



<http://researchspace.auckland.ac.nz>

ResearchSpace@Auckland

Copyright Statement

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

This thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of this thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from their thesis.

To request permissions please use the Feedback form on our webpage.

<http://researchspace.auckland.ac.nz/feedback>

General copyright and disclaimer

In addition to the above conditions, authors give their consent for the digital copy of their work to be used subject to the conditions specified on the [Library Thesis Consent Form](#) and [Deposit Licence](#).

Note : Masters Theses

The digital copy of a masters thesis is as submitted for examination and contains no corrections. The print copy, usually available in the University Library, may contain corrections made by hand, which have been requested by the supervisor.

**OBESITY IN PACIFIC ADOLESCENTS:
A SOCIO-CULTURAL STUDY IN
AUCKLAND, NEW ZEALAND**

Tasileta Teevale

A thesis submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy in Community Health, The University of Auckland, 2009.

ABSTRACT

The purpose of this thesis was to explore socio-cultural factors that may promote or prevent obesity in Pacific communities residing in New Zealand. Specific objectives were to describe the behaviours, knowledge, beliefs and values of Pacific adolescents and their parents, as related to food consumption, physical activity and body image and to compare the responses of obese Pacific adolescents and their parents to their non-obese or healthy weight counterparts. A mixed-methods approach was utilised to gather data. Information was collected from a questionnaire administered to 4215 students who participated in the New Zealand arm of the Obesity Prevention In Communities (OPIC) project and sixty-eight individuals (33 students and 35 parents) from 30 Pacific households participated in individual interviews as part of the qualitative phase of the study. To meet the comparative objectives of the study, Pacific adolescents were recruited by obese ($n=16$) and healthy weight ($n=17$) status.

The outcome of the analysis found that cost and affordability of food, time-constraints through employment obligations and lack of health education or experience negatively affected the health-promoting behaviours of Pacific adolescents and their parents (i.e. not meeting the current guidelines for healthy eating and regular physical activity). Healthy weight Pacific adolescents were significantly more active, consumed fruit and vegetables regularly and had habitual levels of breakfast and lunch consumption compared to obese Pacific adolescents. Obese adolescents were inactive, had takeaway family meals more often and skipped breakfast and lunch meals more frequently. Obese adolescents were also dissatisfied with their body weight, received more parental encouragement to lose weight and engaged in weight control behaviours more than the healthy weight cohort. Healthy weight adolescents and parents seemed to have more health-related knowledge and experience than obese adolescents and parents.

There were no differences in the knowledge, values and beliefs about the health-protective effects of food and regular physical activity between obese and healthy weight Pacific adolescents and their parents. There was sound knowledge observed in the link between food and particular eating habits, physical inactivity and body size to obesity risk and study participants desired to increase their healthful behaviours, particularly amongst the obese. The key difference between healthy weight and obese adolescent households was in parental presence at home. Healthy weight adolescents came from households that were more likely to have a full-time or part-time parent at home. While obese adolescents were more likely to come from households that had both parents working full-time, particularly for sustained periods of time in shift-type working arrangements.

Furthermore, all students and parents perceived overweight and underweight bodies undesirable for adverse health consequences, suggesting they understand the link between obesity and health. Most students and parents desired average-sized bodies that were functional, i.e. for adolescents, bodies that could be competent in sports and dance, for Pacific adults, bodies that could achieve daily tasks like housework, childrearing and meeting the needs of the family were desired and valued.

This thesis finds that socio-environmental influences like socio-economic position, occupational type, health education and experience were much more instrumental influencers on health behaviours than socio-cultural factors. Attitudes, values and beliefs about food, physical activity and body image, which were comparable between obese and non-obese Pacific adolescents and their parents, were not as influential on health behaviours. Obese adolescents held the same attitudes, beliefs and values about food, physical activity and body image as their healthy-weight counterparts, but these factors were not protective for obesity-risk.

To address obesity in Pacific youth in New Zealand, a number of macro-environmental changes are recommended to reverse obesity trends. Developing food pricing control policies to mitigate healthy food costs, revising sustained employment hour policies, making changes to school food and physical activity environments and incentivising healthy workplaces are some suggestions. This study suggests certain structural environmental factors related to poverty affects the health-promoting behaviours of Pacific communities in New Zealand. Future obesity intervention efforts for Pacific groups need to address poverty status and specific interventions that prioritise the elements of motivation, self-esteem, self-confidence and life-skills training as well as making policy changes to structural barriers is likely to be more effective.

ACKNOWLEDGEMENTS

FAAMALO

E momoli atu le faamalo ma le faafetai tele, i ai latou uma sa fesoasoani mai i le tusiaina o lenei pepa faa-le-aoaoga, ua faaulutalaina o le: "Obesity in Pacific adolescents: A socio-cultural study in Auckland, New Zealand". O le upu moni, e le mafai ona uma ma maea lenei tusitusiga, pe ana leai lo outou faamalosi mai mo au. Mo ou tane, tama tama, matua, uso, tuagane ma aiga uma i Niu Sila ma Samoa, faapea foi au uo; ua faamalo timai, faafetai fai tatalo, malo le tapuai. Ia tatou faafoi faatasi le viiga ma le faamanu i le Atua, aua o ia e ona le poto ma le atamai ua foai mai.

ALOFAAGA

O lenei taumafaiga ou te aualofa ai i si ou tama ma tina-matua o Toetagata ma Tupu Teevale.

First, I must pay tribute to the Pacific adolescents and their families whose lifestories have made this project possible. I hope that this project is of service to your future wellbeing. You have kindly allowed me to be part of your experience and I gratefully acknowledge that this undertaking was possible only through your goodwill and participation.

Many people have helped me with this study:

I gratefully acknowledge the support and encouragement of my Supervisors Professor David R. Thomas, Associate Professor Robert Scragg, and Dr. Vili Nosa. I truly appreciate all your professionalism and worthy advice throughout the project. It was an honour to work with you all.

I would like to acknowledge the OPIC project for its scholarship support and training goals for Pacific health researchers. Pacific Health department and staff for its support and giving me space to complete this work.

Thank you to my husband Matiu for your support, advice and review of drafts and taking on the primary caregiving role for our sons Tai and Tama, who many times missed out on mummy time throughout this process. It has been a long and arduous road. I apologise to all family and friends who have been neglected throughout this most alienating and unsocial process. I thank you for your patience and understanding and hope the end result is of some benefit for all.

This thesis is dedicated to my paternal grandparents Toetagata and Tupu Teevale, who have made many sacrifices for our wellbeing as their children. I thank you most gratefully for your love and dedication. Whatever I have achieved I owe to your encouragement.

TABLE OF CONTENTS

Abstract	ii
Acknowledgements	iv
Table of contents	v
List of Figures	ix
List of Tables	xi
List of abbreviations	xii
CHAPTER 1 - INTRODUCTION	1
<hr/>	
Obesity in New Zealand	2
Research aim & objectives	4
Research design	5
Chapter outline	5
CHAPTER 2 - REVIEW OF LITERATURE ON OBESITY	7
<hr/>	
Defining Obesity	7
Measuring Childhood Obesity	8
Generalisability of obesity standards across ethnic groups	9
Obesity Prevalence in Pacific groups	11
Trends in Obesity Prevalence	12
Health consequences of obesity	13
Causes of Obesity	15
<i>The role of Nutrition and Physical Activity in the Obesity Epidemic</i>	15
Patterns of nutritional intake and behaviours of Pacific groups in New Zealand	15
Physical activity patterns of Pacific groups in New Zealand	19
<i>The role of Environmental factors in the Obesity Epidemic</i>	22
Macro-environmental analysis of obesity aetiology	22
Empirically defined environmental factors that may protect or promote obesity	25
<i>The role of socio-cultural factors in the obesity epidemic</i>	26
Socio-economic status and obesity	28
Social norms, attitudes, values or beliefs about food and eating	29
Social norms or cultural customs, attitudes, values or beliefs about physical activity	36
Social norms, attitudes, values or beliefs about body image	39
A critique of body image research	42
Research methodology review	45
<i>An alternative research strategy</i>	46
Obesity Intervention Studies	47
Summary and Conclusions	49

CHAPTER 3 - METHODOLOGY & ANALYSIS **51**

Research Paradigm	51
<i>Qualitative versus Quantitative research inquiry – the choice of paradigm</i>	51
<i>The strengths of Qualitative and Quantitative Research</i>	53
Overall Design	54
<i>Research Methodologies: Why choose a qualitative approach?</i>	54
<i>Mixed-Methodology Approach</i>	55
Theoretical Framework	56
Research Objectives	57
Ethical review	57
Sample	59
<i>Qualitative interviews</i>	59
<i>Quantitative survey</i>	61
Procedures	64
<i>Qualitative interviews</i>	64
<i>Quantitative survey</i>	67
Analysis	68
Information Dissemination	69
Detailed Sample Profile	70

CHAPTER 4 - RESULTS **71**

<i>FOOD HABITS</i>	71
.....
Research objectives	71
Interview and Survey questions	72
Overview of Food Habits findings	76
Food supply and Preparation	77
<i>Food Supply</i>	77
<i>Food preparation</i>	78
Food consumption patterns	79
<i>Typical household meals</i>	79
<i>Breakfast</i>	84
<i>Lunch</i>	88
<i>Main meal</i>	97
<i>Food practices at special occasions</i>	98
<i>Food preferences</i>	101
<i>Eating more or less</i>	102
Food knowledge & influencers	106
<i>Food knowledge</i>	106
<i>Food and eating influencers</i>	106
<i>Parental support for healthy eating</i>	108
<i>Influencers on parents eating habits</i>	113
Food context	117
Summary	119

<i>PHYSICAL ACTIVITY</i>	120
Research Objectives	120
Interview and Survey Questions	120
Overview of Physical Activity findings	125
Student and parental levels of physical activity	125
<i>Student activity status</i>	125
<i>Student motives for physical activity</i>	129
<i>Reasons for Student inactivity</i>	129
<i>Students' weekend activities</i>	132
<i>Parent activity status</i>	132
<i>Perceived barriers for parental physical activity</i>	132
<i>Parental weekend activities</i>	134
<i>Parental-child physical activity link</i>	135
<i>Transport to school</i>	136
Physical activity beliefs and values	137
<i>Students' physical activity beliefs and values</i>	137
<i>Parents' physical activity beliefs and values</i>	138
Physical activity influencers	140
<i>Parental support for Physical activity</i>	140
<i>The nature of parental influence on students' physical activity</i>	146
<i>Parental support by student weight status</i>	147
<i>Parental gendered expectations</i>	149
<i>Influencers on parental physical activity</i>	150
Future activity	151
<i>Students</i>	151
<i>Parents</i>	153
Summary	154
<i>BODY IMAGE</i>	155
Research objectives	155
Interview and Survey Questions	155
Overview of Body Image findings	156
Body beliefs	159
<i>Body Image and Ethnicity</i>	159
<i>Perceptions on overweight and underweight bodies</i>	161
Body Ideals	164
<i>Students</i>	164
<i>Parents</i>	164
Sources of influence on Body Image	165
<i>The nature of parents influence on students' body image</i>	166
<i>Students' perceptions of parental influence</i>	168
<i>The nature of influence by family members on parents' body image</i>	169
Body management and control	170
<i>Weight control behaviours</i>	170
<i>Weight control strategies</i>	173
Summary	175
<i>DIFFERENCES BETWEEN HABITS OF OBESE vs HEALTHY WEIGHT ADOLESCENTS</i>	176
Research objectives	176
<i>Food Habits</i>	176
<i>Physical Activity</i>	179
<i>Body Image</i>	181
<i>Household Demography</i>	183
Summary	185

CHAPTER 5 - DISCUSSION	186
<hr/>	
Food Habits	186
<i>Summary</i>	195
Physical Activity	196
<i>Summary</i>	202
Body Image	204
<i>Pacific students' body image:</i>	204
<i>Pacific parents body image:</i>	205
<i>Positing Pacific societal structures as an explanation on body image and Pacific peoples</i>	206
<i>Pacific social roles and effects on gendered body image</i>	208
<i>Positing Pacific cultural values as an explanation on body image and Pacific peoples</i>	208
<i>Juxtaposing Western cultural explanations of body image</i>	211
<i>A critique on Westernisation theory and body image in Pacific people</i>	214
<i>"Is the Pacific 'ideal' body size the 'healthy' body size to attain?"</i>	216
<i>Summary</i>	217
Differences between obese and healthy weight students	219
<i>Summary</i>	225
Study limitations and strengths	226
CHAPTER 6 - CONCLUSIONS & RECOMMENDATIONS	229
<hr/>	
Summary of main findings	229
Implications and recommendations	234
Recommendations for future research	240
Concluding remark	243
APPENDICES	244
<hr/>	
Appendix A: Summary of studies on body image and Pacific or Polynesian people	244
Appendix B: Participant Consent Form	247
Appendix C: Participant Information Sheet	248
Appendix D: Student Invitation	249
Appendix E: Interview Participant Demographic Form	251
Appendix F: Interview Guide	255
Appendix G: Proposed conceptual model of pathways linking selected socio-cultural factors with obesity	259
REFERENCES	260
<hr/>	

LIST OF FIGURES

Figure	Title	Page
Figure 2.1	BMI cut-off points for public health action	8
Figure 2.2	The ecological model of the causes of obesity	22
Figure 2.3	Conceptual model of pathways linking selected socio-cultural factors with obesity.	27
Figure 2.4	Levels of activity and Intentions divided by Segments according to determinants of Physical Activity (<i>n</i> =8077)	37
Figure 2.5	Summary of the characteristics of the ‘Others Oriented’ segment (<i>n</i> =398)	38
Figure 2.6	The ANGELO framework (Analysis Grid for Environments Linked to Obesity) used to ‘scan’ the environment for barriers and facilitators to healthy eating and regular physical activity	49
Figure 4.1	Students’ breakfast consumption (%) across 5 school days by Ethnicity (<i>n</i> =2740)	84
Figure 4.2	Students’ source of breakfast (%) by Ethnicity (<i>n</i> =2740)	85
Figure 4.3	Pacific students’ breakfast frequency (%) by weight status (<i>n</i> =1518)	86
Figure 4.4	Student’s lunch consumption (%) across 5 school days by Ethnicity (<i>n</i> =2740)	88
Figure 4.5	Students’ source of school lunch (%) by Ethnicity (<i>n</i> =2740)	89
Figure 4.6	Pacific students’ school lunch frequency (%) by Weight Status (<i>n</i> =1518)	90
Figure 4.7	Students’ source of school lunch by Weight Status (<i>n</i> =2740)	91
Figure 4.8	Obese and Healthy weight Students’ rating of parental support (% rated ‘A lot’) to eat healthy foods by Ethnicity (<i>n</i> = 2740)	110
Figure 4.9	Pacific students’ rating of parental support (% rated ‘A lot’) to eat healthy foods by Age (<i>n</i> =1518)	111
Figure 4.10	Pacific students’ rating of parental support (% rated ‘A lot’) to eat healthy foods by Weight status (<i>n</i> =1518)	112
Figure 4.11	Contextual factors affecting Food habits	118
Figure 4.12	Pacific student activity (%) at lunchtime by weight status (<i>n</i> =1518)	126
Figure 4.13	Pacific students’ activity status by Weight status (<i>n</i> =33)	127
Figure 4.14	Students’ beliefs about physical activity’s link to healthy weight by Weight Status (<i>n</i> =33)	137
Figure 4.15	Students rating of parental support (% rated ‘A lot’) for physical activity by Ethnicity (<i>n</i> =2740)	142
Figure 4.16	Pacific students’ rating of parental support (% rated ‘A lot’) for physical activity by Age group (<i>n</i> =1518)	143

Figure	Title	Page
Figure 4.17	Students' rating of parental support (% rated 'A lot') for physical activity by Weight Status ($n=4215$)* and by Pacific ethnicity ($n=1518$) [#]	144
Figure 4.18	Influential sources (%) on Pacific students' physical activity ($n= 33$)	145
Figure 4.19	Pacific students' desire for future activity by Weight status ($n=33$)	152
Figure 4.20	Sources of influence on student and parental Body Image ($n=63$)	166
Figure 4.21	Pacific students Perception of body weight (%) by Obese and Healthy weight status ($n=1518$)	170
Figure 4.22	Pacific students levels of satisfaction (%) with current body weight by Obese and Healthy weight status ($n=1518$)	171
Figure 4.23	Weight control behaviours amongst Obese and Healthy weight Pacific students ($n=1518$)	172
Figure 5.1	Contextual factors affecting parental Physical activity	199

LIST OF TABLES

Table	Title	Page
Table 2.1	Summary of strength of evidence on factors that might promote or protect against weight gain and obesity	25
Table 2.2	Summary & Description of Segmented Population groups by attitudes to healthy eating across selected demographic variables	35
Table 3.1	Interview participants sample demographic variables	60
Table 3.2	OPIC Survey Student sample demographic variables	62
Table 3.3	Weight status by key demographic variables amongst Pacific students	63
Table 3.4	Household interview sample demographic variables	70
Table 4.1	Food Habits Qualitative Interview and Quantitative Survey questions	73
Table 4.2	Food items defined by Students and Parents in the Qualitative Interviews as typical “every day” and “special” food items consumed, separated by Student weight status, in descending order of most stated items	80
Table 4.3	A comparison of the rating of parental support to eat healthy foods between total student sample and Pacific sample only, across Ethnicity, Gender, Age and Weight status variables	109
Table 4.4	Household demographic data	118
Table 4.5	Physical Activity Qualitative Interview and Quantitative Survey questions	122
Table 4.6	Students motives for physical activity	129
Table 4.7	Reasons for Student Inactivity	131
Table 4.8	A comparison of the rating of parental support for physical activity between total student sample and Pacific sample only, across Ethnicity, Gender, Age and Weight status variables	141
Table 4.9	Students’ reasons for inactivity and barriers for future activity ($n=33$)	151
Table 4.10	Body Image Qualitative Interview and Quantitative Survey questions	157
Table 4.11	Food habit Differences between Obese and Healthy weight student-parent pair households ($n=30$)	177
Table 4.12	Physical Activity Differences between Obese and Healthy weight student-parent pair households ($n=30$)	179
Table 4.13	Body Image Differences between Obese and Healthy weight student-parent pair households ($n=30$)	181
Table 4.14	Differences between Obese and Healthy weight student-parent pair by various household demographic variables ($n=30$)	184
Table 5.1	Summary of the different hypothesised explanatory factors between Pacific and Western body image	213

LIST OF ABBREVIATIONS

BMI	Body Mass Index
CDC	Centres for Disease Control
HEHA	Healthy Eating-Healthy Action strategy
HSC	Health Sponsorship Council
IOTF	International Obesity Task Force
kJ	Kilojoules
MOH	Ministry of Health
NIDDM	Non-insulin dependent diabetes mellitus
NZDep	New Zealand Deprivation scale
NZers	New Zealanders
NZHS	New Zealand Health Strategy
OECD	Organisation for Economic Co-operation and Development
OPIC	Obesity Prevention in Communities study
PIS	Participant information sheet
RCT	Randomised controlled trials
SES	Socio-economic status
SPARC	Sport and Recreation New Zealand (government funding agency)
UK	United Kingdom
US	United States
WC	Waist circumference
WHO	World Health Organisation

Chapter 1

INTRODUCTION

The World Health Organisation (WHO) has declared obesity as a global epidemic with high prevalences evident in both developed and developing countries.¹ The increasing prevalence of the condition in children and adolescents is of a particular public health concern as evidence shows a positive association between childhood and adult obesity.^{2,3} This suggests that the true health impact of obesity may exacerbate in the future, compelling public health ministries to declare obesity reduction as a priority population health objective.⁴ Obesity is related to a number of adult health conditions including cardiovascular disease, various types of cancers, kidney disease and type 2 diabetes. In addition, obese people are more likely to experience psychological problems and social distress.⁵ Evidence suggests obesity also costs economically with an estimated 2-7% of developed countries annual health budget spent on healthcare related to obesity.¹

The South Pacific region has the highest rates of obesity in the world.⁶⁻⁸ In New Zealand, more than half of the adult population (62.7%) and approximately a third (31.1%) of children (ages 5-14 years) were classified overweight and obese.^{9,10} However, of particular concern is the higher prevalences observed in Pacific minority population groups domiciled in the New Zealand environment. Pacific adults (63.7%) and children (23.3%) have an almost three-fold higher risk of being obese compared to the general population (26.5% for adults; 8.3% for children). In addition, the prevalences of Pacific youth obesity are also much higher in the New Zealand environment compared to Pacific youth living in their various South Pacific island environments.^{11,12} These disparate rates and the lack of empirical data to support the development of preventive and management actions to address population levels of obesity for Pacific populations in New Zealand, is the key motivation behind the current study.

