Porirua but also include increased stall holding opportunities for residents to help improve the economic capacity of the area. This market could also act as a vehicle for transferring and sharing knowledge about healthy food, cooking, and gardening skills.

- Support for food co-operatives could be considered by both the Porirua City Council and Regional Public Health. These would both improve access to healthy food in Eastern Porirua and also potentially increase employment opportunities and reduce food costs for residents. As opposed to a supermarket or yet another convenience store, residents could have control over the type and quality of food stocked. The University of Otago and Regional Public Health could follow the introduction of any food co-operative by evaluating the effectiveness of it in improving healthy food accessibility.

- Primary Healthcare Organisations (PHOs) need to consider their role in advocating for healthier food options and improved food accessibility in their communities and nationwide. District Health Boards and Public Health Units could provide support and information to PHOs and community groups to improve their capacity to make submissions to local and central government to form positions on issues related to healthy eating (and other health issues too).

This would provide a voice to those often not heard in important decision making processes and increase control of the community and local people over their health.

- The Porirua City Council could consider access to healthy food in strategic planning documents such as Long Term Council Community Planning process (LTCCPs) and planning documents. This could include consideration of the number, type and quality and perception of food outlets in communities, especially where individual factors may also inhibit access to healthy food. Collaboration with research and public health units to identify the most suitable ways for food accessibility to be incorporated would likely strengthen this approach.

- Consider the feasibility of attracting a supermarket to Eastern Porirua. This could be an opportunity for collaboration between the Porirua City Council and Regional Public Health. The Porirua City Council may need to look at ways it could attract a supermarket to this area by way of urban planning and/or incentives. Regional Public Health could investigate and monitor the impacts of large food stores that are already in development in New Zealand to provide further information on how a supermarket may impact healthy food accessibility.

- The reasons why 'less healthy' options (such as reduced fat milk and wholegrain bread) are often more expensive in convenience stores than their healthier counterparts needs to be further investigated. If there are barriers to convenience store owners selling both options at the same price or even discounting the healthier option then it is important that solutions to this are sought. Regional Public Health and the Porirua City Council could work with convenience store retailers to improve the accessibility (both physical and economic) of healthy

options within their stores. This could be modelled on healthy corner store projects that have been initiated in the United States.

- The findings of this research indicate that there is a need to monitor the balance of food options available in particular geographical areas. This should not be restricted to the banning of 'unhealthy' options but include the provision of incentives or support for an increase in 'healthy' options. Local councils will need to be creative with planning and zoning conditions, however this may require encouragement and advocacy from public health organisations. This research demonstrates the value of environmental audits. Public health or health promotion projects and programmes that aim to improve healthy eating and food choice could well benefit from their use.

- Some form of nutrition assistance programme, in the form of a smart card or food vouchers, could be implemented in New Zealand. This would allow discounts on specific foods and should be able to be used in convenience stores as well as supermarkets. The Ministries of Health and Social Development and Treasury and the University of Otago could work together to further explore how this could be implemented.

- The social and cultural appropriateness of nutrition messages used in social marketing campaigns needs to be considered. The Health Sponsorship Council could investigate the use of role modelling as a tool to increase sociocultural accessibility of healthy foods especially for children. Enhanced cultural specificity of food health promotion materials was also recommended by participants and so a review and testing of all current materials could be undertaken by the Ministry of Health or District Health Boards in collaboration with community groups.

- Benefit entitlements need to be reviewed and adjusted so that all New Zealanders who are subsiding on welfare are guaranteed to receive an amount of money that ensures a safe, healthy and nutritious diet for all members of the family. This should take into account variation for special dietary requirements and should be amended regularly as food costs fluctuate. Public health units such as Regional Public Health and Universities should encourage the Ministry of Social Development to work with them to develop more suitable and realistic estimations of the cost of a healthy diet.