The disparate prevalence by ethnicity and by New Zealand environment for Pacific populations has necessitated the need for a socio-cultural study. Current evidence on obesity aetiology suggests environmental factors are more predominant in the rapid increase of population obesity levels rather than physical determinants like evolutionary genetic changes.^{13,14} In particular, social changes in modern environments seem to track the observed increases in obesity rates over the same time period.¹⁵

Social factors are therefore considered the most important influence on the prevalence of obesity although, despite the rhetoric in the literature, few investigations have examined the associations between socio-cultural variables and obesity-risk behaviours related to eating and physical activity. Potential socio-cultural (or socio-environmental) determinants of obesity include social circumstances,

such as economic and material wealth, but also social norms regarding body weight, physical activity and eating, levels of social support for obesity-protective behaviours, social capital, social and cultural customs, values or expectations for what is important in relation to the role of food or the acceptability of vigorous exercise.¹⁶

Empirical datum also show that obesity is mediated by ethnicity, with minority and migrant groups in Western countries showing significantly greater obesity prevalences than the ethnic majority.¹⁷⁻¹⁹ The origins of such ethnic variations in obesity prevalences are not well-understood and the research base identifying specific important socio-cultural influences on obesity is extremely limited. The aim of this study was to address this research gap and give due credence to the importance of social factors by exploring their possible impact on the obesity prevalence in one of New Zealand's growing ethnic population groups. Researchers have urged the prioritising of studies that look to explain the inequalities in obesity, and children and adolescents especially have been targeted as a special high-risk sub-population.^{13 20} This is because children and adolescents tend to have less control over their own food and physical activity choices; are more dependent on their environment and are more susceptible to its influences (e.g., television advertising).^{21 22} The period of adolescence is also formative and lifelong habits are being developed at this life stage. In addition, Swinburn & Bell conclude, "and there is a duty of care for adults and society to provide the best possible environment for children".^{23 (p460)} This study looked to address these particulars by investigating how socio-cultural factors may influence the key health behaviours of nutrition and physical activity in Pacific adolescents.

Obesity research reviews have also reinforced the role that primary caregivers have over children and adolescent health behaviours.²⁴⁻²⁶ Parents often control the resources for adolescent lifestyles, for example, physical activity resources, primary food sources, schooling and church activities, and other social activities (for example, with friends). Values about food and diet, physical activity and body image may also be influenced by parents and other caregivers. This study assumed that, for Pacific adolescents socialised in traditional Pacific cultural milieu, the influence of parents was a critical area for investigation, and the study therefore included Pacific parents as key participants.

Obesity in New Zealand

Obesity is defined as an excessively high amount of body fat (adipose tissue) in relation to lean body mass. In the New Zealand context there has been a rise in obesity in recent decades - from 9% (adult males) and 11% (adult females) in 1977 to 20% and 22%, respectively, in 2003.²⁷ The 2006/07 New Zealand Health Survey found that one in four adults (ages 15+) were obese (26.5%) but Pacific adults (63.7%) were two and a half times more likely to be obese than men and women in the total population. One in twelve New Zealand children (aged 2 to 14 years) was obese (8.3%) and one in five children was overweight (20.9%). However adjusted for age, Pacific children (23.3%) were at least 2.5

times more likely to be obese than boys and girls in the total population.¹⁰ International comparisons show that New Zealand's population obesity levels was ranked seventh highest compared to other participating Organisation for Economic Co-operation and Development (OECD) countries in 2003.²⁸ The latest OECD Health data 2009 report has confirmed population obesity prevalences were increasing for all the 30 countries monitored by the OECD.²⁹ New Zealand's obesity prevalence of 26.5% now ranked them the third highest in the world, behind the United States at 34.3% and Mexico at 30%.

A study carried out jointly by the Ministry of Health and the University of Auckland, estimated the disease burden of overweight and obesity.²⁸ Estimations derived through statistical modelling found that higher than optimal BMI contributed to approximately 3200 deaths in New Zealand in 1997, mostly through type 2 diabetes, ischemic heart disease and stroke. This burden will be even higher today given that the mean BMI of the adult population has increased since 1997. Two out of every five deaths each year (approximately 11,000 annually) was found to be due to nutrition-related risk factors such as, high cholesterol (reflecting mainly saturated fat intake), high blood pressure (reflecting a range of factors most notably high sodium intake), overweight and obesity and inadequate vegetable and fruit intake. Of these 11,000 deaths a year, 8000 to 9000 are likely to be due to dietary factors alone, and the remaining 2000 to 3000 due to sub-optimal physical activity levels. The joint effects of diet (includes cholesterol, blood pressure, BMI and vegetable and fruit consumption) rank first among the top 20 causes of death by risk factor and insufficient physical activity was also in the top 10.^{28 30}

The WHO has identified nutrition and physical activity as important contributors to the world's disease burden. Recognising this, the WHO has developed, under a May 2002 mandate from Member States, a Global Strategy on Diet, Physical Activity and Health.³¹ Since obesity reduces the health of populations and incurs significant public health costs, many governments have introduced policy initiatives to address these issues. The New Zealand Health Strategy (NZHS) sets the platform for the Government's action on health, and reducing obesity is one of the priority objectives, along with improving nutrition and increasing physical activity.⁴ These three objectives have been combined into the Healthy Eating–Healthy Action (HEHA) Strategy which is the Ministry of Health's strategic approach to improving nutrition, increasing physical activity and achieving healthy weight for all New Zealanders.³²

In 2003, community and industry consultations which included reviews of relevant policy, services, programmes, literature, international strategies, epidemiology, and research culminated in the development of the Healthy Eating – Healthy Action (HEHA): Oranga Kai – Oranga Pumau Strategic Framework. The strategy recognises that it will take multiple actions by multiple players over many years to change the environment so that healthy choices are the easy choices. In recognition of this, the HEHA Implementation Plan 2004 - 2010 was developed in partnership with other central

government agencies, health-related non-government organisations, academia and industry³³. The Implementation Plan has an outcome focus and outlines a set of actions to achieve the goals and vision of the Strategy.

In addition the HEHA strategy recognised that obesity is more prevalent in Maori and Pacific communities than other New Zealand groups and the reducing inequalities framework was used to guide the development of the Plan.³⁴ The NZHS identifies the Government's priority areas and aims to ensure that health services are directed at those areas that will ensure the highest benefits for the population, focusing in particular on tackling inequalities in health.⁴ While there is a wealth of evidence available on the burden of ill health resulting from poor nutrition and insufficient physical activity,^{28 30 31 35-39} evaluation evidence showing the benefits of interventions to improve diets and increase physical activity is sparse. Less information is available for sub-population groups who often bear greater disease burden. Understanding the mechanisms for behavioural change among target groups is critical for developing obesity intervention programmes. This study addresses a gap in the evidence base by investigating the impact of socio-cultural factors on obesity aetiology for Pacific families in the New Zealand environment.

Research aim & objectives

The overall aim of the research was to explore socio-cultural factors that may promote or prevent obesity in Pacific communities residing in New Zealand.

The specific objectives were:

1. To describe the behaviours, knowledge, beliefs and values of Pacific adolescents and their parents, related to (a) food consumption, (b) physical activity and (c) body image.
2. To compare the responses of obese Pacific adolescents and their parents to their non-obese or healthy weight counterparts.
3. To investigate both the factors promoting obesity and factors that may prevent obesity

To further support the development of future obesity intervention or management programmes for Pacific communities in New Zealand the study used a solution-focused paradigm, or appreciative inquiry lens, to explore the factors that influence non-obese states.⁴⁰

The scope of the thesis included an investigation into the culturally specific perceptions, preferences, ideas, attitudes and practices around food and eating, physical activity, and body image. The thesis will describe participants' eating and physical activity patterns and their experiences related to messages they received about food, activity and body image from the community. The study explored personal perceptions about body size, including participants' definition of healthy body sizes. Finally, future expectations of personal and family eating and activity patterns, and body size will be described as well as current and future strategies to achieve personally acceptable body weight and size.

Research design

A mixed-methods research design including both qualitative and quantitative research methods was used. Given the lack of research on socio-cultural factors and obesity risk for Pacific populations in New Zealand, qualitative methods were used as it allowed the topic to be explored in depth and the social context to be included in terms of understanding the phenomenon. The study was affiliated to a greater obesity intervention study called the Obesity Prevention in Communities (OPIC) study which took place concurrently. Quantitative data gathered through the use of a survey questionnaire as part of the OPIC study were also utilised to provide complementary information on the research topic.

Chapter outline

The thesis contains six chapters. The focus of Chapter one is to introduce the study, its general aims and rationale for the project. Chapter two reviews the literature on obesity and define key thesis constructs. It focuses on providing current evidence on obesity patterns and determinants for Pacific people within the New Zealand environment. In addition, it critiques current socio-cultural research related to Pacific people and obesity-risk and makes comment on the existing research methodologies employed in this field of study.

Chapter 3 outlines the relevant research methodologies and data analysis procedures. A full description of the study sample, procedures for recruitment and instruments used are described. Issues pertaining to validity/reliability, information dissemination and ethical issues are also discussed in Chapter 3.

The Results of the study are contained in Chapter 4, which comprises of four sub-sections, detailing the study's key objectives: 1. Food Habits, 2. Physical activity, 3. Body Image 4. Differences between obese and non-obese students and parents. Each sub-section introduces the specific research objectives, preview the relevant key questions, provide an overview of the main findings, followed by the study results in detail organised under relevant sub-headings. Each sub-section closes with a Summary.

The following chapter 5 discusses the findings and limitations of the study. Chapter six concludes the thesis, with a summary of the major findings of the study. Implications of the study results will be developed into recommendations for addressing obesity in Pacific communities in New Zealand. Future recommendations for research in this field of study are also presented.

Chapter 2

REVIEW OF LITERATURE ON OBESITY

Obesity is increasing not only in the developed countries but recently also in developing countries. According to WHO reports it rates among the top 10 causes of the global burden of ill health, its rapidly increasing prevalence amongst children and adolescents being particularly disturbing.¹

The purpose of this chapter is to review the current literature surrounding the obesity epidemic, beginning first by defining obesity and its assessment on children and adolescents, followed by a section on obesity prevalence for Pacific populations in New Zealand. An examination of empirical data on obesity aetiology will follow which will contextualize the need for the current study. The chapter will conclude with an assessment of relevant obesity intervention studies, followed by a summary of key literature findings.

Databases of scientific publications and relevant websites were searched. The key terms of the thesis included obesity, adolescents, Pacific or Polynesian, nutrition, physical activity and body image. Several of the major health and social science-related electronic databases used included Anthropology Plus, CINAHL, Hawaii Pacific Journal Index, Historical Abstracts, Index New Zealand: INNZ, JSTOR, MEDLINE, ProQuest Dissertations & Theses, PsycINFO, Sociological Abstracts, SPORTDiscus, and Te Puna: The New Zealand National Bibliographic Database. General web-based search engines (e.g., *Google* and e-Books), specialist and research-focused search engines (e.g., *Google Scholar* and HEHA Knowledge Library) were also utilised to search for unpublished technical reports. Specialised bibliographic software Endnote X1 was used to store and manage references and abstracts.

Defining Obesity

A simple definition of obesity is an excess of body fat. Another name for body fat is adipose tissue, and adiposity is the state of having body fat. There are various ways to measure quantitatively excess body fat in order to define obesity in individuals. In adults, adiposity is commonly assessed using the body mass index (BMI; weight/height²; kg/m²), which is the international standard for the assessment of obesity in adults and correlates with body fat ($r = 0.7-0.8$).⁴¹ However, determining obesity for children and adolescents (ages 0-18) is more complex since growth and maturation alters weight and height over time.

Measuring Childhood Obesity

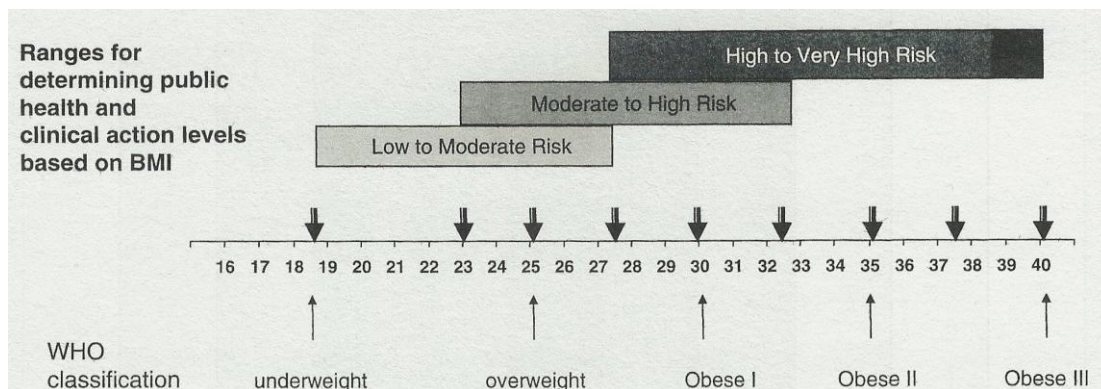
Reviews of childhood obesity research have found that the criteria used to assess obesity in children and adolescents vary worldwide.⁴²⁻⁴⁴ WHO and the International Obesity Task Force (IOTF), which was established in 1994 to address the increase of obesity worldwide, proposed that a standardised international criterion was needed for monitoring the obesity epidemic across countries and developing robust worldwide population health standards for both adults and children. A meeting was convened in 1997 to agree on an appropriate measurement to assess obesity for children and adolescents and issues discussed included valid ways to measure body fat and the development of a set of age and sex specific cut-off points for defining obesity.

Today, the WHO³⁶ classification for obesity in adults is measured using body mass index (BMI) cut-off points across a continuum of low to moderate to high and very high risk of health complications (Figure 2.1 below). The continuum helps to address population specific differences in BMI using BMI as a proxy measure of adiposity. The current standard defines obesity in adult populations at a BMI level of 30kg/m².

Figure 2.1: BMI cut-off points for public health action⁴⁵

↓ = suggested cut-off points for reporting population BMI distribution and specific action levels for populations and individuals.

Source: Crawford & Jeffery, 2005, p.5⁴⁵



Currently, the gold standard definition used widely to define childhood and adolescent obesity is known as the IOTF overweight and obesity cut-offs proposed by Cole and others.⁴¹ Using data from six different populations as the reference, Cole and others developed age- and sex-specific cut-off points for body mass index for overweight and obesity in children using dataset centiles linked to adult cut-off points. Consequent validation studies have confirmed that Cole's age- and sex-specific BMI cut-offs perform better than all other public health evaluations and clinical screening tools such as the frequently used anthropometric-based measurements of skinfold thickness or waist circumference measurements, for assessing body fatness in children and adolescents.⁴⁶⁻⁴⁸

What has been challenged is the representativeness of the population data-set used. The IOTF BMI cut-offs used data-sets from Brazil, Great Britain, Hong Kong, the Netherlands, Singapore and the United States, which reflect Western populations the most and lack representation from other parts of the world, namely Africa, West Asia, and the greater Pacific region. This has implications for defining obesity across different non-Western populations, and a local debate has since ensued about the validity of BMI as a measure of obesity for Pacific or Polynesian populations in New Zealand.⁴⁹⁻⁵¹

Generalisability of obesity standards across ethnic groups

New Zealand has an ethnically diverse population. According to the latest population statistics⁵², 78.7% of adults (ages 15+) identified as New Zealand European, 14.7% as New Zealand Maori, 9.2% Asians and 6.9% Pacificⁱ. The population profile for New Zealand children however is more ethnically diverse compared to the ethnic profile for adults, with 18% (compared with 6%) identifying with more than one ethnic group. For children, 75% identified as New Zealand European, 24% as New Zealand Maori, 11% Pacific and 7% Asians. The current demographical characteristics of Pacific peoples, (i.e., high fertility, rapid intermarriage, a high population growth rate, and a youthful population) indicate that there is a strong in-built momentum for future growth with an expectation for greater proportions of Maori and Pacific or Polynesians making up New Zealand's population. In 2006, 40% of the New Zealand births were of Maori or Pacific descent.

Although BMI is generally accepted as a reasonable measure of body fatness, there is some, but not consistent evidence showing that the relationship between BMI and adiposity is not constant throughout a population and may vary greatly between ethnic groups both in adults⁵³⁻⁵⁵ and in children.^{56 57} New Zealand-based body composition studies using multi-ethnic samples of adults have found differential body compositions with Maori and Pacific peoples having lower levels of body fat

ⁱ People can choose to identify with more than one ethnic group, called 'Ethnicity-All-Count' therefore percentages do not add up to 100.

than Europeans at any given BMI level.^{51 58-60} Conversely, Asian peoples have higher body fat for any given BMI and have more central or truncal adiposity than Europeans.⁴⁹

The use of international assessment standards has been opposed from a local level particularly for its potential to overestimate prevalence in Maori and Pacific children and underestimate obesity for Asian groups.^{49 61} The scarcity and conflicting evidence on New Zealand children's body composition across ethnicities adds to the complexity of this debate^{62 63}; as well as a lack of strong empirical data on the relationship between BMI, body composition and consequent morbidity and mortality in children.⁴³ For example, Tyrell and others' ⁶³ study examining the relationship between BMI and body composition across ethnicity did not find significant differences between European, Maori, and Pacific Island children in the normal range of BMI (<30kg/m²), but did find significant differences at higher BMI levels, with percent body fat lower in Pacific children at higher BMI (>30kg/m²) levels compared to European children. Their small sample (*n*=93) of Indian children also showed ethnic differences, with Indian children having higher percent body fat at any given BMI compared to European children. Rush et al,⁶² replicated the study for children ages 5-14 years and found no difference in percent body fat and BMI for boys, but found significant differences for girls, with Pacific Island girls averaging 3.7% lower percent body fat than European girls at fixed BMI levels.

The reasons for the different relationships between BMI and body fatness in different ethnic populations is not well understood. Current hypotheses implicate the effects of puberty, gender, sexual maturation, body frame size, lean body mass and body fat distribution on children's BMI and adiposity. In any case, recent Ministry of Health reports ⁵⁰ document the need for large-scale New Zealand based population studies to be undertaken, and in particular, to develop ethnic appropriate measures of body composition for New Zealand's burgeoning multi-ethnic young.

The variant nature of emerging studies for multi-ethnic samples has led most countries worldwide to revise the use of international standards for assessing obesity prevalence and take particular care for assessing obesity prevalence for children and adolescents particularly from multi-ethnic populations. In essence, the compromise has been for nations to make judgements about the appropriateness of classification systems for certain purposes. Within a New Zealand context, the current Ministry of Health practice has been to accept current international advice ⁴⁴ for the use of WHO defined BMI and the Cole criteria as an indicator of obesity in adults and children for the purpose of international comparison and monitoring, and at the same time have adopted New Zealand-based evidence for the use of higher BMI cut-offs for Maori and Pacific adult (ages 15+) groups for the purposes of national monitoring and health policy development.⁵⁰

Ideally, New Zealand needs its own population-specific reference data or cut-offs, and having ethnic-specific BMI charts for Asian, Maori and Pacific children and adolescents would also greatly enhance the assessment and monitoring of obesity in these groups of children. Given that New Zealand national references are nonexistent, the Ministry has followed Australia's practice (who also do not have Australian national references) to use the United States (US) Centre for Disease Control (CDC) BMI percentile charts at the clinical level, but recommend the use of the Cole criteria as the "best available option" for identifying and monitoring population trends of childhood obesity.⁵⁰ In particular, the Ministry recommends clinicians use CDC growth reference charts and other anthropometric measurements (like measuring skinfolds thickness) to predict total body fat for individual children and adolescents, especially at the care management and intervention monitoring phases, and for practitioners also to recognise the limitations the Cole criteria may have when applied to certain ethnic groups.