- An easy to use front of pack nutrition labelling system should be implemented. Multiple traffic lights or simple traffic light system should be promoted and some form of these should be required, regulated and monitored by the NZFSA as they are in the U.K. This should be accompanied by a comprehensive and culturally appropriate consumer education programme to ensure all New Zealanders become confident in their food choices. Country of origin labelling (CoOL) was also perceived by participants as providing better information on food production thus increasing control over their food supply. The feasibility of implementing mandatory CoOL should also be investigated further.

Conclusions

Food is inextricably linked to health. The distribution of food-related ill-health is unequal across countries, cities and areas of varying deprivation and socioeconomic status (Robertson 2001). The first chapter of this thesis has outlined how people on low-incomes and those living in deprived areas suffer from poorer health and specifically are more at risk of developing a variety of diet-related conditions including obesity, CVD and diabetes. This has resulted in millions of people in developing countries suffering from malnutrition but has also resulted in a sharp increase in non-communicable disease in developed countries. The literature review in Chapter Two has outlined the reasons why the accessibility of food is a significant public health issue. It was also argued in Chapter Two that the role of the environment is important to consider when attempting to address this issue. To improve the health of the population the barriers to food accessibility need to be identified and addressed with appropriate solutions. Chapter Three gave an overview of the methods that were used in this research to answer the four research questions.

This research sought to explore food environments of Whitby and Eastern Porirua. These two local environments were found to be markedly different from one another in terms of the availability and population density of food outlets potentially making healthy food less accessible than unhealthy food for residents of Eastern Porirua. These results suggested a need to focus on the balance of options within neighbourhoods and suburbs particularly in those areas where the residents may be less mobile. The lack of a neighbourhood supermarket presented further issues for Eastern Porirua in that reliance on convenience stores for basic foods such as bread and milk increased the amounts spent on these items and the price differentials made the less healthy option more economically attractive and accessible.

This research also identified the main perceived barriers to healthy food accessibility and proposed solutions for residents. One of the key messages that should be taken from this research is that quality of resources is just as important as provision of them. There is more to do than just attempting to limit the number of fast food outlets in areas that may be described as 'food swamps' such as Eastern Porirua. While outlets and sources of healthy food may be provided in an area, features of what is available including price, smell, aesthetics, social and cultural acceptability and knowledge of the resources will determine its accessibility. This builds on the premise that availability is necessary but not sufficient to ensure accessibility of resources and services (O'Dwyer and Coveney 2006). It is recommended that public health researchers look further upstream than this and examine why fast food is so readily available and focus on addressing this. This may involve investigating the wider political and economic influences that determine the price and availability of this type of food.

There are many possible interventions that could be implemented to improve the food environment in Eastern Porirua however no single action will provide a complete solution. Income was identified as the most important barrier to being able to access healthy food and having more income was also suggested as a way of improving access. This should be a serious consideration for those who have any scope to address this. This may include public health units like Regional Public Health and government agencies such as Ministry of Social Development.

The ANGELO (Analysis Grid for Environments Linked to Obesity) framework proved to be valuable for identifying the barriers to healthy food accessibility. It was effective in classifying barriers into different environment types – physical, economic, political and sociocultural – and for indicating what sort of solutions may be effective. However, the application of ANGELO was problematic at some stages of the research process. Barriers did not seem to fit neatly into each of the environment types and could often have been

categorised as two or three environment types. ANGELO is a static model that lacks explanation of the interaction between environment types. An extension of the ANGELO framework could be developed to further unpack the mechanisms by which specific features of the environments do influence healthy food accessibility and whether this has an impact on behaviour and health outcomes.

In summary, this thesis has established that place is important for people. However, it is not only the physical or geographical nature of place that is important for healthy food accessibility. The social, cultural and economic environments are also key to understanding the relationship between features of the environment, the people living in them, and the unique interaction between the two.

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Appendix A: Focus group interview schedule

Today we would like to gather information on what you believe are the major barriers to healthy eating as a resident of Porirua. We would also like to know about the things that make it easier or enable you to access food for a healthy diet.

By barriers we mean things that prevent or stop you from being able to do something or act in a certain way.

General -

What does the term 'healthy food' mean to you?

Where do you shop for food? Why?

Probes -

Proximity to work, schools, home, church

Price of food

Type of food available/range/variety

How often do you shop for food and why?

Probes –

Time, convenience, shopping in bulk, income

How do you travel to/get to food outlets and stores?

Probes -

Walk, bike, cycle, take the bus, drive a car, get someone to drive you, catch a ride with someone else, have it delivered, get dropped off by supermarket van, take a taxi, mixture

What are aspects of your physical surroundings that might prevent you from getting healthy food?

Probes -

Distance to types of stores - dairies, supermarkets, fast foods, market

Availability of fruit and vegetables and other healthy options in stores

Transport options

Walkability of the area

Tidiness, physical appearance of the shopping areas – graffiti, litter, safety

Do you believe the stores in your area provide a good selection of healthy food?

Probes –

Local supermarkets

If there was a supermarket nearby do you think access to healthy food is more convenient?

Supermarket access

Do you believe the cost/price is a barrier to purchasing healthy food?

Probes -

Cost of food, price of fruit and vegetables

Cost of transport to get to food

How about your income? Do you consider it another barrier of purchasing food for a healthy diet?

Probes -

Not having enough money for food due to other bills or household costs or expenses

What are other factors that influence the type of food you choose to buy?

Probes –

Kids/partners prefer take away food

Children's other preferences come first

Cultural obligations

Family commitments e.g. church, sports, special occasions

Are other family members supportive of new foods or healthier options?

Public health campaigns

Advertisements

Are there significant others/ people/environment that you think may influence your food choices?

End questions

What do you believe the barriers to being able to provide you and your family/whānau with food for a healthy diet?

Is there anything else we haven't already talked about that you see as a barrier to accessing food for a healthy diet?

Do you have any suggestions about anything you think would make it easier for people living in your area to get food for a healthy diet?

Appendix B: Panui for focus group recruitment

Invitation to take part in a focus group on food accessibility and availability in Porirua

We invite you to take part in a focus group for a student research project about access to and availability of food.

What is the aim of this research?

- To better understand the major barriers to healthy eating in Porirua
- To understand how cultural, social, economic and physical factors affect food choice
- To gain information on the barriers to be used to guide planning for regional and city-wide food security and public health projects

What types of participants are being sought?

Pākehā residents of Porirua East, Waitangirua or Cannons Creek who are the main food shopper for their household - must be between 18 and 65 years.

What will participants be asked to do?

Should you agree to take part in this research, you will be asked to participate in:

- A focus group with other participants and researchers discussing food access and availability, which may last up to 90 minutes

When?

- The focus groups will be held in late February 2009 or early March

Contact

If you are interested in participating or if you have any questions about the project please contact:-

Carly Woodham
Department of Public Health
University Phone Number: (04) 385 5541 x 6081 or 0274 699 688
Email: wooca901@student.otago.ac.nz

This research has been reviewed and approved by the Department of Public Health, University of Otago.

Appendix C: Information sheet for focus group participants

An in-depth assessment of food accessibility in Porirua
INFORMATION SHEET FOR
PARTICIPANTS

Thank you for showing an interest in this research. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you of any kind and we thank you for considering our request.

What is the aim of this research?

- To better understand the major barriers to food accessibility in Porirua
- To gain information on the modifiable barriers to be used to guide planning for regional and city-wide food security and public health interventions

This research is being undertaken as part of the requirements for a Masters in Public Health

What types of participants are being sought?
Adults: male and female shoppers who are residents of East Porirua and Whitby will be sought to participate in interviews and focus groups.

What will participants be asked to do?
Should you agree to take part in this research, you will be asked to participate in:

- A focus group with other participants and researchers which may last up to 90 minutes

Please be aware that you may decide not to take part in the research without any disadvantage to yourself of any kind.

Can participants change their mind and withdraw from the research?

You may withdraw from participation in the research at any time and without any disadvantage to yourself of any kind.

What data or information will be collected?
Participants views on the social, cultural, physical and economic barriers to accessibility of healthy food.

What use will be made of the data or information collected?