Obesity Prevalence in Pacific groups

According to the latest national health statistics, the prevalence of obesity in New Zealand adults has more than doubled from 1977 to 2003 (9% in males and 11% in females in 1977 to 20% and 22%, respectively, in 2003).²⁷ Results from this Ministry of Health report on the obesity epidemic for New Zealand confirms that "an epidemic of obesity has occurred in New Zealand over the past quarter century" and may have even began earlier than the 1970s, since about 10% of the adult (ages 15+ years) population were already obese at that time.^{27 (p14)} This number has risen to about one in four adult males and females obese (24.8% males, 26.0% females) by 2006.¹⁰

This trend is also observed for children (ages 5-14 years) with the Children's Nutrition Survey⁹ showing almost one in five children (21.3%) being classified as overweight and almost one in ten (9.8%) were obese in 2002. A marked ethnic variation in prevalence was noted with Pacific children having higher obesity rates across both males and females (26.1% and 31.0% respectively), followed by Maori (15.7% and 16.7%), compared to the NZ European group (4.7% and 6.0%). This ethnic variation continued for Pacific adults (ages 15+ years), with 38% of Pacific males and 47.8% of Pacific females rated obese compared to the total NZ population prevalence of 19.2% for males and 21% females.^{64 65}

These New Zealand results mirror findings from other epidemiological surveys worldwide, with a two to nearly fourfold increase in prevalence of childhood obesity reported from different countries all around the world^{66 67}. In the United Kingdom (UK), Chinn and Rona's⁶⁸ study of English and Scottish children (ages 4-11 years) showed an increase in obesity over a twenty year period during 1974-1994, but particularly in the decade from 1984 to 1994. In the US, Flegal's et al⁶⁹ study from national samples showed obesity prevalence doubling over a 30 year period (1960-1994) for children ages 6-17 years.

US data confirmed small increases in the earlier periods of time from the 1960s to the 1980s with obesity prevalence at 2-4% for both boys and girls, and then a sharp increase during the 1980s period with obesity prevalence for both sexes at 7-8% by 1994. Magarey's⁷⁰ analysis of Australian data showed the same trends with national prevalence of obesity at 1% in 1985 increasing to 5% ten years later in 1995 for Australian children ages 7-15 years.

International data also strongly support the trend for differential obesity prevalence for minorities and migrants in Western societies.⁷¹⁻⁷³ In the UK, Chinn et al.,⁷⁴ examined several ethnic groups from inner city districts, in terms of weight for height and found a clear trend of an increase in overweight in subcontinent Indian children, but not in white and Afro-Caribbean children. This is at odds with North American data, with the US National Longitudinal Survey of Youth showing clear differences between majority and minority groups, with African-American and Hispanic children showing significantly greater obesity prevalence.^{19 75} A study undertaken with indigenous native Canadians in central Canada, confirmed a higher prevalence for children and adolescents ages 2-19 years compared to US based cohorts.⁷⁶ And in Australia, Booth's¹⁷ review of regional and national school-based surveys found higher obesity prevalence for students from European and Middle-Eastern cultural backgrounds.

Epidemiological data show that the high prevalences of childhood obesity observed in developed countries are now increasingly observed in developing countries as well.⁷⁷ The obesity risk groups in developed countries are poor, rural children with low socio-economic status, whereas urban upper class children with Western lifestyles belong to the risk groups from developing countries. Evidence from the Pacific supports these findings with clear differences in the prevalences between urbanised and rural Pacific cohorts, with authors impugning modernisation as the key culprit in the obesity epidemic in developing Pacific countries.^{8 78-80}

Trends in Obesity Prevalence

An increase in the prevalence of overweight and obesity can be either due to a shift of the whole BMI distribution or only part of it. When the entire distribution shifts, the 50th percentile or median will shift as well, indicating all children and adolescents are gaining weight over time at any given BMI. Recent New Zealand data tracking the secular trend of obesity prevalence shows that over the last quarter century (1977-2003) New Zealand's adult (ages 15+) mean BMI has increased; however a much greater increase has occurred at higher percentiles (i.e., increasing skewness) over time.²⁷ Prevalence of overweight remained fairly stable over this period (1977-2003) but a major proportion of the change involved people who were already obese becoming even more obese. Coupled with this, were proportions of people who were already overweight moving up into the obese category and a similar proportion of people who were previously of normal weight becoming overweight. "Overall, the

prevalence of obesity has slightly more than doubled, and that of normal weight has declined by about one-fifth, while that of overweight has remained virtually unchanged".^{27 (p15)}

For children, the only longitudinal data on BMI trends in New Zealand is from a local study in the Hawkes Bay, which tracked obesity prevalence for 11-12 year olds between 1989 to 2000.⁸¹ Results mirror adult trends of increasing skewness in prevalence distribution with greater increases in obesity prevalence (four-fold increase) compared to overweight prevalence (2-fold increase). A recent study of New Zealand adolescents (ages 14-18 years) from low socio-economic areas of Auckland found obesity prevalence increased from 19.4% in 1997/1998 to 30.7% in 2005; with the greatest increases at the high end of the distribution.⁸² International data from the UK⁶⁸, US⁸³ and Australia⁸⁴ similarly report increases in BMI at higher percentiles rather than at lower percentiles, with only moderate increases in the median, indicating a fairly consistent trend with heavy children becoming more markedly heavier over the past 30 years.^{67 71} No empirical evidence for children from developing Pacific countries currently exist however, Hodge's et al⁷⁹ study of adults (ages 25+ years) in Samoa, showed clearly that the distribution of BMI has shifted to the right, both in rural and urban locations and for both sexes, over a thirteen year period between 1978-1991.

Health consequences of obesity

Obesity can be defined as a disease in which excess body fat has accumulated such that health may be adversely affected. It has been shown that childhood obesity is predictive for obesity in adulthood⁸⁵⁸⁶ and obesity related morbidities have also been observed in children, although to a lesser extent than in adults.^{87 88} Excess body-fat is a well-established risk factor for type 2 diabetes mellitus (also known as non-insulin dependent diabetes mellitus NIDDM), coronary heart disease, stroke and selected adult cancers.¹ An analysis of the relationship between BMI and waist circumference (WC) and the prevalence of chronic diseases from data obtained from 2002/03 New Zealand Health Survey for adults (ages 25+ years) showed that increasing BMI or WC was associated with increasing prevalence of cardiovascular disease, diabetes, high blood pressure, high blood cholesterol, osteoarthritis, asthma and sleep disorders both in males and females.⁸⁹

In particular, the association between BMI and WC was strongest for diabetes and blood pressure, with adults in the highest BMI or WC, at 3.5 times more risk of having diabetes and 2-3 times more likely to have high blood pressure compared to those with low BMI or WC.^{90 91} The impact of high BMI on premature mortality was estimated, with 11% or 3154 deaths recorded for New Zealanders in 1997 attributable to higher-than-optimal BMI levels.³⁰ This amounted to 83% of diabetes deaths, 24% of ischemic heart disease, 15% ischemic stroke deaths and 4% of all cancer deaths. This analysis and others^{28 92} further report that small changes in the projected increase in the mean population BMI by 2011 will help prevent approximately 385 deaths annually, mainly from diabetes.

The increased prevalence of obesity in Pacific children and adolescents is believed to have contributed to recent alarming increases in Type 2 diabetes in New Zealand's young people.^{7 93 94} Ministry of Health current statistics state that some 200 new Pacific Island diabetes cases are diagnosed each year and an estimated 136 annual Pacific deaths result from diabetes. Diabetes prevalence for the Pacific New Zealand population is six times greater than that of the general population although these figures reflect diagnosed cases only, and given the insidious nature of diabetes, many undiagnosed cases are accounted for.^{65 95}

While it is generally accepted that obesity is associated with an increased mortality risk for Europeans and Pacific populations in New Zealand, the evidence is less clear from developing Pacific countries. Hodge's review of obesity in native Pacific populations found no strong association between obesity and total mortality in longitudinal studies from Nauru and Fiji, but mortality rates were elevated 3-fold in subjects with Type 2 diabetes, and they concluded that "...given the strong relationships between obesity and risk of NIDDM, prevention of NIDDM by maintenance of healthy body weights should reduce overall mortality in these populations".^{7 (p84)} This would seem to be auspicious advice as reduction in obesity is a major factor in the management of established NIDDM, with a drop in weight lessening the need for insulin dependency and sometimes no other management may be necessary.⁹¹ To that end, a call has been made for population-wide lowering of BMI for overweight and obese individuals as the panacea for diabetes in at-risk groups.⁹⁶

As well as being a risk factor for chronic diseases, a recent international review of the health consequences of childhood obesity also shows that obese children are more likely to experience psychological problems than non-obese children, with the risk of this greater in girls than in boys.⁵ Studies have also shown that obesity in adolescent/young adulthood has adverse effects on social mobility and economic outcomes, with associations again stronger in women than in men.^{88 97 98} For example, Gortmaker's⁹⁹ follow-up study on 370 obese persons aged 16-24 in the US found women who had been overweight, had completed fewer years at school, were less likely to marry, had lower household incomes and higher rates of household poverty, than women who had not been overweight. Results for men who had been overweight, found that they were less likely, only to be married.

As well as causing excess morbidity and mortality, obesity imposes an important financial burden on New Zealand society. The direct cost alone of obesity was calculated at \$247.1 million in 2000/01.¹⁰⁰ This equates to 2.5% of total health expenditure, in line with the global WHO estimate that obesity consumes 2-7% of developed countries' annual health budgets.¹ In developing Pacific countries, the proportion of health funding associated with non-communicable diseases, primarily from obesity and Type 2 diabetes consumes greater proportions, with almost 60% of the Tongan health budget and 39% of the Fiji annual health budget spent on health care.¹⁰¹

Causes of Obesity

Obesity is not a single disorder but a heterogeneous group of conditions with multiple causes. Body weight is determined by an interaction between genetic, environmental and psychological factors acting through the physiological mediators of energy intake and expenditure. Although genetic differences are of undoubted importance, current literature states that the marked rise in the prevalence of obesity over a short 25-30 year period must be influenced more by behavioural and environmental changes.^{66 102-104}

The Role of Nutrition and Physical Activity in the Obesity Epidemic

In particular the role that nutrition and physical activity play in the obesity epidemic, has been investigated more extensively than any other area, as proximal measures of body fatness which is a function of energy intake (nutrition) and energy expenditure (physical activity). While the physiological explanation of obesity can be rendered obvious as an energy imbalance (too much nutritive energy and not enough physical activity), the specific aetiology of obesity at the population level remains largely unknown. Current surveillance methods have not provided consistent results on diet and physical activity patterns in accordance with obesity prevalence and there is little consensus yet on the relative importance of eating versus physical activity in the rise of obesity over this time.^{103 105}

Patterns of nutritional intake and behaviours of Pacific groups in New Zealand

Worldwide trends indicate that total energy or total calorie intake has been stable for both adults and children and yet obesity prevalences have generally doubled over the same time period.¹⁰⁶ New Zealand data seem to concur with international records. New Zealand based national nutrition surveys found adult males generally have higher median usual daily energy intake than adult females and for children, energy intake increased with age.^{9 107} This was related to body size differences by gender and increases by physical growth through age. By ethnicity, Pacific children had comparable energy intake (8863 kilojoules (kJ) for Pacific males; 7871 kJ for Pacific females) with NZ European children (8972 kJ males; 7518 kJ females), while Maori children (9609 kJ males; 8590 kJ females) had the highest median usual energy intake.⁹

The 1997 National Nutrition Survey for adults aged 15 years and older was severely limited in its analysis of Pacific peoples' nutrient intake due to the small sample size of 307 Pacific adults captured from a total sample size of 4,636.¹⁰⁷ Nevertheless it found similar usual daily median intake between Pacific males (11,726 kJ) compared to an intake of 11,631 kJ for all males (total sample), while Pacific females showed higher intakes at 8,630 kJ than total sample female intake of 7,701 kJ. Due to the inadequate Pacific sample size these comparisons could not be analysed for significant effects but the

patterns at least do not seem to match the disparate obesity prevalence between Pacific groups and non-Pacific in the New Zealand environment. Furthermore, no difference in energy intake by socio-economic status measured by small area deprivation NZDep quartiles, was observed in 1997.¹⁰⁷ Interestingly, the higher energy intake for male adults was attributed to their greater lean body mass and greater average body weight relative to females. The differences in lean body mass by ethnicity, particularly between Pacific or Polynesian groups may also relate to differences in energy intake, although this was unexplained in both surveys.

The evidence from research into children and adolescent's dietary intake and its association with body weight is generally conflicting with reviews showing no evidence to support the proposition that overweight and obese young people consume more calories than other children and adolescents of their age group.^{108 109} Research into adolescent dietary intake suggests this particular life-stage poses significant risks in health promoting nutritional behaviours, with adolescents more likely to skip meals and generally consume less energy from food than they require, particularly amongst teenage girls.¹¹⁰ ¹¹¹ Current data from studies of childhood overweight and obesity from the US, France, Australia, Britain and Spain suggest that overweight and obese children may actually consume less energy, particularly (but not only) when energy intake is expressed as a proportion of body weight.^{109 112} Analysis of the affiliated OPIC New Zealand data supports overseas trends with overweight and obese adolescents showing better nutritional behaviours than their healthy weight counterparts.¹² The 2002 Children's Nutrition Survey data also show no positive relationship between New Zealand's children's average energy intake and obesity rates.^{9 113}

Methodological weaknesses, particularly the use of self-reported tools, different dietary recall timeframes and survey items to assess dietary intake are often blamed for the inconsistent results. Generally, food intake is difficult to measure accurately for population groups with children, adults and the overweight often underreporting foods and serving sizes, particularly when there are strong social desirability effects in social environments.¹¹⁴⁻¹¹⁸ Further analysis of the affiliated OPIC study data suggests that adolescent weight control attitudes may have a confounding effect on nutritional behaviours consequently affecting dietary intake and ensuing survey results.¹¹⁹ This study suggested that overweight and obese students who wanted to lose weight may actually be already adopting positive dietary changes by consuming more fruits and vegetables and decreasing consumption of energy-dense snack foods than their healthy weight counterparts. These interactions were particularly strong from an adolescent sample that was overrepresented in the overweight and obese categories. Fifty-seven percent of the OPIC sample of 3500 adolescents was overweight or obese and 50% of the sample was trying to lose weight. Furthermore, cross-sectional studies were recommended to exclude participants who are currently trying to lose weight from future analyses examining the relationships between BMI and nutritional behaviours as the confounding effects may misinform future intervention

strategies.^{119 120} The 1997 National Nutrition Survey for New Zealand adults reported approximately a third of the adult population were engaging in weight loss behaviours.¹⁰⁷

Other researchers in the field support such moves away from epidemiological surveys that try to associate risk of weight gain or obesity to aggregate 'bottom-line' estimates of diet intake and physical activity expenditure, as the associations are not related to behaviours which, from an interventionist point of view are much more meaningful to identify.^{45 111} For example, Crawford & Ball¹⁰³ suggested that while a diet that is high in fat is likely to play a role in weight gain, fat intake is not a single behaviour, but the product of a multitude of eating and other food-related behaviours such as eating cake, drinking full-cream milk, increased food portion sizes, eating purchased snacks or takeaway meals, or using deep frying cooking methods. Assessing the role of dietary behaviours in the aetiology of weight gain, that is, trying to understand the eating behaviours underpinning a high-fat diet is much more likely to provide clues as where to intervene to prevent obesity.

Therefore, current evidence is less certain about obesity as being mainly an overeating problem and suggestions have been made instead about the importance of particular types of foods. Foods that are either too high in fat and sugars, and a daily diet too low in fibre content, may also have an influence on body weight.³⁶ With regards to high-fat diets, popular assessments made in the literature include a variety of food habit and behaviours. The most popularly surveyed include consumption of dairy products, energy-dense snack foods, use of fats and oils in cooking methods, frequency of takeaway meals and trends in eating out occasions.¹²¹ Surveys of diets high in sugar content include assessing consumption of sugary beverages, most popularly known in New Zealand as fizzy drinks and also sweet confectioneries. Fruit and vegetable intake is most frequently used to assess positive fibre content of individual diets. Surveys of food habits and dietary patterns, such as frequency of snacking, meal skipping, eating together as a family and diet restriction or diet cycling, are also prolific in the literature for assessing diet quality and its impact on body weight.^{111 122-124} An analysis of these key food and dietary patterns is presented below from New Zealand based data with particular reference to Pacific ethnic groups.

High-fat diets

The current WHO guidelines recommend 15-30% of total energy be consumed as fat.³⁶ New Zealand data indicate that the percentage contribution of total energy from fat has declined from 37.5% to 35% for the adult population between 1989 to 1997.¹⁰⁷ However, mean percentage of daily energy intake from fat is associated with higher BMI levels.¹²⁰ Furthermore, lower socio-economic groups had higher fat intakes than well-off groups and in the New Zealand context, this was observed for Pacific and Maori adults and children who occupy the most deprived social grouping category.^{10 125-127}

The Children's Nutrition Survey found Pacific (males 35%; females 34.3%) and Maori (34.2%; 34%) children had slightly higher mean percentage of daily fat intake than New Zealand European children (32.6%; 32.3%). Pacific and Maori children also purchased school lunches more frequently than New Zealand European children and consumed some high-fat foods particularly hamburgers and meat pies.^{9 128} The OPIC study found similar high-fat dietary behaviours with Pacific adolescents showing comparable patterns with Maori adolescents. Both purchased school-based foods significantly more than European and Asian adolescents, preferring pies and hot chips as after-school snack foods and eating takeaway meals more than once a week for dinner meals.¹² Metcalf's et al.¹²⁷ study found the higher fat intake of Pacific adult diet was due to eating habits and cooking methods, with Pacific adults more likely to eat most or all of the fat on meat foods and to use animal fats such as butter, lard or dripping rather than olive/canola or vegetable-based oils for cooking food.

High-sugar diets

International data are more agreed on the association between having a diet high in sugar, particularly through the intake of sugary-beverages, and increased risk of obesity.^{36 129-131} Fizzy drinks are the most popularly assessed food item as they contribute a high-dosage of sucrose, have little nutritional value, contain acids contributing to dental caries and may displace more nutritional fluids such as milk which is important for children's health.¹³¹ New-Zealand based data support current trends with high-sugar diets mediating children's BMI.^{120 130} There are also consistent patterns of intake by ethnicity and deprivation, with Maori and Pacific children and adolescents, and those from the most deprived neighbourhoods, showing higher consumption of fizzy drinks compared to New Zealand European children and young people from the least deprived areas.^{10 12 132 133} One study found high-sugar intake was associated with accessibility and purchasing power, with children using the school canteen or tuckshop as their main source of school food and being much more likely to choose fizzy drinks to consume than other drinks offered.¹²²

Fruits & Vegetables and high-fibre diets

Populations are recommended to eat at least three servings of vegetables and two servings of fruit each day, based on evidence linking vegetables and fruits for their health protective properties, particularly for specific health conditions like heart disease, stroke, high blood pressure and some cancers.³⁶ The evidence of its specific influence on obesity risk is weaker with New Zealand data showing fruits and vegetables having no association with adolescent or children's BMI levels, and intakes not differing markedly by deprivation or ethnicity.^{12 123 125 132} One longitudinal study did find a positive association with BMI among pre-school aged Pacific children, with a higher proportion of fruit and vegetables intake being associated with a lower BMI and weight gain from birth to 4 years.¹³⁴ However, the data on adult fruit and vegetable and fibre intake are conflicting with some showing adequate intakes mediate BMI with Pacific adults consuming less than the recommended amounts,¹²⁶

¹³⁵ while others found no association with obesity status with Pacific adults having comparable or better fruit and vegetable intakes compared to other ethnicities.^{127 136} Recent data suggest that generally Pacific adults and adolescents are meeting the current guidelines for fruit intake but not for vegetables.^{10 12 135}

Food & eating patterns

Reviewing available New Zealand data on food and eating patterns of Pacific groups, showed Pacific children ¹²⁸, adolescents ¹² and adults ^{137 138} skipped meals, with breakfast meals being the most assessed in the literature.^{10 139} Pacific children and adolescents also had higher snacking frequency and food purchasing habits for breakfast and school lunch meals compared to other ethnicities.^{12 122} A recent study of Auckland children ages 5-11 years found purchasing school lunch behaviours was positively associated with children's fat status.¹²⁰ Pacific adolescents reported having regular family meals which were associated with positive nutritional behaviours such as limiting television use, fruit availability at home, consuming the recommended fruit and vegetable servings and receiving parental support for healthy eating.¹²⁴ However, having regular family meals was not associated with accessibility and consumption of many high fat/high sugar foods, which may suggest that the immediate environment surrounding the home and other neighbourhood institutions, like schools, may be saturated with easily accessible energy-dense foods which family food habits could not influence. Studies on Pacific adult eating habits found that the higher fat-intake by Pacific adults was related to increased meal portion sizes and the increased frequency of eating certain foods like chicken, fish, eggs and bread.^{126 127}

Physical activity patterns of Pacific groups in New Zealand

A review of nutritional patterns puts the origins of obesity into question: overeating and fat intake may not be the major culprits in weight gain they were once thought to be and some experts suggest over-consumption of rich foods may well be part of the problem, but perhaps only when combined with inactivity and sedentary living.^{106 140-142} Like dietary intake, physical activity is also a complex phenomenon, made up of disparate behaviours which are often poorly conceptualised and hard to measure with any accuracy. For example, a person is described as being physically active if they engage in one or more of a vast number of individual behaviours that together result in energy expenditure above resting metabolic rate. Such daily behaviours could include but certainly not limited to, walking as a means of transportation, lifting heavy items for employment, gardening or domestic chores, running for exercise, playing an organized sport, swimming for pleasure, or dancing and kapa haka (Maori dance) for cultural performances. In addition, behavioural researchers go further to state that physical inactivity should be looked upon not simply as the absence of physical activity, and that the identification of the behaviours of physically inactive individuals is also important to understand in terms of its relation to weight gain.^{45 103} This would allow for better obesity-risk behavioural profiling

and be beneficial for obesity prevention efforts in the future. For example, sedentary behaviours could include television viewing, driving a car or other inactive forms of transportation, sitting and reading, working on a computer, playing electronic games or using mobile technology. Qualitative studies using life-course methods to capture usual daily behaviours across a number of domains is probably the best research process for capturing not just discrete activity but also all other inactive behaviours.

Youth physical activity trends and determinants

In any case, obesity and being physically inactive are the two most prevalent risk factors for common chronic diseases in the Western world.¹⁴³⁻¹⁴⁶ Having a physically inactive lifestyle has been shown to be a risk factor for weight gain with age.¹⁴⁷ Current surveillance data both worldwide,¹⁴⁸⁻¹⁵² and in New Zealand,^{9 10} show fewer than half of adolescents meet current guidelines for physical activity. New Zealand national guidelines for physical activity was the same for both adults and children, set at 30 minutes of physical activity for at least 5 days of the week. The guidelines for children and adolescents (ages 5-18 years) were recently reviewed in 2007 and the recommended standard is now set for at least 60 minutes of moderate to vigorous physical activity per day.

Current New Zealand studies show conflicting results, with some showing Pacific adolescents physical activity rates to be higher compared to non-Pacific,^{9 12 128 153} whereas other national studies show lower rates for Pacific youth.^{154 155} Inconsistent methodologies using subjective measurement tools can render variable results.^{156 157} Scientists agree on the need for objective measures for physical activity.¹⁵⁸⁻¹⁶² The best available New Zealand based data assessing children's physical activity by objective measures, using multi-day memory pedometers to estimate physical activity levels over five days and analysing these levels against BMI, did find the expected positive correlation between physical inactivity and higher BMI in New Zealand children.^{120 163}

Reviews on the determinants of physical activity have shown that individual, social and environmental variables affect youth physical activity.¹⁶⁴⁻¹⁶⁷ Literature on adolescent physical activity has shown clear trends for New Zealand data which concur with international trends. Boys are more active than girls^{152 168-171}; in multi-ethnic populations, different ethnic groups participate at unequal rates^{123 150 169 172}, participation generally declines with age^{168 173 174}; physical self-efficacy is a strong predictor of future physical activity¹⁷⁵⁻¹⁷⁷ and peers, siblings and parents are key influencers of youth activity.^{166 178 179} Furthermore, youth physical activity participation is affected by weather and variable seasons,^{180 181} and objective measures of physical activity have shown clear patterns of activity with children engaging in intermittent high-intensity exercise, rather than sustained bouts.^{182 183} In addition, inactive or sedentary activities, such as time spent sitting or watching television has been shown to be related to low levels of physical activity.^{108 184-187}

Adult physical activity trends

A review of the correlates for adult physical activity concluded that despite methodological difficulties for assessing physical activity among the general population, both cross-sectional^{146 188-190} and prospective studies¹⁹¹⁻¹⁹⁴ show “an overwhelming case in favour of the conclusion that physical activity (especially discretionary leisure-time and recreational physical activity) is strongly related to successful long-term weight maintenance”.^{195 (p259)} What can be drawn from the available literature in this field is that: low levels of physical activity are a risk factor for weight gain; sedentarism is more common in obese people; and regular physical activity changes body composition and contributes to weight loss and weight maintenance.^{37 144 191 193} The current guideline for adult physical activity in New Zealand is 30 minutes of moderate intensity physical activity for at least 5 out of 7 days of the week. The recent SPARC report showed only 48.2% of all New Zealanders are meeting current guidelines for adult physical activity and Pacific adult physical activity levels were higher than the national average with 52.6% Pacific adults assessed as being active.¹⁹⁶ This conflicted with the National Health Survey data which showed Pacific adults have lower physical activity levels than European and Maori groups. In addition, Pacific men and women were significantly more likely (1.52 and 1.40 respectively) to be sedentary compared to the total population.^{10 65}

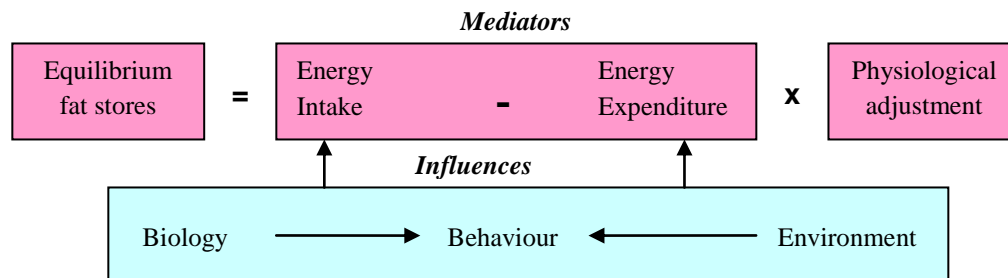
Limitations in using self-reported data for collecting nutritional and physical activity patterns and behaviours are likely to continue to fuel the debate between the relative contribution of over-nutrition and under-activity in the aetiology of obesity. The Children’s Nutrition Survey found that while Pacific children showed high intake of some fatty foods compared to their NZ European counterparts, there were no differences observed in total energy intake from food, and Pacific children consumed more daily fruit portions than other ethnicities and were more physically active than NZ European. This resulted in the authors making this conclusive statement “The relative contributions of nutrition and physical activity to obesity are not fully understood; for New Zealand children, it may be that excessive consumption of high-fat/high-sugar foods is driving excessive weight gain more so than inadequate physical activity”.^{128 (p54)} As both nutrition and activity are the fundamental elements of the same energy balance equation, it may be the case that it is not simply a matter of one or the other, but a closer interaction between the two which influences weight gain (or weight loss) in ways not yet fully understood. In any case, both sides of the debate need to develop better objective tools for measuring the key behaviours contributing to the aetiology of obesity and studies that investigate both elements concurrently are likely to be more advantageous in elucidating the possible interactions between the two behavioural traits.

The role of Environmental factors in the Obesity Epidemic

The reasons why energy imbalance is common in New Zealand, and indeed in all Western countries, are complex and will require both macro and micro investigative efforts to elucidate. Swinburn's 'ecological model' of the causes of obesity (Figure 2.2) regards obesity as a normal response to an abnormal environment.¹⁰⁴ Biological factors such as genes, ethnicity, gender, hormonal and other heritable factors, explain much of the variance in body fat between individuals within a given environment, however, they do not explain the large population increases of the obesity epidemic, which shows itself across gender and across multi-ethnic populations. To that end, obesity experts generally agree that environmental influences on individual behaviour, which are much more modifiable than biologic influences have the greatest potential for explaining and managing the obesity epidemic.

Figure 2.2: The ecological model of the causes of obesity¹⁰⁴

Source: Egger & Swinburn, 1997, p. 478¹⁰⁴



Macro-environmental analysis of obesity aetiology

A useful description of how environmental changes may impact on epidemic population obesity has been provided by Greg Critser¹⁹⁷ and others.^{102 121 198 199} Critser's socio-historical and macro-environmental analysis details how changes in the American environment over the last 30 years, which has been replicated to some degree throughout most of the developed world, has led the US to its current status as the leading Westernised country with epidemic obesity. A number of inter-related and compounding environmental factors interplay with one another to produce what Swinburn refers to as "obesogenic environments" which affect individual lifestyles in significant ways and promote obesity inconspicuously.¹⁴

For example, Critser proposed that the economic changes in the 1970s led to changes in American agriculture resulting in a surplus of cheap fats and sugars which in turn allowed a huge variety of cheap fast-food and super-sized energy-dense snacks to be developed for American palates. In addition, the roles of society, schools and parents as custodians of caloric intake were eroded in the 1980s. Societal changes led to parenting changes: both parents were now working, parents were left with less time or inclination to supervise their children's meals, and more meals were being eaten outside the home with loss of control over portion sizes and the nutritional content of meals.^{102 121 200} New ideas about food and children came into vogue in society. Research suggested children should eat more frequently than three times a day and that children should be allowed to self-moderate their food intake²⁰¹ – this was associated with an increase in snacking on energy-dense micronutrient-poor foods which was most prevalent among the poor.²⁰²

Moves to limit taxation in the late 1970s^{203 204} also left schools competing for money with other public services and led to budget cuts that curtailed physical education, stopped subsidisation of school cafeterias (thus leading to an entrepreneurial rather than a nutritional food environment), and thereafter super-sized and fat-laden fast foods and soft drinks entered American schools.²⁰⁵ Coke purchased 'pouring rights' in schools by providing them with monetary remuneration in return for selling and advertising rights^{206 207} which led to children drinking Coke and other soft drinks in place of milk and nutrient-rich foods.

Increases in calorie consumption were not matched by compensatory increases in physical activity; instead a decline of physical exercise in schools across the USA was taking place. Complex forces combined to erode PE at school. A climate of budgetary constraints, declining national productivity and job growth, coupled with declining school math and science scores, parents' collective 'bad memories' of failure and humiliation in PE, and a societal change towards individualised rather than group exercise with the advent of private gyms and 'aerobics', led to PE teachers being sacrificed in favour of 'higher' academic priorities.²⁰⁸

Societal attitudes to exercise were also changing. Exercise was no longer seen as a way to better one's performance in everyday life but as a means to reduce the risk of chronic diseases, with only moderate exercise prescribed for the latter, replacing more vigorous exercise prescribed for the former.²⁰⁹ Unfortunately, the moderate exercise prescription of the 1990s coincided with a time of unparalleled opportunity to be both sedentary through the advent of labour-saving technology and household devices, e.g., microwaves, dishwashers, electric gates and garage-doors. Urban design, which promoted urban spread, changed the way Americans commuted with notable increases in the use of private car modes for daily transportation¹⁰⁵ with an ensuing decrease in walking, cycling or public transportation usage from the growing suburbia populace.

Television viewing hours rose in the 1980s as time-constrained and isolated parents used television as a baby-sitter. Advertising of fast foods increased rapidly and children and parents were sitting watching hours of TV full of billion-dollar cues to eat even when one was not hungry. In addition, the socio-economically disadvantaged were viewing most TV and exercising least, and this was found to be associated with poorer neighbourhoods affording less safe environments for physical activity and a strong inverse association between duration of TV viewing and weekly exercise was observed.^{35 108 186}

Ball & Crawford²¹⁰ identified key socio-environmental changes that have coincided with the obesity epidemic in developed countries. The significant changes in household composition and family structure, with the decline in the traditional two-parent families and the rise of single-parent households which has doubled over the same thirty year period, has coincided with the increase in obesity. Divorce rates doubled and a greater proportion of single person households grew, particularly for men. Changes in the labour market saw greater proportions of women entering the labour force, along with a decline in manufacturing and an ensuing increase in the financial and business sectors, and longer working hours (50 hours/week) becoming the norm.

In addition, patterns of migration changed significantly over this time, with countries becoming more ethnically and culturally mixed than ever before. Income inequalities which are attributable to substantial economic shifts in developed nations, have resulted in a growing economic divide between the most and least disadvantaged.²¹¹⁻²¹³ Empirical data already support a socioeconomic effect on obesity and studies that elucidate how being in an economically disadvantaged position affects key nutritional and physical activity behaviours, should be encouraged. Some authors propose that this type of research should be prioritised and not just encouraged, as not doing so would further exacerbate existing socio-economic inequalities in obesity prevalences and general health status.^{210 214}

The complex factors identified by Critser¹⁹⁷ and others^{198 199 214} aid our understanding of how environmental factors can be pervasive and powerful forces driving the obesity epidemic. A similar historical analysis that links the obesity epidemic with environmental factors has not yet been carried out for NZ. As noted by Egger and Swinburn,¹⁰⁴ environmental influences represent the public health arm of the obesity problem with obesogenic macro-environments almost always overriding the more limited effect of programmes aimed at individual behaviour, making healthy choices that much difficult at the individual level.

Empirically defined environmental factors that may protect or promote obesity

In 2003, the WHO compiled a list of the environmental factors that research has shown to promote or protect against weight gain and obesity, divided according to the strength of the available evidence (Table 2.1).³⁶ Convincing evidence exists for the protective function of regular physical activity against unhealthy weight gain, with data showing sedentary lifestyles, particularly sedentary occupations and inactive recreation (e.g., television watching), promoting weight gain. A reduction of 30 minutes of television viewing a day has been shown to be effective in reducing weight, particularly as it has been found, that children, more often than not, eat high energy-dense micronutrient poor foods or snacks while watching television.^{21 186 187 215}

Table 2.1: Summary of strength of evidence on factors that might promote or protect against weight gain and obesity^a

Source: World Health Organization, 2003, p.63³⁶.

Evidence	Decreased risk	No relationship	Increased risk
Convincing	Regular physical activity High intake of dietary fibre ^b		Sedentary lifestyles High intake of energy-dense micronutrient-poor foods ^c
Probable	Home and school environments that support healthy food choices for children ^d Breastfeeding		Heavy marketing of energy-dense foods and fast-food outlets ^d High intake of sugars-sweetened soft drinks and fruit juices Adverse socioeconomic conditions (in developed countries, especially for women) ^d
Possible	Low glycaemic index foods	Protein content of the diet	Large portion sizes High proportion of food prepared outside the home (developed countries) "Rigid restraint/ periodic disinhibition" eating patterns
Insufficient	Increased eating frequency		Alcohol

^aStrength of evidence: the totality of the evidence was taken into account. The World Cancer Research Fund schema was taken as the starting point but was modified in the following manner: randomised controlled trials (RCTs) were given prominence as the highest ranking study design (RCTs were not a major source of cancer evidence); associated evidence and expert opinion was also taken into account in relation to environmental determinants (direct trials were not usually available).

^bSpecific amounts will depend on the analytical methodologies used to measure fibre.

^cEnergy-dense and micronutrient-poor foods tend to be processed foods that are high in fat and/or sugars. Low energy-dense (or energy-dilute) foods, such as fruit, legumes, vegetables, and whole grain cereals, are high in dietary fibre and water.

^dAssociated evidence and expert opinion included.

Increasing evidence exists showing that passive over-consumption of calories from energy-dense foods, that is, foods that are high in fat and sugar and low in water and fibre, and particularly the consumption of sugary beverages, promote weight gain.^{215 216} The New Zealand Children's Nutrition Survey⁹ showed an increasing number of New Zealand children (ages 5-14 years) drink carbonated beverages at least weekly (45%), with the highest intake by Maori and Pacific children, matching their higher obesity prevalences.

A growing consistent body of evidence associates obesity with lower socio-economic status in developed countries, particularly among women. The WHO¹ report suggests this is because people living in deprivation are most at the mercy of obesogenic environments, with their eating and activity behaviours set at the "default choices" on offer, for example, food choices limited by cost or whatever is geographically available. Current studies have not elucidated whether the association between SES and obesity is bi-directional, nor are the mechanisms through which SES influences food and activity patterns clear, but longitudinal studies have shown a consistent effect with SES predisposing obesity.¹⁶
^{19 210 217-219} In New Zealand, prevalences of overweight and obesity are highest amongst Maori and Pacific children, adolescence and adults, who also have low socio-economic status and live in highly deprived urban regions.^{220 221}

The WHO³⁶ review also identified possible causes of overweight and obesity, although more research and clinical trials are needed to establish associations with greater certainty. Factors such as 'super-sized' food portion sizes, eating foods prepared outside of the home, and alcohol consumption currently show inconsistent interactions, and need further investigation to warrant defining them as protective or causative factors of obesity.

The role of socio-cultural factors in the obesity epidemic

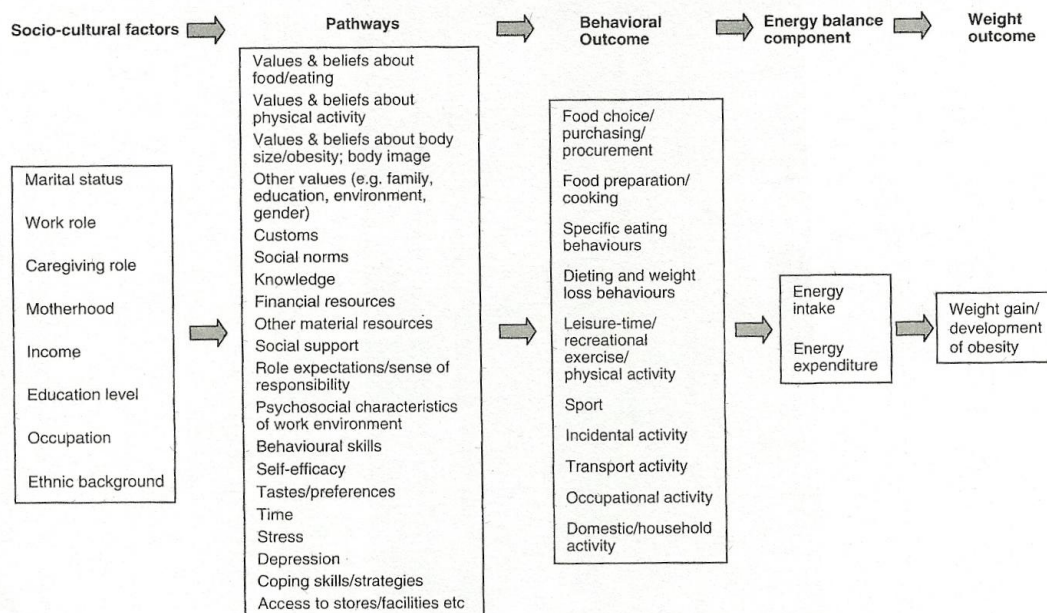
Obesity is socio-culturally distributed, that is the prevalence of obesity varies according to socio-cultural factors, including socio-economic position, social roles and circumstance, and cultural factors.²¹⁰ Ecologic models of behaviour, and most health promotion models, specify that health behaviours are influenced by biologic, demographic, psychological, social-cultural, environmental and policy variables.^{142 222 223} However, very little attention has been paid to social aspects of the environment that might impact on obesity, or operate within families, social groups, institutions (such as schools, workplaces, churches) or communities. Potential socio-cultural (or socio-environmental) determinants of obesity include social circumstances, such as economic and material wealth, but also social norms regarding body weight, physical activity and eating, levels of social support for obesity-

protective behaviours, social capital, social and cultural customs, values or expectations for what is important in relation to the role of food or the acceptability of vigorous exercise.¹⁶

Past research has focussed primarily on the effects of socio-economic status on adult weight change, but has missed the opportunity to view adolescent behaviours in the same light, as if to deny the effects of a social environment on their eating and physical activity behaviours. Ball & Crawford¹⁵ believe this is due to the difficulty in measuring factors such as cultural values and beliefs which will require more creative methodologies. Nevertheless they called for further investigations into how culture influences behaviours and its impact on obesity risk. To that end, Ball & Crawford proposed a model (Figure 2.3) of socio-cultural influences on obesity which captures the mediating socio-cultural influences on diet and physical activity behaviours resulting in a particular weight outcome. The model is an attempt to provide a theoretical framework for making plausible links between socio-cultural factors, dietary and physical activity behaviours and obesity, with the authors imploring future researchers to amend the model as new evidence comes to light. The key objective of this thesis was to explore the socio-cultural factors that may affect food, eating, physical activity and body image behaviours in Pacific groups in the New Zealand context. Taking a lead from the conceptual model below, key socio-cultural areas were assessed including: social circumstances through economic and material wealth, i.e., socio-economic status; social norms, values or beliefs regarding food and eating, physical activity and body weight; social capital, i.e., knowledge of obesity-risk behaviours; and last, levels of social support for health promoting behaviours.