- Interviews will be audio-recorded and translated verbatim for analysis.

- The material that we obtain will be made anonymous, to ensure that you are not identified. Your identity will be confidential to the research team. Transcribed material will not contain identifying information such as respondents' names.

- The results may be published but any data included will in no way be linked to any specific participant. Participants will have a right to review transcript and quotes before any data is published as well.

- The data collected will be securely stored. At the end of the project any personal information will be destroyed immediately except, as required by the University's research policy, any raw data on which the results of the project depend, which will be retained in secure storage for five years, after which it will be destroyed.

- This study involves an open-questioning technique where the precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops. Consequently, although the Department of Public Health is aware of the general areas to be explored in the interview, the precise questions to be used have not been finalised.

- In the event that the line of questioning does develop in such a way that you feel hesitant or uncomfortable you are reminded of your right to decline to answer any particular question(s) and also that you may withdraw from the project at any stage without any disadvantage to yourself of any kind.

You are most welcome to request a copy of the results of the research should you wish.

Reasonable precautions will be taken to protect and destroy data gathered by email. However, the security of electronically transmitted information cannot be guaranteed. Caution is advised in the electronic transmission of sensitive material.

What if participants have any questions?

If you have any questions about our project, either now or in the future, please feel free to contact either:-

Carly Woodham or Louise Signal

Department of Public Health Department of Public Health

University Phone Number: 385 5541 x 6081 University Phone Number: 385 5541

Email: wooca901@student.otago.ac.nz Email: louise.signal@otago.ac.nz

This research has been reviewed and approved by the Department of Public Health, University of Otago.

Appendix D: Consent form for focus group participants

An in-depth assessment of food accessibility in Porirua

CONSENT FORM FOR
PARTICIPANTS

I have read the information sheet concerning this research and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:-

1. My participation in this research is entirely voluntary;

2. I am free to withdraw from the research at any time without any disadvantage;

3. The audio-tapes will be destroyed at the conclusion of the research but any raw data on which the results of the research depend will be retained in secure storage for five years, after which it will be destroyed;

4. I may have access to the conclusions and any publications if I request them;

5. This research involves an open-questioning technique where the precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops and that in the event that the line of questioning develops in such a way that I feel hesitant or uncomfortable I may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind;

6. I do not have to answer any questions that give me discomfort, and the audio tape can be stopped at any time;

7. This research is funded by Regional Public Health and so data may be used by this organisation after completion of the project, however no data will be linked back to specific individuals;

8. The results of the project may be published and available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity.

I agree to take part in this project.

....

(Signature of participant) (Date)

Appendix E: Demographic questionnaire for focus groups

1. Are you?

☐ Female

☐ Male

2. Please indicate your age:

☐ 20 – 30 years

☐ 31 – 40 years

☐ 41 -50 years

☐ Over 50 years

3. What is your total household income?

☐ 0 - $10,000

☐ $10,001 - $20,000

☐ $20,001 - $30,000

☐ $30,001 - $40,000

☐ $40,001 - $50,000

☐ Over $50,000

4. How many children do you have?

_____

5. How many people live in your household?

_____

6. What is your current marital status?

☐ Married

☐ Partner

☐ Single

7. Where do you usually live? Please give address or suburb (if don't you don't want to give your address)

_____
_____
_____

8. Which country were you born in?

☐ New Zealand

☐ Tonga

☐ Cook Islands

☐ Niue

☐ Tokelau

☐ Tuvalu

☐ Fiji

☐ Samoa

☐ Australia

☐ Other _____

9. Which ethnic groups/groups do you belong to?

☐ Tongan

☐ Cook Island Māori

☐ Niuean

☐ Tokelaun

☐ Tuvalu

☐ Fijian

☐ Samoan

☐ Māori

☐ New Zealand European

☐ Other _____

10. Are you descended from a Māori (did you have a Māori birth parent, grandparent or great grand parent)?

☐ Yes

☐ No

☐ Don't know

11. Are you currently employed?

☐ Employed - full time

☐ Employed - part time

☐ Not employed in paid work