Figure 2.3: Conceptual model of pathways linking selected socio-cultural factors with obesity

Source: Ball & Crawford, 2005a, p.45¹⁵



The following section will review the nature, scope and findings of literature on socio-cultural factors affecting food and eating, physical activity and body image behaviours of Pacific people in the New Zealand environment.

Socio-economic status and obesity

The limited New Zealand data currently support international studies showing moderate to strong associations between socio-economic status and obesity prevalence, with those occupying low socio-economic status at greatest risk of obesity.^{9 10 113 128} The 2006/07 New Zealand health survey concurred with results of the earlier Children's Nutrition Survey which showed obesity prevalences for children were related to neighbourhood area level deprivation scales, with children living in the most deprived neighbourhoods having the highest obesity levels, for both boys and girls.^{9 10}

Duncan's et al.'s¹²⁰ recent study of Auckland children ages 5-11 years used school decile ratings to measure neighbourhood deprivation and found children from low SES group were 1.6 and 2.7 times more likely to have excess body fatness than children in the middle and high SES groups respectively. Interestingly, further analysis of body fat by Polynesian ethnicity (mixing both Pacific and Maori groups together) adjusted for sex, age and SES levels negated the disparate body fat levels between Polynesian and European children. The authors suggested that ethnic differences in obesity may be inflated for Polynesian groups through their overrepresentation in the 'at risk' low socio-economic position in New Zealand. The authors went further to state "Thus, the traditional view that children of Polynesian descent are predisposed to obesity may largely reflect socio-economic disadvantages rather than cultural or genetic influences."^{120 (p143)}

Other authors have made references to the confounding nature of ethnicity and socio-economic status in their analysis of obesity-risk behaviours.^{120 128} However ethnicity comparisons are still much more popular in the New Zealand literature than socio-economic analyses. This may be related to methodological convenience as it is much easier to gather ethnicity data than socio-economic variables. Most studies including national surveys take a narrow gaze of social rank by using one single dimension to measure socio-economic status.^{9 10} The most popularly used is the New Zealand deprivation quintile. However, area-level deprivation is closely related to the ethnic composition of the area²²⁴ and does not necessarily measure personal or household levels of socio-economic status.

A recent Ministry of Health report²²⁰ looking at the effects of social status on adult body size, used two markers to assess obesity-body mass index and waist circumference; and went further than most studies in New Zealand by assessing socio-economic status at three different levels using individual educational status, household income levels, and neighbourhood deprivation quintiles. The study found there was a strong association between socio-economic status measured at the individual, household and neighbourhood level for both markers of body fat. However, the relationships were

modified by both gender and ethnicity. There was a limitation in this report, with no analysis of Pacific ethnicity and social status due to limited sampling of Pacific groups in the 2002/03 New Zealand Health Survey. This meant analysis could only be completed between Maori and non-Maori, with Pacific and Asian sub-populations added to the non-Maori group for comparison. This study found that for New Zealand European females there was a strong inverse socioeconomic gradient for BMI and WC, for New Zealand European males a shallower inverse gradient and for Maori females little if any relationship. However for Maori males, a strong direct gradient was observed. That is, among Maori males, higher socioeconomic status was associated with a larger BMI. The different patterning of socioeconomic gradients in obesity prevalence by gender and ethnic groups was said to reflect differential timing of the obesity epidemic in these population groups which may have implication for designing obesity intervention programmes across gender and ethnic groups.²²⁰

Overseas studies suggest that socio-economic status (SES) mediates health promoting behaviours. Higher SES is associated with a better diet and better nutritional knowledge.²²⁵ There is good evidence of SES variations in body image and weight control attempts,²¹⁷ values about diet and health,^{226 227} confidence in cooking skills and having discretionary income for food and recreation.^{16 228} Studies on the food and physical activity behaviours of communities in low socio-economic positions show the exact opposite trends.^{226 228-230} For example, making poorer dietary choices and reported lack of knowledge, not necessarily about healthiness of foods but about cooking or knowing how to prepare nutritious, low cost and tasty foods, were behaviours most observed in low SES communities.^{16 229} Cost and healthy food availability and access were key factors mediating food choices.^{121 231-237} Limited New Zealand data concurred with overseas studies, showing lack of money, lack of motivation, health problems, transport to supermarket, lack of cooking knowledge and lack of time to cook were the main barriers to healthful eating for low-income New Zealanders.²³⁸

Social norms, attitudes, values or beliefs about food and eating

The current research base seems to suggest that socio-cultural factors do play an important role in influencing eating, physical activity and sedentary behaviours, and thus risk of obesity. Evidence of cultural differences in attitudes to food, for instance, was demonstrated in a study by Rozin and others²³⁹ which demonstrated substantial between-country differences in attitudes, with Americans most likely to associate food with health rather than pleasure and the French being the most pleasure oriented and least food-health oriented. Across gender, the Americans were the health extreme, altering their diet more often in the service of health while the French and Belgians the most pleasure extreme did not. However, the authors noted the irony of differential health status between these countries, with cardiovascular disease occurring at much lower rates in France than in the USA, the so-called “French paradox”. The authors go further to say that medical literature presumptions about the composition of foods (e.g., fat and sodium levels) as the critical aspect of food influencing longevity

might not be as important as attitudes towards food, and food-related stress and food concerns that differ across countries may be a negative influence on health. Cultural values such as a consumerism may drive Western societies towards increased purchasing of foods and convenient meals.¹⁹⁸ With regards to physical activity, environmentalism may affect people's transport choices in the future, with more people taking active transport modes (e.g., walking and cycling) rather than passive fuel-dependent transportation. The impact of such values like individualism and secularism on dietary and physical activity habits have thus far been noticeably absent in scientific research field and should be explored.

Only recently have New Zealand data become available regarding the socio-cultural factors influencing food, eating and physical activity behaviours, as a consequence of government policies to increase population levels of physical activity and healthy eating practices.^{32 240} Commissioned reports by government agencies such as the Health Sponsorship Council and SPARC, have attempted to identify social norms around food, eating and physical activity with some analysis by ethnicity.²⁴¹⁻²⁴⁴ The reports have been written to meet specific objectives, namely to develop further government policies and interventions around increasing healthy eating and healthy action (HEHA strategies) for New Zealand's population. Given the dearth of information on socio-cultural factors, qualitative methods were used to explore constructs such as attitudes, motivations, barriers and enablers of healthy eating for all population groups in the New Zealand context. The sampling strategy included relatively equal numbers of focus group ($n=18$) and individual interviews ($n=48$) across the four main ethnic groups of New Zealand European, Maori, Pacific and Asian, with equal numbers recruited along socio-economic status.

The Health Sponsorship Council (HSC) report *Healthy Eating in New Zealand Families and Whanau*²⁴¹ is comprehensive and outside the parameters of this review to describe here. The main findings of the report detail New Zealanders' attitudes and eating practices for breakfast, lunch, dinner, special occasion meals, particular foods like snacks, takeaways, vegetables, fruit, fizzy drinks and alcohol, food preferences, food dislikes, food limits, signifiers of healthy eating, perceived benefits and drawbacks of healthy eating, level of concern about healthy eating, food roles and responsibilities, decision-making dynamics, eating rules and guidelines, healthy and unhealthy eating messages, communications (internal and external to families) and influential communication channels. Findings were reported for the total sample and there were more similarities between ethnic groups in food and eating attitudes, motivations, barriers and enablers than there were differences. The study did report differences by Pacific ethnicity when observed which are detailed below. The HSC report findings are summarised below; its findings supported by other New Zealand based or South-Pacific based studies with Pacific samples:

Lunch:

- Pacific groups practiced shared Sunday lunch with extended family groups, with high value traditional Pacific foods, generally meat and carbohydrate dishes included,¹³⁸ although New Zealand raised Pacific participants reported injecting Western dishes into this custom.
- Some Pacific parents in ‘white collar’ jobs chose specific lunch items to include in their children’s lunch boxes, particularly packaged snacks, motivated by wanting to project a certain social status, not wanting their children to be unlike their peers, not wanting to be seen to be coming from poverty status.
- Pacific parents did not generally enquire about what older children (from intermediate school age) purchased to eat from school canteens as they assumed that schools provided foods that would be healthy.

Dinner:

- Traditional foods were still the mainstay of Pacific family dinner meals. Typical cuisine included taro, green bananas, pumpkin and kumara, and noodles were also reported.²⁴³ Pacific-born and raised parents prepared meals they were familiar with, and upbringing was an important influence on food choices.²⁴⁵
- Younger Pacific members reported they rarely cooked and or had little interest in cooking with takeaway meals being their regular dinner meal. This included a higher intake of fizzy drinks with takeaway meals.²⁴³
- Family meals could not be accommodated in small overcrowded state provided homes, so some members of the family ate dinner outside of the dining areas or usually in the lounge when dining areas and a dining table were absent.

Special Occasions:

- Examples of these occasions include wedding, funeral, milestone anniversary or birthday celebrations like 21st birthdays or community events like church conferences or venue openings. Particular traditional foods were identified as being important to provide on special occasions. A cooked pig, corned beef (canned variety), taro, coconut cream and desserts including ice-cream, fruit salad, traditional pies and cakes were identified.²⁴¹ These were high status foods, considered the best and offered first to high ranking guests like church Ministers at special occasions. Pacific people accepted these rich foods were the least healthy and people often over-ate at special occasions but such occasions were irregular¹³⁸ and most Pacific people believed that the “frequent consumption of takeaway foods every day due to the realities of economic and time constraints” was more influential on unhealthy eating practices.²⁴⁶

- In special and particularly public occasions, food was not viewed simply as a function of individual consumption and sustenance but as an important form of social currency embodying collective values.^{247 248} Food shared in these occasions was used to express generosity, hospitality and even status between individuals and between groups.²⁴⁹ Food sharing was important in creating and maintaining relationships between people which was expected to be reciprocated.²⁵⁰ Acceptance of food provided was expected and it expressed the guest's recognition of the host's hospitality and goodwill.¹³⁸
- Younger Pacific adults included healthier more Westernised style foods, in particular salads and fruits and made conscious healthier food choices like omitting to take fizzy drinks to special occasions.
- Traditional eating sequence in special occasions were mentioned, which differed between Eastern and Western Polynesian groups, with Niuean and Cook Island groups noting children usually ate first in special occasions while Samoan and Tongan groups noting the reverse pattern.

Takeaways:

- Pacific participants reported that household proximity to takeaway outlets influenced their food habits and reinforced takeaway food intakes. A participant quote illustrated this point: *"My community is very low [income] ... so the places there are very – it's like there's not very good quality food and [lots of] junk food."* Pacific Other female – Auckland.^{241 (p78)}
- Pacific participants were trying to reduce takeaway consumption, motivated by their increased media exposure to healthy eating messages targeting Pacific communities.

Vegetables:

- Some Pacific participants viewed traditional Pacific diets included less vegetables, while others disagreed.
- There was unfamiliarity with New Zealand based vegetables like cauliflower and broccoli which affected consumption.²⁴³

Fruit:

- Families were motivated to increase their fruit intake and believed increasing fruit intake would be easier than increasing vegetable intake, particularly as fruits were easily transportable to eat as snack food and to include in children's lunchboxes.

Fizzy drinksⁱⁱ:

- Some Pacific families were heavy consumers of fizzy beverages, which may be related to the link between drinking fizzy and eating takeaways simultaneously. It was also related to its relatively low cost compared to milk, reinforcing consumption.
- Regular consumption of fizzy drinks by parents influenced their children's intake.
- Many were trying to cut down on fizzy drinks due to their newfound awareness of its high sugar content and the link with child and adult obesity levels for Pacific groups.

Food and drink preferences:

- Boil-up meals was preferred by different Pacific generations, with older members preferring them while younger members did not.
- Despite a sound knowledge base of healthy versus unhealthy foods, Pacific adolescents preferred foods and drinks according to taste, low cost and easy accessibility. Energy-dense snack foods, fizzy drinks, takeaway burger meals, fish'n'chips and pies were Pacific adolescents' most purchased and eaten food items.^{245 251} Overseas research states adolescent food choices are often non-conforming to parental choices as teenagers seek more autonomy and health-related motivations for food choices is low for this age group.²⁵²⁻²⁵⁴

Factors that worked against healthy eating:

Factors internal to families:

- Those wanting to continue with traditional diets (and who viewed few vegetables as being traditional) in order to uphold cultural values, made it hard to practice healthy eating for all household members and within community group gatherings.²⁴⁷ This was similar between Pacific and Indian groups.²⁴¹
- Extended family groups with other adults present in the household, who provided caregiving to children, like grandparents or older siblings, may choose divergent food rules as per their own preferences, undermining parental healthy eating rules.²⁴¹ Pacific families stated this meant family-based nutritional educational services were preferable.^{249 255}

Factors external to families:

- Some found it hard to say no to unhealthy food offered by hosts as it went against cultural beliefs to reject offers of hospitality expressed through food.

ⁱⁱ Are sugary carbonated sweetened beverages.

- Some Pacific families always cooked large amounts of food to cater for all household members as well as unexpected visitors that may arrive. However this was not conducive to eating the correct portions of food as cooking in bulk meant eating in bulk.²⁴³

Belief about healthy foods:

- Earlier focus group studies found Pacific people believed traditional island food was healthier, especially taro leaves, and Western food like takeaways and junk food were making people fat.^{243 246}
- Another study found Pacific participants believed there was a food transition from migration to New Zealand with an increased intake of meat foods in the New Zealand diet responsible for body weight gain. In the Island environment, fish and shellfish were the main protein foods with meat reported to contribute only a fifth of a daily diet. Participants believed Tongan food, particularly starchy foods like yam and cassava, were much more filling, provided more energy for longer periods than New Zealand based starchy foods like potatoes, bread and rice.¹³⁸

Influential messengers:

- Pacific people were motivated to listen to those they knew and had similar backgrounds, particularly family members and locals or church leaders but not experts or celebrities.^{243 247}

Socio-economic effects:

- Some Pacific participants stated that only well-off relatives ate certain healthier food options, like brown rice.²⁴³

In addition, the HSC report segmented population groups by attitudes to healthy eating against some key demographic variables for comparison, as summarised in Table 2.2.²⁴¹ The segments represent a continuum of knowledge about healthy eating and healthy eating behaviours. Pacific groups were found to be represented in the lower end of nutritional and health knowledge link, reporting less healthy eating behaviours and were the most in need to make large behavioural changes to increase their nutritional profiles. This was supported by an earlier focus group study which found the most financially constrained ate more takeaways, consumed soft drinks regularly, had high fat/high sugar diets, were smokers and exercised less and furthermore expressed the least interest in changing these particular lifestyle habits.²⁴³

Table 2.2: Summary & Description of Segmented Population groups by attitudes to healthy eating across selected demographic variables.

Source: Health Sponsorship Council, 2007, p.190 ²⁴¹

Variable	'True Believers'	'Providers'	'Convertees'	'Complacents'	'Avoiders'	'Inerts'
Essence as people in relation to eating	'You are what you eat'	'Keeping it close to home, and (for some) keeping costs down'	'I want to be around for my family/whanau and grandchildren'	'We're doing OK'	'Where's the evidence that healthy eating is good for you?'	'The kids are very active'
Description of segment profile	Most knowledgeable and consistent in terms of practising healthy eating behaviour. Healthy eating was a priority.	Moderately knowledgeable and ate fairly healthily as a by-product of using the food resources they found in their own community, and their 'do it yourself' approach to food preparation.	Were trying to eat more healthily, often as a result of a health scare or issue. As a result they were actively acquiring new eating knowledge and habits.	Believed that their family/whanau ate more healthily than it did. Less healthy eating habits had crept up on them over time.	Were resistant to healthy eating messages. They may have been reasonably knowledgeable but cited conflicting health information as a reason to continue eating as they pleased (which was mainly less healthy foods).	Least knowledgeable about healthy eating and the least healthy eaters. Healthy eating was not on their radar.
Knowledge about healthy eating	High	Moderate	Moderate and increasing	Moderate by may be out of date	Varies – may reject information received	Low
Concern about healthy eating	High	Moderate to low	High	Moderate to low	Varies – may be in denial	Low
Eating behaviours	Fanatically healthy and very disciplined	Healthy as a results of DIY approach	More healthy than in past. Making gains in some areas (e.g., fizzy & takeaways)	Less healthy than in past. Subtle erosion of healthy eating habits (e.g., through convenience foods and snacks).	Unhealthy is the norm.	Unhealthy is the norm.
Ethnicity	Pakeha (white NZer) Maori Chinese Malaysian Singaporean	Pakeha Maori	Pakeha Maori <u>Pacific*</u>	Pakeha Maori <u>Samoan</u> <u>Tongan</u> Indian	Pakeha Maori <u>Pacific*</u>	Pakeha Maori <u>Samoan</u> Fijian Indian
Socio-economic status	Low to high	Medium to high	Low to high	Low to high	Low to high	Low to medium
Number of children	2 to 3	2 to 5	1 to 5	1 to 5	2 to 3	1 to 4
Age of children	3 to 12 years	3 to 17 years	1 to 16 years	0 to 15 years	1 to 15 years	1 to 16 years
Geographic location	South Auckland Wellington Christchurch	Gisborne Wairarapa Christchurch	Gisborne Wellington Wairarapa Christchurch Timaru	Gisborne Wairarapa Wellington	Auckland Wairarapa	Auckland Gisborne Wellington Christchurch

* Note: Pacific ethnicity includes Samoan, Tongan, Cook Islander, Niuean, & Tokelauan

Generally, the limited New Zealand-based literature leans towards Pacific people making little connection between diet and physical health. The connection was made only when an adverse health event occurred or when given specific medical advice. A study of family functioning and well-being found Pacific people did not mention health as a key issue or challenge to family functioning.²⁴² Health was a 'sleeper' issue for most until an unfortunate health event took place requiring immediate management which is in agreement with the 'Complacents' and 'Convertees' segmentation profiling described in Table 2.2. This is very likely related to differential Pacific worldviews about the construct health, with Pacific people viewing health much more holistically than just physical health.^{138 256-258} This worldview related all events, including negative health condition, as influenced by spiritual, emotional and physical domains combined. Strong religious faith also influenced health beliefs with God as the provider of all things including good health and well-being. This meant personal health outcomes are viewed outside the control of individual behaviours.

Pacific people were generally aware of the physical health protective functions of fruit and vegetables intakes but specific knowledge was low about food quality, preparation, food purchasing habits, food supply on budgetary constraints and self-efficacy to change food habits.^{135 238 259} There was a general disconnect between general health knowledge and lifestyle behaviours despite most Pacific people desiring improvement in family nutrition and eating habits. Pacific people in the lowest socio-economic positions were less inclined to view it was possible to make the necessary lifestyle changes.^{238 243} Researchers went further to state that while some Pacific cultural differences were noted, the "differences in attitudes toward healthy eating often appeared to relate to upbringing, education, and socio-economic status (as opposed to cultural factors)."^{242 (p137)}

Social norms or cultural customs, attitudes, values or beliefs about physical activity

There is a dearth of New Zealand based data available on general population social norms, attitudes, values or beliefs about physical activity and to the author's knowledge, no studies particularly of Pacific groups domiciled in New Zealand. One report commissioned by the sports and recreation funding agency SPARC looked at a comprehensive range of determinants based on a combination of behavioural, environmental and psychological variables that may influence physical activity behaviours.²⁴⁴ The objective was to identify motivators and barriers to physical activity for social marketing purposes, with a specific sampling and methodology guided to develop further government policies in alignment with recent public health goals to increase population levels of physical activity. This study found the three key motivators to physical activity were awareness and belief that physical activity is good for your health; desire to keep in shape and encouragement from others and wanting to role model physically active behaviours. The three key barriers to physical activity were lack of time and/or energy, lack of encouragement or support from others and existing health problems. Despite

achieving a large overall sample size ($n=8163$; 14,000 households were randomly selected; 61% response rate), a key limitation of the study was that it was a mail-out survey which may have captured a more educated, New Zealand born, more well-off section of the Pacific population that is not reflective of the Pacific majority in terms of key demographic positioning. A total of 185 or 5% of the sample were of Pacific ethnicity. The report therefore is light in making comparisons across ethnicity groupings. However, given the limited research in this area, findings pertaining to Pacific adults will be described below.

To meet the study's objectives, the sample was divided into three broad groups based on their current levels of physical activity and intentions. Figure 2.4 illustrates that 45% of the sample were currently 'Active'; 9% of the sample were deemed 'Inactive' by way of not meeting current threshold guidelines for weekly frequency of activity and had no intention to become more regularly active, and a middle group called 'Target Group' (45% of the sample) were people who were not already regularly active but had some intentions to become more regularly active in the next six months. This 'Target Group' (so-called as the cohort for targeting further government interventions), was further divided by clustering behaviours, intentions, motivations and barriers resulting in six segment groups. The description of the cluster groups is provided in Figure 2.4. The study reported one key finding for Pacific people who were mostly represented in the 'Others Oriented' segment. The study found the 'Others Oriented', 'Busy & Stressed' and 'Support Seekers' had the highest proportions of obesity.

Figure 2.4: Levels of activity and Intentions divided by Segments according to determinants of Physical Activity ($n=8077$)

Source: SPARC, 2003a, p.9²⁴⁴

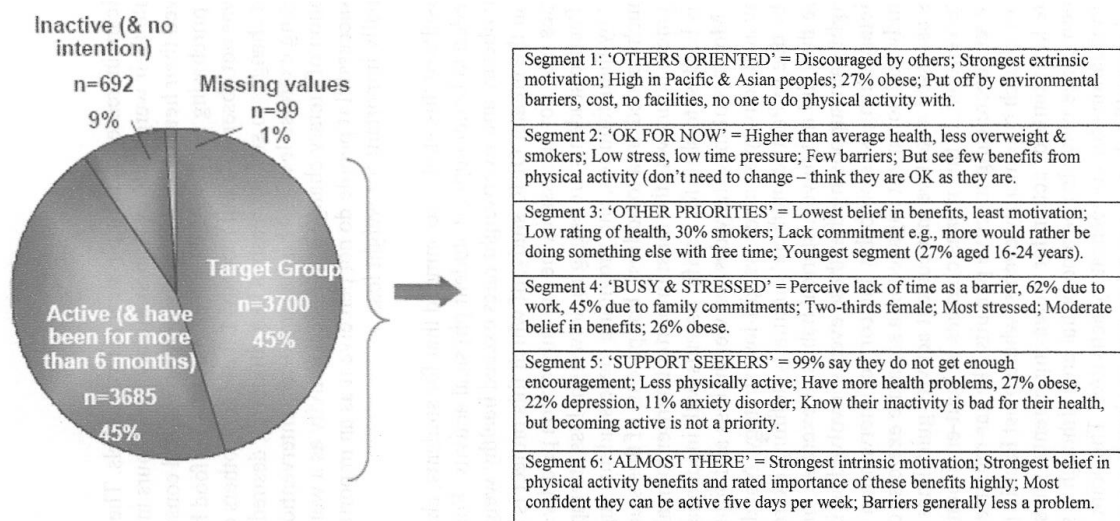
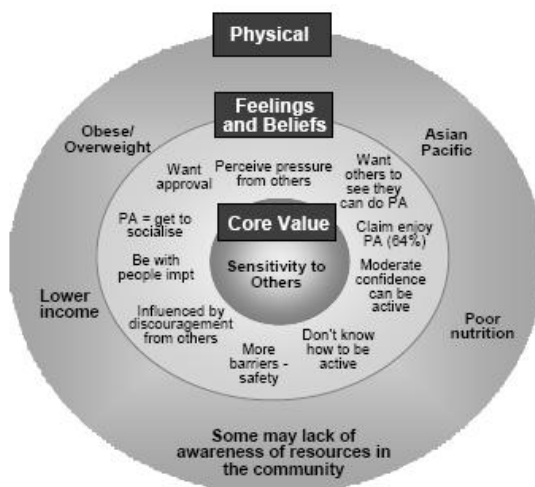


Figure 2.5 summarises the distinctive features of the 'Others Oriented' segment. At the core of the diagram is Sensitivity to Others which is a common link between the Feelings and Beliefs of people in this segment. People represented in this sample were more motivated extrinsically. Such beliefs include feeling more influenced by the discouragement from others, wanting approval from others, perceiving pressure from others and wanting others to see that they can do physical activity. 'Others Oriented' believed in the importance of the health and social benefits of physical activity and their level of intrinsic motivation, that is enjoyment of physical activity, was high and comparable to other segment groups. People in this segment perceived more barriers than any other segment groups. There were commitment barriers related to lacking time through work, family and household responsibilities, lacking energy, finding it hard to stick to routines and getting bored easily. Community-related barriers were described to be environmental ones, particularly related to safety such as dog nuisance, heavy traffic, inadequate street lighting, transportation to facilities, unawareness or facility access problems (may be related to language barriers) and being more financially constrained. Physical barriers include finding physical activity uncomfortable due to existing chronic health conditions and or finding it hard to walk due to heavy weight. A greater proportion of this segment also alluded to lacking knowledge, rating the item "I don't know how to be physically active" as being salient. 'Others Oriented' reported they would become more active if the cost barrier was removed, such as providing free or low-cost gym memberships was rated the highest perceived motivating factor. Finally, this segment had good intakes of fruit but inadequate levels of vegetable consumption with only 13% eating none or one serving a day. This segment had the highest proportion of Pacific and Asian ethnicities and was identified as a key priority segment for government target interventions.

Figure 2.5: Summary of the characteristics of the 'Others Oriented' segment (n=398)

Source: SPARC, 2003a, p.14 ²⁴⁴



Literature on Pacific or Polynesian physical activity in New Zealand is generally confined to specific sport studies rather than activity for health-promoting affects.^{260 261} Very little even exists from the greater South Pacific region. What is available documents differential recreational activity patterns by gender and age for some Pacific groups, as befitting their social role, with females expected to prioritise household duties over other active leisure pursuits.²⁵⁰ Within the New Zealand context Lanumata's et al.,²³⁸ study of Pacific people's view of physical activity found Samoan focus group participants alluded to exercise as being a Westernised construct which differed greatly from a Pacific cultural viewpoint. The report stated "All of the participants who are Samoan born (all but one participant) raised the notion that there was no such thing as structured exercise in Samoa. The only form of exercise they knew was the daily chores either at home or at the plantation."^{238 (p55)} This suggests Pacific people may have differential knowledge, awareness and experience with physical activity completed as a separate structured routine activity called 'exercise' solely for health benefits.

Social norms, attitudes, values or beliefs about body image

It is hypothesised that cultural variations in social norms regarding body weight and the importance of appearance may also be significant in translating cultural values into weight-related behaviours.¹⁵ The disparate obesity levels between particular ethnic and minority groups are suggested to be linked to the differential body image between groups. The most popular in the literature are comparisons from the US between African-American women who are said to have positive feelings and are more tolerant towards fuller bodies, with adolescents desiring larger body image ideals than their white European counterparts.²⁶² The theory posits that these particular body image attitudes may increase the risk of obesity in African-American girls and women (who already have the highest prevalence rates of obesity in the US) and such body image ideals may be counterproductive to engaging in weight loss behaviours.^{263 264}

Several reviews have examined the empirical evidence for a link between African-American females' body image and their higher risk for obesity and have found conflicting results, with methodological problems, such as variant body image ideals depending on the definition of ethnicity used, the methodological tools employed, the study samples' heterogeneity and the lack of physiological data.²¹⁴^{263 265} On the other hand, there is a plethora of consistent literature on White women's and adolescent girls body image, more than there is for men and boys, stating that high levels of body dissatisfaction amongst White European females is the social norm, with strong desires for smaller body ideals fuelling their higher rates of eating disorders like bulimia and psychological conditions like anorexia nervosa, depression and anxiety.²⁶⁶⁻²⁶⁸

The empirical evidence linking body image and obesity risk is lacking and little evidence exists to refute or support any influence. Some investigations into the relationship between negative body image and greater body dissatisfaction found adolescents engaged in harmful weight control behaviours that actually increased their weight over time and presented more obesity-risk.^{97 269 270} Other studies suggest a positive association between weight satisfaction and positive body image with personal motivation to engage in weight-control behaviours.²⁷¹ For example, adolescent girls with high body satisfaction received greater environmental support to eat healthily and participate in physical activity²⁷² while adults with higher body size satisfaction engaged in more physical activity than those with lower body satisfaction, irrespective of actual body weight.^{273 274} This suggests that perception of body size may be important, particularly for adolescents who have reported body dissatisfaction regardless of weight status and engaged in weight-loss behaviours like dieting despite being of healthy weight.^{275 276} Some researchers suggest body image ideals are also relevant amongst children and studies are emerging in this area to examine the relationship between obesity risk and body image for children.^{277 278}

To the author's knowledge, no study has examined Pacific adolescent or adult body image and its affect on behaviours leading to obesity-risk within the New Zealand context. A review of literature that used Pacific samples from the South Pacific have also found conflicting trends (see Appendix A, pages 244-6 for table summarising studies on body image and Pacific or Polynesian people). Some studies found small body ideal differences between Pacific and Western populations,²⁷⁹⁻²⁸¹ whilst others found similar body image ideals across ethnic groups, particularly between Westerners and Pacific men,²⁸² Pacific women²⁸⁴ and Pacific adolescents.²⁸⁵⁻²⁸⁸

One such study comparing Island-based Tongan men and women body image ideals with white European Australian men and women and found Tongan women tended to slightly underestimate their weight (by 1.5kg) while white Australian women tended to overestimate their weight by almost twice as much (by 2.3kg); however Tongan and Australian men both overestimated their weight by 1.5kg. Furthermore, Tongan men and women desired larger ideal body sizes (28kg/m² and 26kg/m² respectively) than Australian European (men 24kg/m² and women 22kg/m²) but physiological measurements showed Tongans had more lean body mass and lower percent body fat at the same BMI levels compared to European Australians. The authors went further to state that "When these preferred body sizes were compared with weight categories 'adjusted' to equivalent BMIs on the basis of %fat as presented in this paper, the Tongan body preferences for both females and males were reasonable and realistic."^{53 (p1813)} The authors suggesting that the Tongan's preferred body sizes were in fact physiologically healthy sizes to prefer and attain.

Studies also found Pacific samples generally showed less pre-occupation with their bodies compared to Western counterparts, and desired functional bodies while aesthetic appeal was important for Westerners.^{287 289} Pollock's^{290 291} work in the Pacific suggests beauty ideals for women were related to their gender based functionality which was based on fertility and procreation, which was particularly important for cultural systems underpinned by kinship relations. Fattening practices that took place in the Pacific for example, whereby young Polynesian women were given the choicest foods and discouraged from laborious work was part of addressing this, with attempts to preserve the fecundity and successful pregnancy and lactation of women.²⁹² A woman with body shapes that were "full-bodied", "wide hips", "strong legs" that could bear many children successfully were highly valued and deemed attractive and ideal. These beauty ideals for Pacific women are also found in other non-Western groups.^{214 293}

Body image trends for Pacific men and adolescent boys living in the Islands or in Western countries tended to find more agreement in body size ideals with Western men. That is, all men irrespective of ethnicity men tend to rate average mesomorphic bodies as their preferred ideal.^{282 294} Pacific men also valued functional bodies rather than attaining aesthetically pleasing bodies. For Pacific men, their bodies' functionality was related to clearly defined gender roles within traditional Polynesian societies, as the warrior, the worker, the provider, the hunter-gatherer, the fisherman, the agriculturalist, the cook, amongst other things.²⁹⁵ Strong bodies and bodies that were a by-product of completing this work were muscular, tall, agile, robust and were therefore highly valued for men. Interestingly, cross-cultural literature on male body image finds this body type is valued and idealised amongst both Western and non-Western men and boys, with the sporting context a key environment for displaying these elements of masculinity.^{285 294}

Despite the conflicting nature of the findings from the available body image literature on Pacific or Polynesian peoples a popular hypothesis linking body image to disparate obesity levels between Pacific and non-Pacific groups exists. This may be driven by popular anecdotes which are captured in the title of one such study "Do Polynesians still believe that big is beautiful?"^{256 281 296} The stimulus behind most of the early investigations into Pacific peoples' body image, particularly those that looked to compare with Western or Westernised groups, is the assumption that Pacific peoples valued and therefore desired very large bodies, and in relation to obesity-risk, this is a problematic cultural feature to have. To the author's knowledge, no qualitative research in Pacific peoples' body image has been conducted in the New Zealand context by Pacific researchers. This study makes a contribution to the literature gap and more importantly through an emic viewpoint. A critique of the current literature is provided below which calls into question the initial catalyst behind earlier investigations which have led to the perpetuation of particular types of body image research for Pacific groups.

A critique of body image research

Much of the literature about Pacific people and body image tested body ideals in reference to non-Pacific ideals, using non-Pacific tools, worldviews and without specifying cultural definitions of key concepts like 'obesity', 'body size', 'big', 'large', 'beauty' and 'health'. Undertaking etic approaches to culturally bound concepts can render unfortunate misrepresentations particularly if human behaviours which look on the surface to be universal are in fact undertaken and understood for entirely different reasons.^{293 297} On reviewing the current crop of literature on body image and Pacific or Polynesian samples, a scientific "fact" is touted stating that Pacific people valued bigger bodies and by reference of its relation to obesity, bigger is postured as fatness or of having problematic health adverse adiposity levels. The title of such a study "Do Polynesians still believe that big is beautiful? Comparison of body size perceptions and preferences of Cook Islands, Maori and Australians" illustrates this point.²⁸¹ The authors of this article state in a factual manner that Polynesian societies' body image ideals valued very large bodies and then referenced earlier Westerners anthropological observations as the key evidence sources. Gould's ²⁹⁸ investigation into Polynesian body image warned about the limitation of contemporary cross-cultural body image studies which have all been derived from etic Western ethnographic, osteological and biological anthropological studies.

The critical question that arises from reviewing the current literature is what is meant by the word "big" and in what way did researchers define this term. Western anthropologists made observations on cultural groups using their normative standards and referenced "bigness" against their own bodies and current cultural ideals. In this regard, early European contact observations of Polynesian groups are probably correct in describing Polynesian people as being bigger. According to Gould's ²⁹⁸ historical analysis of Polynesian body sizes, in reference to the Western observer's own body, Polynesians indeed had bigger body sizes. However, bigger in terms of stature, in terms of muscularity, in terms of robustness, in terms of shape, wider shoulders, thick mid-sections, stout legs, well-proportioned. Early observations of the people relevant to this study, from Tonga,²⁹⁹⁻³⁰² Samoa,³⁰³⁻³⁰⁵ and the Cook Islands,³⁰⁶⁻³⁰⁸ were described as "tall", "strong", "muscular", "well-proportioned" "stout", were of above average size by European standards but quite definitely that "no evidence of obesity was observed".²⁹⁸
³⁰⁹ A fundamental problem exists through the use of loaded terms like "big" and "large" used in the current literature interchangeably and without care to mean "obesity" or at most, the measurable health adverse adiposity. It must also be noted that early Western observers made subjective estimations of body sizes and did not actually complete measurements of early Polynesian body sizes, by weight or by height, nor do we have evidence of the standard referent body size measurements of the observing Europeans, used to make these subjective comparisons. To use these early estimations therefore, to conjecture an ethnic groups' contemporary body size ideals is highly questionable science.

Another limitation of historical references is that many of these early observational accounts emphasised the exceptional or the atypical 'specimens' and gave insufficient accounts of the norm. Consequently, there are much more accounts describing the body sizes of Polynesians of high status or chiefly status, probably because early Westerners contact was in the company of high ranking Polynesians. In any case, Gould's conclusions supported by others^{309 310} stated:

...it is clear from the historical sources that the majority of Polynesian men and women (subject to an adequate diet) were of a tall stature, strongly muscled, and had robust skeletal frames compared to other populations. However, they did not have the high degree of adiposity characteristic of many contemporary Polynesian populations. The exception being those of high status, such as the royalty of Hawai'i.^{298 (p16)}

Scant early observations have gone on to state, that while high status or chiefly individuals may have bigger body sizes and one must be careful not to associate fatness with bigness as described here, the common people were considerably smaller and these atypical larger sizes were not attained for all.^{298 302 303 308 311} It is the author's understanding that current analyses that begin with statements "Do Polynesians still believe that big is beautiful?" have made an erroneous assumption, that if leaders of Polynesian groups had larger body sizes, then that would be the ideal for the masses. The supposition behind this analysis is that Western beauty ideals, body sizes included, are strongly influenced by the physical norms of the high status group in a society.³¹² Concepts such as "beauty", "ideal" and even the supposition that a cultural group would aspire for the body sizes of their higher classes are culturally-bound syndromes and current evidence on Pacific or Polynesian body ideals have never supported extreme obese body sizes as their ideal.²⁸²⁻²⁸⁸ The authors of these studies, further concluded, that their contemporary Pacific samples who did not choose the idealised bigger body sizes as expected, must be taking on Westernised ideals and an acculturation effect is observed.

The following limitations must be noted on this current state of affairs:

1. There is no earlier evidence, that Polynesian people had idealised bigger “obesity-defined” body sizes for themselves. Although “plumpness” was valued, particularly for women, related to their function in traditional societies as child-bearers accountable for the continued existence and survival of the group, extreme obesity was most unlikely to have been valued *per se*, rather it was acknowledged, that large body sizes attained by chiefs were a *by product* of their high status, rather than an attained body for beauty’s value.^{290-292 298} These chiefly body sizes therefore came to represent power, authority, *mana*ⁱⁱⁱ, high status or wealth.^{293 313}
314
2. The author is critical of the “taken for granted” application of Brown’s³¹² Westernised theory of body aspirations mediated by higher classes to Polynesian or Pacific people. How do we know that Pacific populations had aspired or aspire to have chiefly body sizes? Current evidence does not support this.²⁸²⁻²⁸⁸
3. How do we know that Pacific populations had body image ideals at all? How do we know Pacific populations separated their physical self in their minds and made comparative judgements about it? Of what purpose would having a body image be to peoples domiciled in South Pacific island environments?

Current empirical evidence does not answer these points with any clarity. Given the dearth of evidence and the lack of validation of some key contextual concepts, the current body of work on body image ideals about Polynesians or Pacific people must be treated with care. The current study makes a contribution to a key literature gap in this field by examining whether these body ideals exist for Pacific adolescents and their parents and whether it is a critical socio-cultural factor driving the disparate obesity rates of Pacific people in the New Zealand environment.

ⁱⁱⁱ New Zealand Maori word *mana* means prestige, authority, control, power, influence, status, spiritual power, charisma.

Research methodology review

The conflicting nature of some of the findings with regards to Pacific people's nutritional and physical activity habits and patterns in the New Zealand environment is very much influenced by the quality of the information provided. Much of the data on Pacific adult nutritional and physical activity behaviours are gleaned from national surveys which captured very small samples of Pacific people upon which to base interpretation.^{10 107 135 244} Due to the limited sample sizes, separate analyses by Pacific ethnicity could not be reported. Some have used convenient sampling methods which constrained Pacific samples to particular areas (i.e., Auckland) and across certain occupations.^{126 127} Nutritional surveys particularly are inconsistent in their methodology using different recall timeframes, different number of items, different methods of food recall i.e., frequency of consumption versus food portioning sizing, and different definitions of Pacific-based foods which all can affect the strength of the associations between variables and interpretations.^{107 126 132 137 315-318} Some did not report using validated tools across ethnic groups which is particularly important for making cross-cultural analyses.^{120 132 134 136} This is even more pertinent with those studies that investigate behaviours in socio-cultural contexts, for example, definitions of what constitutes a "meal occasion" is very likely to be different between Pacific and non-Pacific.^{137 138 248} This highlights the importance of having ethnocentric approach or Pacific-centric analyses in studies involving Pacific populations as recommended by the Pacific research community.³¹⁹

320

Also important to note in the New Zealand context, is that SES confounds Pacific ethnicity patterns since there are strong relationships between the two.²²⁴ The use of one dimension to measure socio-economic status, particularly area-level deprivation, masks the affects of personal or household SES levels within those neighbourhoods. National based health research needs to do more to collect all variant dimensions of SES to fully understand the health protective effects of SES, particularly as evidence suggests, social-determinants seems to be much more influential on health outcomes than behavioural habits.^{230 321} In addition, using one dimension to measure socio-economic status does not allow researchers to fully explain how economic conditions affect personal, familial and household behaviours and much more analyses seem to concentrate on ethnicity or cultural differences to explain aberrations. Analyses that continue in this light are suggesting that socio-economic conditions cannot be modified whilst cultural practices could be. However, other studies have found differences in health behaviour are larger by SES than by ethnicity.²⁴⁰ For example Black Americans of high SES were much more similar with Whites in dietary behaviours than to low SES Black groups.³²² The finding that different indicators of SES, that is occupation, education and income, are differentially associated with weight gain indicates that different social conditions may play a role between SES and obesity.^{210 218 220 323 324} Thus it is important to gain a better understanding of how different social economic conditions influence behaviours for developing targeted interventions and reducing obesity risk, particularly amongst the most disadvantaged communities.^{16 325}

Furthermore, ethnic analyses assume homogeneity in Pacific samples, whereas census trends shows growing heterogeneity not only in economic, occupational and educational levels but also in ethnic mixing and identification.^{221 326 327} Last, some surveys combine both Pacific and Maori ethnic groupings into one Polynesian sample.^{120 328 329} This may be useful for showing strong socio-economic effects as the two ethnic groups are overrepresented in deprivation measures in New Zealand. However, that may be the only common ground between the two groups as indigeneity and being a migrant from a Pacific Island environment engenders different social, historical and political experiences affecting cultural behaviours in significant ways. Therefore, studies must be careful not to infer a Polynesian ethnic grouping in the New Zealand environment.

On the other hand, other national surveys have made much progress in addressing previous research limitations by taking on board the principle of 'equal explanatory power' which uses particular sampling techniques that allows relatively equal numbers of New Zealand's key ethnic groups to be represented in surveys.^{9 241 316} This allows analyses and interpretations for all groups to be at the same breadth, depth and quality which are essential for studies that look to make cross-cultural analyses.³³⁰

An alternative research strategy

Given the limitation with current self-reporting measures of nutritional and physical activity behaviours, experts in the field are becoming more vocal about using new methodology to explore obesity aetiology particularly across sub-populations.^{17 40 222 226 331 332} Quantitative studies that seek to describe nutritional or physical activity behaviours are limited in their explanatory power on factors that may mediate human behaviour. Social scientists urge the use of multi-disciplinary approaches to understanding human behaviours, particularly the use of qualitative studies which imbeds the social-context on human behavioural habits and patterns.^{15 290 333}

An alternative research strategy that may also be useful for guiding interventions to prevent weight gain involves the identification and description of weight maintenance. Contrary to popular belief, not everybody is gaining weight and the identification of those modifiable characteristics of "weight maintainers" (i.e. people who have successfully maintained a stable weight over time) may assist in the development of strategies aimed at preventing weight gain in others.^{40 194 331 334} Ball and Crawford go further to state that;

"We believe that this is a particularly promising approach when attempting to understand the elements necessary for obesity prevention in population groups identified as high-risk, such as those of low socio-economic position. That is, what insights can be gleaned from investigating how some individuals of low socio-economic position, despite the odds, remain 'resilient' to weight gain and obesity?"^{16 (p17)}

The concept of resilience, or the appreciative inquiry approach borrowed from the sociological sciences, will be applied in the current study.

Obesity Intervention Studies

Some researchers have been frustrated by the lack of convincing and consistent evidence despite concerted efforts.³³⁵⁻³³⁷ Proponents of environmental obesity research have called for a change in the way epidemiological studies approach obesity aetiology. Ege⁶⁷ and others¹⁹⁹ propose that neither cross-sectional nor case control nor longitudinal studies, can establish causality between environmental variables and obesity, since all of these studies are prone to bias. Eating and exercise habits have been habitually difficult to survey accurately but intervention studies which specifically examine environment, behaviour and weight interactions will, when well designed prove causality.

Current reviews on the effectiveness of interventions for childhood obesity have been mixed, probably due to methodological limitations as well as their inability to control for various socio-cultural effects.³³⁵³³⁷⁻³⁴² Studies examining combined dietary education and physical activity interventions have showed small impacts on BMI.¹⁶⁴³³⁶³⁴³ However, dietary education delivered by multimedia strategies to children with a strong focus on parental involvement and a reduction of soft drink consumption did have significant affects on obesity prevalence.²⁶³⁴⁴ Physical activity interventions aimed at reducing sedentary activity (i.e., television viewing) showed trends towards a reduction in children's BMI.¹⁶⁴¹⁶⁷

Barnfather's³³⁸ review of obesity prevention programmes for children operating in the Auckland region found that most of the programmes delivered by some 40 providers were general in nature with programmes focusing on increasing physical activity or improving nutrition as goals, with none having obesity prevention as a primary goal and many did not therefore measure weight-related outcomes. Only four programmes collected weight-related measures, but most of these had significant data collecting/recording problems with the one possible exception, the Kids in Action programme. Kids in Action is a family-based childhood obesity treatment programme rather than a obesity prevention programme, currently running in the Counties Manukau District Health Board area delivered by a Pacific health provider for Pacific families. In 2003, an internal evaluation of data showed that 70% of 71 children had lost or maintained their weight, while 42% had lost weight. Twenty-five percent of children on this programme had medical co-morbidities. Interestingly, the programme leader talked about the need for more research into how Pacific families actually live and how this impacts on lifestyle. For example, 30% of the children on this programme were from single parent families with many adolescents presenting irregular eating habits and most not eating breakfast due to a lack of time or food in the house. Many children were exhibiting food behaviours picked up from national surveys, with many eating pies on the way to school, with regular lunches comprising of sausage rolls and soft drinks.

Review of the obesity prevention literature found that interventions that are most strongly based in theories of behavioural change are most effective.^{164 335 343 345} The most successful interventions appear to be those that focus on obesity as a behavioural problem, not just a nutritional one, with both eating and activity targeted as behaviours rather than purely as energy values. Motivation is a key part of intervention design. For example, Robinson states that intervention developers too often assume that health benefits in themselves would be enough motivation for obesity prevention and weight control, when in fact this is clearly not the case for most people, and particularly for non-Western groups. “In fact, health benefits may be some of the weakest motivators for behaviour change in well populations. In many of the successful prevention programs, health and weight benefits were not promoted as the primary motivators for behaviour change.”^{345 (p253)} This type of intervention is becoming popularly known as ‘stealth interventions’, with programmes developed for high-risk groups acknowledging that other more pressing societal issues, such as safety, economic well-being or cultural maintenance may override any health motivations and should be addressed first and ideally in conjunction with weight-related health goals.^{325 346 347} Although it is acknowledged that attempting to change individual behaviour and prevent weight gain is generally ineffective, the literature of psychological and behaviour change models suggests that a multi-faceted approach based on ‘stages of change’, and with good social support, is more effective than one-off educational sessions.³³⁶

Swinburn et al,¹⁴ proposed that a comprehensive approach to obesity prevention which simultaneously addresses as many of the underlying behavioural and environmental causes of obesity as possible would be most effective. Single intervention programmes or single setting approaches will be insufficient in achieving the appropriate intervention ‘dose’ required to reverse population trends of obesity. Swinburn & Bell²³ regard the real drivers of the present obesity epidemic to be environment making changes to modern day life. A lifestyle that is supported by a powerful market-driven economy which is driven to improve people’s lives and making money results in people making ‘default’ behavioural choices, by choosing what is easy, desirable (which is influenced by marketing) and what everyone is doing. These changes create the increasing prevalence of obesity over time, although the natural variation between people, like biology and socio-cultural factors may better explain the differences between individuals “Therefore, reversal of the obesity epidemic will require both individual and population-based approaches”^{23 (p457)} tackling both the behaviours and the wider environment in its broadest sense. To that end, Swinburn & Bell²³ and others¹⁰⁴ propose a process called the ANGELO (Analysis Grid for Environments Linked to Obesity) framework to be used by obesity prevention studies to scan obesogenic environments and identify leverage points for change (Figure 2.6).

Figure 2.6: The ANGELO framework (Analysis Grid for Environments Linked to Obesity) used to 'scan' the environment for barriers and facilitators to healthy eating and regular physical activity

Source: Swinburn & Bell, 2005, p.459 ²³

Environment size Environment type	Microenvironment (settings)		Macroenvironment (sectors)	
	Food	PA	Food	PA
Physical	What is available?			
Economic	What are the financial factors?			
Policy	What are the rules?			
Sociocultural	What are the attitudes, beliefs, perceptions and values?			

Summary and Conclusions

Obesity has become one of the most important public health problems facing both developed and developing countries throughout the world. Recent surveys also show a rapidly increasing prevalence of obesity among children and adolescents. Current New Zealand data exhibit the same trends, but with an overwhelming increased risk for Maori and Pacific children and adolescents. Secular studies show that obesity prevalence is more marked in those who are already overweight and obese, becoming heavier over time, and this trend occurs both in developed and developing nations.

There are current debates over the efficacy of BMI measurements for estimating body fat proportions in Polynesian groups. There is an urgent need to address this through completing a large-scale New Zealand based reference growth study from birth to death, with multi-ethnic sub-populations included. Without this, best available evidence supports the use of international universal definitions for health-related weight.

A growing body of literature is developing a strong case for preventing obesity in childhood and adolescence, as it predisposes later obesity in adulthood.^{3 5 87 348 349} This is followed not only by a number of health related morbidity but latest data suggest that obesity is a major risk factor for Type 2 diabetes, which is increasing in alarming rates particularly for Pacific populations, both in New Zealand and in the Pacific region. These recent increases in disease place a major economic burden on society and at the individual level, as they affect not just biologic but psychological health status and social well-being.

Obesity aetiological research has adjudged obesity not as a single disorder but a heterogeneous group of conditions with multiple causes. While the specific mechanism of energy imbalance causes an increase in body weight which is further determined by an interaction between genetic, environmental and psychological factors, population obesity epidemic studies attribute the spectacular rise of obesity to changing macro-environments.

Obesity prevalence however is not equally shared amongst groups in most Westernised multi-ethnic societies; it is socio-culturally distributed. The variations between individuals or social groups/subpopulations are attributed to socio-cultural factors which mediate nutrition and activity behaviours in different ways. Much of this research is lacking at this current time. However, most obesity researchers agree that when these studies employ innovative research strategies for addressing how socio-cultural factors impact on obesity, the results will make a contribution towards understanding the variability in obesity-risk across these different groups.

In addition, obesity intervention studies are more likely to prove causality amongst variables and are most needed for policy makers who can have the greatest impact on macro-environments. But interventions must be comprehensive in nature utilising multiple strategies (educational, policy, fiscal, environmental changes, social marketing) in multiple settings (homes, schools, workplaces, neighbourhoods), along with political policies at the macro level (regulation of television advertising, promotion of active transport, food industry tax or incentives) are needed to be integrated to be most effective in reversing the current obesity trends.

Chapter 3

METHODOLOGY & ANALYSIS

This chapter provides an overview of the study's research process. The chapter begins with a discussion on the research paradigm, which has influenced the research approach and design of the study. It outlines the research objectives and discusses the ethical issues relevant to the study. A description of the participants and the procedures for gathering data is followed. The chapter continues with an outline of the information gathered and the data analysis processes and concludes with a description of the research reporting processes and a profile of the sample.

Research Paradigm

"A paradigm is a worldview",³⁵⁰ or "a set of basic beliefs" that is accepted on the basis of faith.³⁵¹ A paradigm frames the nature of reality and therefore provides a framework for interpreting the world and makes explicit how research should be conducted, what constitutes legitimate problems, solutions and criteria of proof.³⁵² It is the paradigm that defines acceptable methodologies, research priorities, conceptualisation of problems, appropriate methods and the standards by which the quality of research is assessed. Therefore a discussion of the research paradigm is essential, as it forms the framework within which the study is conducted.

Qualitative versus Quantitative research inquiry – the choice of paradigm

There is a range of inquiry paradigms each with their own traditions in social theory and diverse research techniques.^{351 353} Most research literature however discusses two paradigms often placed at opposing ends of an abstract continuum, called Qualitative and Quantitative paradigms.

The quantitative approach asserts that the social world exists externally and that its properties can be measured through careful observation; an observation free from personal, political or religious values. Defenders of the quantitative approach state that social reality is not random, but patterned and ordered and that quantitative research allows humans to discover this order and laws of nature that stand the test of time.^{354 355} The basic nature of human beings is that people operate on the basis of external causes with the same cause having the same effect on everyone.³⁵³

Proponents of the qualitative approach believe that the qualitative inquiry paradigm is the only valid and meaningful way to study human beings as all paradigms are human constructions and are therefore subject to human error. For example, as explained by Guba and Lincoln, “No construction is or can be incontrovertibly right; advocates of any particular construction must rely on persuasiveness and utility rather than proof in arguing their position.”^{351 (p108)} Therefore, a paradigm that seeks to understand the world through how humans construct meaning in natural settings, without manipulation of the natural setting is more appropriate for understanding human society.

Qualitative paradigm supporters criticise the quantitative approach for a number of reasons: for removing the context from the phenomenon being studied, and thereby reducing the generalisability of findings; for excluding the meaning and purpose people attach to activities; for imposing outsider theories or hypotheses which have little or no meaning for the group being studied; for assuming that ‘facts’ can be value-free, when in actuality ‘facts’ are often a reflection of value systems, of which the quantitative worldview is but another example of a value system.³⁵¹ The quantitative approach is limited in that it never explains why a thing is, it limits itself to the question, how it is.

The nature of the problem is an important factor for choosing the guiding paradigm. Quantitative studies usually present a problem that evolves from the literature, so a substantial body of literature exists on which the researcher can build. Variables are known, and theories may exist that need to be tested and verified. For qualitative studies the research problem needs to be explored because little information exists on the topic. The variables are largely unknown, and the researcher wants to focus on the context that may shape the understanding of the phenomenon being studied. “In many qualitative studies a theory base does not guide the study because those available are inadequate, incomplete, or simply missing.”^{352 (p10)}

The “paradigm wars” often overemphasise a confrontation between the paradigms and results in a need for choosing one or the other.^{351 (p116)} In actuality, both qualitative and quantitative research utilise a variety of research methods that are complementary and can be undertaken across a range of disciplines. Other authors advocated against alignment with one paradigm over another and strictly linking the paradigm and methods together. For example, Patton³⁵⁰ takes a pragmatic stance and stated that the paradigm choice, recognizes that different methods are appropriate for different situations, while other authors supports the pragmatist point of view and presented the “situationalists” school of thinking, that “certain methods are appropriate for specific situations”.^{352 (p176)}

In stating this, the nature of the problem of this study (exploratory) has necessitated a leaning towards a qualitative stance, but at the same time, employing a situationalist point of view, by integrating a quantitative method to better inform the overall study.

The strengths of Qualitative and Quantitative Research

A generic definition of qualitative research is provided below:

Qualitative research is multimethod in focus, involving an interpretive naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.^{356(p2)}

Examples of qualitative research strategies and tools include: case study, personal experience, introspective, life story, interview, observations, historical, interactional, and visual texts.

The major strength of qualitative methods is that they enable the researcher to explore an issue at depth and in detail, and that the naturalistic approach means that findings are more readily applicable to the real-world situation.³⁵⁰ The qualitative researcher is not constrained by pre-determined categories. For example, open-ended in-depth interviews allow participants to express their views in depth and detail. Therefore, qualitative research leads to detailed information and enhanced understanding of a small number of cases but is limited in that its findings are not statistically generalisable.

The main strength of quantitative research is that a broader coverage of issues is possible for a substantial number of people, and therefore data can be statistically aggregated leading to statistically generalisable findings. The quantitative approach utilises standardised measures which require that responses fit within a limited number of pre-determined categories, and therefore within the etic view of the researcher.³⁵⁰ For example, a research participant's experiences or opinions must fit within a range of pre-determined categories. However, it should be noted that while generalisations have statistical meaning, they may have little relevance for an individual case. For example, while a New Zealand Sport and Recreation Study¹⁹⁶ found 52.6% of Pacific adults met current physical activity guidelines, it cannot be assumed that over half of those attending a Pacific group's physical activity workshop will be regularly active

Overall Design

Research Methodologies: Why choose a qualitative approach?

This study aims to explore the socio-cultural factors, such as community attitudes, beliefs and values that may promote or prevent obesity in Pacific communities residing in New Zealand. Given the lack of research on socio-cultural factors determining obesity in Pacific populations in New Zealand, the qualitative approach was favoured as it allowed the topic to be explored in depth and allows the context to be included in terms of understanding the phenomenon. The primary data-gathering method was in-depth semi-structured interviews.

Furthermore, the researcher's lived-experiences as a Samoan migrant have shaped a worldview, which acknowledges that people possess an internal sense of reality; that ordinary people construct their social reality by giving meaning and creating interpretations through their social interactions with others and their physical world. The researcher subscribes to philosophical principles which have been loosely described as "indigenous Pacific research" worldviews.³⁵⁷ First is the ontological assumption that the social world for people is intangible and internal to their cognition. Second, the epistemological assumption is that knowledge is relativist and inseparable from the context and the social realities of Pacific people. Therefore, research that looks to elucidate insider or particularistic constructions, using frames of the participants, is the ideal research methodological approach.³⁵⁸

The aim of this study is to understand the meaning people give to their behaviours within their unique social context. In order to describe the experiences of others, a researcher must get to know the particular social setting of the participants and strive to see it from the point of view of those in it. The nature of the research problem is to study *meaningful social action*, not just the external or observable behaviour of people. "Social action is the action which people attach subjective meaning: it is activity with a purpose or intentThe researcher must take into account the social actor's reasons and the social context of action".^{353 (p69)}

In this sense, a qualitative inquiry approach is favoured as it allows theory to emerge that will describe and interpret how people conduct their daily lives. It contains concepts and limited generalisations, but it does not dramatically depart from the experience and inner reality of the people being studied. The study is exploratory and descriptive it does not aim for prediction of behaviour given that social reality is influenced by dynamics such as socio-cultural, socio-historical and socio-political factors.

While the study was guided by a qualitative inquiry paradigm, it nevertheless, took a 'pragmatist' research strategy approach, by utilising a quantitative method to provide more wide-ranging data on

the research topic. In this sense, the research design took on a mixed-methodology approach – using both quantitative and qualitative research methods.

Mixed-Methodology Approach

The mixing of methods is said to provide many advantages.³⁵⁹ Of particular note is that it affords triangulation of data. A combined method of study is one in which the researcher uses multiple methods of data collection and analysis in order to reduce bias that comes from using only one particular method, investigator or data source. Cresswell^{352 (p175)} provided further reasons for combining methods in a single study:

- Triangulation in the classic sense of seeking convergence of results
- Complimentary, in that overlapping and different facets of a phenomenon may emerge (e.g., peeling the layers of an onion)
- Developmentally, wherein the first method is used sequentially to help inform the second method
- Initiation, wherein contradictions and fresh perspectives emerge
- Expansion, wherein the mixed methods add scope and breadth to a study

The nature of the study was to explore a phenomenon that has a lack of empirical evidence. Therefore the qualitative research method – in-depth individual interviews, was selected for this study in order to:

- Allow the collection of in-depth and detailed information;
- Enable a holistic approach that is context sensitive; and
- Triangulation of data

The quantitative research method – the survey questionnaire, was selected for the study for the:

- Developmental purpose – to gather empirical evidence quickly and provide breadth to the study
- Expansion purpose - for adding scope and breadth to the study
- Complimentary purpose - for finding different facets of the unexplored phenomenon that may emerge
- Triangulation purpose - to allow convergence of results with the qualitative method

Theoretical Framework

The study of socio-cultural factors and obesity aetiology is an emerging field, and the lack of empirical evidence limits the study to theoretical building rather than theoretical testing. The intent of the study is to build empirically grounded theory allowing the data to generate propositions. Using the inductive model of thinking or logic, the study gathers information to form categories or themes until a theory or pattern emerges.³⁶⁰

There is however a strong body of literature on obesity aetiology that proposes theoretical frameworks and models which this study will use, particularly to contrast the results of the study. The literature review has detailed the ecological model of the causes of obesity¹⁰⁴ and particularly the strength of evidence towards macro-environmental changes affecting the increases in Western population obesity-risk (see Figure 2.2, page 22). The underlying theoretical framework for this study is the ecological model.²²³ Social ecological models of health behaviours propose that individual health behaviours are influenced by their environments and that personal, socio-cultural, socio-political, socio-historical and physical-environmental factors are important.^{104 121 214 222 361} The purpose of this thesis was to explore the influences on individual health behaviours and will investigate the interactions between personal and environmental factors.

The study is also informed by Ball and Crawford's model (see Figure 2.3, page 27) of socio-cultural influences on obesity. The model is a first attempt to provide a theoretical framework for making plausible links between socio-cultural factors, dietary and physical activity behaviours and obesity.¹⁵
(p45) The model's framework fits the general aim of this study, which was to investigate how culture influences health behaviours and its impact on obesity risk

Research Objectives

The overall aim of the research was to explore socio-cultural factors, such as behaviours, knowledge, beliefs and values that may promote or prevent obesity in Pacific adolescents and their parents residing in New Zealand.

The specific research objectives were:

1. To describe food consumption patterns, physical activity levels and common body image patterns among Pacific adolescents and their parents living in the same households
2. To describe the influences on current food practices, physical activity levels and body image behaviours
3. To document the experiences related to messages about food, physical activity and body image from influential sources.
4. To describe the context within which food, physical activity and body image habits occur
5. To compare and describe any differences in the socio-cultural factors related to food, physical activity and body image behaviours, attitudes, beliefs and values between obese and non-obese Pacific adolescents and their parents

Ethical review

The study met the University of Auckland's Human Participants Ethics Committee standards for undertaking research and approval was granted in 2006. The following ethical issues were addressed as part of the research design. Research participants were asked questions relating to their body weight, body image and weight gain and reduction, as well as individual and family practices with regards to food and physical activity. Judging that there may be some sensitivity towards these issues, consent was sought for all participants prior to undertaking the interviews. Any persons not wishing to consent were not forced to continue with the interviews and or be audio-taped. Written consent was a requirement with participants' rights explained during meetings (Appendix B_Participant Consent Form)

The Principal Investigator followed Patton's³⁵⁰ (pp356-57) advice for qualitative researchers with a list of ethical issues to address. These are:

- promises and reciprocity;
- risk assessment;
- confidentiality;
- informed consent;
- data access and ownership.

Promises and reciprocity deals with the question 'What's in it for the interviewee?' Miles and Huberman³⁶² stated that in general, study participants are preoccupied with *action* – how to work and live better, while the researcher is focused more on *understanding*. When study participants' feel that there is inequity in the benefits (for the participant compared to the researcher) for completing the research, the access and quality of data can often be jeopardised. In this respect, a researcher needs to be cognisant of action implications of the research and make this explicit to the research participants. Participants were explained the benefits of the study as outlined in a Participant Information Sheet (Appendix C_PIS) which was given to all participants prior to seeking written consent. In addition the study benefits were reiterated before the interview proper began.

Harm and risk issues begs the question 'In what ways, if any, will conducting the research put people at risk?' Harm to participants can come in many varieties: from blows to self-esteem or "looking bad" to others, to threats to one's position and interests, to physical harm. As the primary data gathering phase involved one to one interviews issues of safety were addressed by guaranteeing confidentiality. Participants were ensured that their identities would not be linked to the findings of the study. The PIS outlined how audio-tapes and subsequent data would be stored securely, and accessed only by the Principal Investigator.

The privacy and rights of participants throughout the study were guaranteed through the use of a consent form (Appendix B_Participant Consent Form), which provided the participants the following information:

- The name of the researcher
- Where the researcher (and principal supervisor) can be contacted
- What the survey is about
- The significance and benefits of the survey
- Confidentiality guarantees

- Consent rights
- What the respondent can expect from the researcher

All participants were given the right to access the research data and withdraw their personal information from the data at their discretion. This highlights the issue of ownership. The participant owns personal data; the complete study and its data are negotiated between the researcher and the research institution. Where participant names are included in the study results, names have been changed to ensure anonymity.

Sample

Qualitative interviews

Sixty-eight individuals from 30 Pacific households participated in the qualitative phase of the study. Interview sessions included at least one adult parent or primary caregiver and a separate interview was conducted with their child/student. Thirty-three students were interviewed and were recruited from the OPIC baseline database. Thirty-five parents participated in interviews. Five parent interview sessions included both parents present. Interview sessions progressed until information saturation was reached.

The sample included students from across all of the five year secondary-school levels, Year 9 to year 13, ages ranging from 13 to 17, with a fairly equal numbers of girls ($n=17$) to boys ($n=16$). To mirror current population statistics, the three majority Pacific ethnic groups of Samoan, Cook Island and Tongan students and families were recruited. Of the thirty-three students interviewed, 11 identified with multiple ethnicities (30% multi-ethnic cases). One of the key research objectives was to compare the socio-cultural influences between non-obese and obese Pacific students. Therefore students were sampled by healthy weight status (deemed non-obese) and obese weight status, which was assessed using BMI measurements and international cut-off points recommended by the International Obesity Taskforce.⁴¹ Table 3.1 outlines the key demographic characteristics of the student and parent interview sample.

Table 3.1: Interview participants sample demographic variables

Demographic variable	Students		Parents	
	<i>n</i>	%	<i>n</i>	%
Gender				
Male	16	48.4%	6	17.1%
Female	17	51.6%	29	82.9%
Age range				
13-15	15	45.5%	-	-
16-17	18	54.5%	-	-
18-35	-	-	4	13.4%
36-45	-	-	14	46.6%
46-55	-	-	10	33.4%
56-65	-	-	2	6.6%
Birthplace				
NZ	24	72.7%	5	16.7%
Non-NZ	9	27.3%	25	83.3%
Weight status				
Obese	17	51.6%	-	-
Healthy weight	16	48.4%	-	-
Ethnicity*				
Samoan	17	39.5%	13	37.1%
Cook Island	9	20.9%	8	22.9%
Tongan	9	20.9%	5	14.3%
NZ Maori	4	9.3%	4	11.4%
NZ European	1	2.3%	3	8.6%
Niuean	3	7.1%	2	5.7%

Note: * Ethnicity-All-Count, students chose multiple ethnicities, so total numbers & percentages do not add up to 100%. Across the 3 ethnic groups, students were recruited by gender, school level and by Obese or Healthy weight status only.

Quantitative survey

Information was collected from 4215 students who participated in the New Zealand arm of the Obesity Prevention In Communities (OPIC) project^{iv}. Students were surveyed at secondary schools and questionnaire items included demographic variables, anthropometry, food and nutrition behaviours, physical activity and leisure time activities, body size perceptions and attitudes, and questions relating to family, home, school and neighbourhood environments.

Table 3.2 summaries the key demographic characteristics of the student questionnaire sample. Ethnicity was a forced one-choice question. BMI measurements were used to classify students weight status using recommendations made by the International Obesity Taskforce.⁴¹ Analysis undertaken for this study included using the total OPIC student sample ($n=4215$), as well as analysing the student sample by Pacific ethnicity only ($n=2490$) and also by Pacific weight status, that is, Healthy weight and Obese Pacific student samples only ($n=1518$).

^{iv} see Source 12. Utter J, Faamani GL, Malakellis M, Vanualailai N, Kremer P, Scragg R, et al. Lifestyle and Obesity in South Pacific Youth: Baseline Results from the Pacific Obesity Prevention In Communities (OPIC) Project in New Zealand, Fiji, Tonga and Australia. Auckland: University of Auckland, 2008., for further details on OPIC study methodology.

Table 3.2 OPIC Survey Student sample demographic variables

Demographic variable	Students	
Total OPIC sample	<i>n</i> =4215	100%
Weight status		
Healthy weight	1664	39.5%
Overweight	1475	35.0%
Obese	1076	25.5%
Ethnicity		
Pacific	2490	59.1%
Maori	834	19.8%
Asian	446	10.6%
European	445	10.5%
Selected Healthy Weight and Obese Students Only	<i>n</i> =2740	100%
Weight status		
Healthy weight	1664	60.7%
Obese	1076	39.3%
Ethnicity		
Pacific	1518	55.4%
Maori	554	20.2%
Asian	338	12.3%
European	330	12.1%
Selected Healthy Weight and Obese Pacific Students Only	<i>n</i> =1518	100%
Weight status		
Healthy weight	712	46.9%
Obese	806	53.1%
Pacific Ethnicity		
Samoan	694	45.7%
Tongan	352	23.2%
Cook Island	326	21.5%
Other Pacific	146	9.6%
Gender		
Girls	789	52.0%
Boys	729	48.0%
Age range & School level		
12-15 years / Junior school	1062	70.0%
16-20 years / Senior school	456	30.0%

Table 3.3 details the key demographic variables amongst the Pacific student sample only showing heterogeneity (or otherwise) across variables. Chi-square tests were used and statistical significance was set at $p < 0.05$. Results showed a difference in weight status by ethnicity, with more Cook Island students being of Healthy weight (and less obesity prevalence) compared to Samoan and Tongan students.

Table 3.3 Weight status by key demographic variables amongst Pacific students ($n=1518$)

Demographic variable	Weight status				
	Obese ($n=806$)		Healthy Weight ($n=712$)		P-value
	<i>n</i>	%	<i>n</i>	%	
Gender					
Boys	408	56.0%	321	44.0%	0.0312
Girls	398	50.4%	391	49.6%	
Age					
12-13	241	52.7%	216	47.3%	0.7904
14	176	51.3%	167	48.7%	
15	141	53.0%	125	47.0%	
16	129	53.1%	114	46.9%	
17	119	56.9%	90	43.1%	
Ethnicity					
Samoan	405	58.4%	289	41.6%	<.0001
Cook Island	130	39.9%	196	60.1%	
Tongan	205	58.2%	147	41.8%	
Other Pacific	66	45.2%	80	54.8%	

Procedures

Qualitative interviews

Students were recruited for individual interviews if they had completed the OPIC baseline questionnaire and this data was gathered during the 2005 school year. Students were randomly selected for the interviews, depending on weight status (healthy weight and obese students only), Pacific ethnicity (Samoan, Cook Island and Tongan), gender, and school year. Household location was deemed important for comparing equivalent environmental influences so families were recruited from the catchment area of the Mangere suburb/ward. Three Mangere high schools involved in the OPIC project were approached and agreed to take part in the study. Interviews took place during school terms 1-3 in 2006 from the months of March to September.

The Principal Investigator prepared lists of students who met the inclusion criteria from the OPIC database and met with school Principals, who after giving written approval for the study to take place within the confines of the school, checked the list for current student status (some students may have left school in the intervening time). From a possible dataset of 1518 students, forty student interviews were judged an appropriate sample size for representing the various demographic inclusion variables. Personal invitations were prepared for each student, to introduce the study, the investigator and with details of an invitation to come to a lunch-time meeting (usually the next day) to meet with the Principal Investigator (Appendix D_Student invitation). The school administration staff arranged for the student invitations to be distributed to students through their form class time usually the day before the meeting.

At this meeting, the study was explained and questions clarified for students. Students were then given Participant Information Sheets and Consent Forms to be taken home to share with parents or caregivers and to seek their written consent. The Principal Investigator made herself available every lunchtime sessions to be at the school to collect follow-up consent forms and arrange interview times with students. In addition, evening phone calls were made to student homes to remind them about consent forms and to talk to parents about the study. Often parents would agree at this time to take part in the study and interview times would be arranged accordingly, at a time and day suitable for families. All parent interviews therefore took place at their homes either in the mornings, afternoons and evenings including weekend days. There were many occasions where students would not have telephones available in their homes (few were disconnected numbers), the Principal Investigator would then visit homes and door knock to meet parents to talk about the study. The face-to-face approach was most effective in the recruitment of Pacific parents and adolescents to the study.

From an initial student list of 40 student invitations distributed at each school, approximately 20 students would turn up to the lunch time meeting to meet the Principal Investigator, and then some 10 to 15 students would indicate their consent to participate in the study. Most student interviews took place immediately after school at a small office space made available by the school. On the day of the arranged interview, reminder notices were sent to students during their last class period to meet the Principal Investigator at the after school venue. A few student interviews took place at the students' homes, during the school holidays periods.

All student interviews were completed individually and were audio-taped and transcribed. Most interviews took between 60-90 minutes to complete. English was the main language, but the Principal Investigator and students would often use Pacific (Samoan, Cook Island or Tongan) words to describe certain events or experiences. The majority of parental or caregivers interviews were completed individually, took 90-120 minutes and were also audio-taped and transcribed. Five out of the 30 parental interviews were completed with both mother and father of the student present. Seven out of the 30 parental interviews were completed in Samoan language and then transcribed by the Principal Investigator. One of the parental interviews was conducted in Tongan with use of interpreter, with the remaining interviews conducted in English language. As a show of appreciation and respect a meaalofa (gift) was presented to Pacific students (movie vouchers) and their parents (supermarket vouchers) at the end of interviews. Both students and parents completed (or with the help of Principal Investigator) demographic information forms (Appendix E_Demographic form) before the interview proper commenced.

Integral to the research process and in alignment with indigenous Pacific research principles, particular cultural processes and strategies were followed for both student interviews but also especially with the interviews with migrant Pacific parents.³⁶³ The Talanoa^v interview process, defined by Vaioleti³⁶⁴ (pp23-4) as “an ancient practice of multi-level and multi-layered critical discussions and free conversations...literally talking about nothing in particular, and interacting without a rigid framework” was judged by the researcher to be an appropriate process to use to successfully address the research objectives, namely to obtain rich contextual information and to capture participant realities as they unfold.

^v Samoan & Tongan word literally meaning ‘conversation’ or ‘talking’ or ‘chatting about’

The researcher conducted the interviews using Samoan codes of expectations and cultural practices, particularly the concepts of feagaiga (code of conduct), faaaloalo (respect), fealofani (goodwill), alofa (compassion), loto maualalo (humility), momoli (to assist/express solidarity) and aiga (kinship/relationship).³⁶⁵ Code of conduct includes proper physical presentation as a younger Samoan woman, use of proper forms of address to acknowledge rank, status and respect of elders, humility and respect of participant homes and reciprocating their consent and their participation in the study through showing goodwill, accepting their hosting protocols, presenting a meaalofa (gift) and being explicit about the values and motivation behind the study. In addition, indigenous Pacific research processes must always take into account the relational aspects of the participants and the researcher and interviews could not effectively commence until the relationship and kinship between both parties was acknowledged.^{357 366} Interview protocols for this study followed a particular code of conduct which is similar to Smith's ^{367 (p120)} model for Maori indigenous research practices.

- Aroha ki te tangata (show respect for people)
- Kanohi kitea (the seen face, that is present yourself to people face to face)
- Titiro, whakarongo...korero (look, listen...speak)
- Manaaki ki te tangata (share and host people, be generous)
- Kia tuupato (be cautious)
- Kaua e takahia te mana o te tangata (do not trample over the mana of the people)
- Kaua e mahaki (do not flaunt your knowledge).

One interview guide was developed to guide questions posed to both parents and students (Appendix F_Interview Guide). Instances where questions were relevant to only parents or only students were highlighted in the interview guide. The Talanoa interview process as described by Vaoleti ³⁶⁴ was used to capture typical lifestyle routines and habits as a way to provide context to particular habits. A timeline exercise was used at the beginning of the interview to capture daily life routines and eased interview participants into other study topics. Sub-sections of the Results chapter will detail the key qualitative interview and quantitative survey questions as related to each topic (i.e., Food habits, Physical Activity and Body Image).

Quantitative survey

The OPIC baseline data consisted of questionnaires administered to students from seven co-educational high schools from the South Auckland region in 2005-2006. Four of the schools are in the Mangere suburb/ward and were allocated to be the intervention schools; three schools in other parts of South Auckland became the control schools. All students were invited to participate in the study. From a combined students' schools roll of 7373, 4250 completed the survey giving a 58% response rate. After data cleaning, 4215 complete student data results were included in the final sample size for data analysis.

To minimise disruption to school activities, students were interviewed as a whole class within one school period (usually 40-50 minutes). Students answered questions on Personal Digital Assistants (PDA) and physical measurements of height, weight, waist circumference and body fat measured through a body impedance machine (BIA) were also collected. Measurements were made by trained research staff, using standardised procedures and equipment. Questions developed for the survey originated from several nationally-based survey tools including the New Zealand 2002 National Children's Survey,³¹⁸ National Health and Medical Research Council (NHMRC) Dietary Key Indicators Study, and 1995 Australian National Nutrition Survey.³⁶⁸ (For a copy of the questions included in the survey and further details of their source see <http://www.deakin.edu.au/hmnbs/who-obesity/>.) There were 107 items included in the OPIC survey questionnaire. Only questions that were relevant to the current study's objectives were included in the analysis. Sub-sections of the Results chapter will detail the quantitative survey questions as related to each topic (i.e., Food habits, Physical Activity and Body Image).

Analysis

In the qualitative component, interview transcripts were transcribed and analysed using the grounded theory inductive approach described by Strauss and Corbin.³⁶⁹ This technique enables the systematic identification, categorising and sorting of key themes and sub-themes running through text segments in the transcripts. Computer software programme NVivo7 was used to analyse, sort and code interview data. To ensure rigor and reliability of analysis, a small number of transcripts (approximately five) were randomly selected and coded by other investigators. Any discrepancies were reviewed and discussed until 100% agreement was reached. In addition, stakeholder checks were used to enhance the credibility of the findings by allowing research participants and other people who may have a specific interest in the research to comment or assess the research findings, interpretations and conclusions.³⁶⁰ This procedure is important particularly where interpretations are made about cultural elements outside of the Principal Investigator's own cultural background. Copies of draft reports and/or specific sections were made available to stakeholder groups, namely parents from the 3 different Pacific ethnic groups of Samoa, Cook Island and Tongan background, whose children attended the three Mangere secondary schools, so they could provide written and or oral commentary on the interpretations made in the report sections. Any subsequent changes to the final report were shared with commentators.

The main method of analysis of the quantitative data for describing single variables and describing associations between variables was descriptive statistics.³⁷⁰ Guided by the research questions, the analysis of the survey used descriptive statistical measures of mean, median, mode, summary percentages and measures of variance (standard deviations where useful) to describe those behaviours chosen by the participants and to provide demographical information about the participants. Statistical software SAS (v 9.1, SAS Institute Inc., Cary, NC, USA) was used to generate results.

Bivariate analysis and other measures of associations between variables were used to measure the effect between variables. Chi-square tests were used to determine the relationship between two variables and statistical significance was set at $p < 0.01$. The main purpose for trying to detect a relationship between two variables is to help in the task of explanation.³⁷¹ The quantitative analyses employed for this study compared prevalences of outcomes between comparison groups, which is appropriate for cross-sectional studies. However, statistically significant correlations do not prove causation nor does it suggest the strength or direction of the relationship between variables. Chi-square tests' indicates only if the variable of interest is distributed differently between comparison groups. In most cases, chi-square tests were conducted between the variable of interest (e.g. weight status) and demographic variables (e.g. age, gender or pacific ethnicity). Subsequent chi-square tests were conducted to determine if demographic variables confound the relationship between variables (data not

shown). Table 3.3 (on page 63) summarises the sample by weight status across key demographic variables. There were no significant differences in the sample of obese and healthy weight Pacific students by gender or age. The Mantel-Haenszel method was used to adjust comparisons for possible confounding from covariates.

The OPIC quantitative survey data was derived from a clustered sampling design which sampled participating schools by school decile ratings. Clustered sampling is a sampling technique based on dividing the whole population into groups ("clusters"), then using random sampling to select elements from the groups. Random sampling is a method of selecting a sample from a population in which all the items in the population have an equal chance of being chosen in the sample. The increased homogeneity of students selected by clustered sampling decreases the variance amongst the sample and produces an under-estimation of the standard error compared to simple random sampling. Advice was taken from biostatisticians in the School of Population Health not to use appropriate software, such as SUDAAN, to correct for any design effect, as it produced unexpected chi-square values that were not consistent with the contingency tables from simple analyses. Rather, they advised use of p-value of <0.01 to determine statistical significance (rather than the usual cut-point of 0.05) to allow for any design effect on the standard error arising from clustered sampling. Only results that met statistical significance set at $p<0.01$ are presented in this thesis.³⁷²

Information Dissemination

The results of this research project were given to participating families, participating school boards, local District Health Boards and relevant government ministries by way of a formal summarised report and or presentation.

Findings were also presented at conferences and meetings relevant to the area of study. For example, in the public health, obesity, Pacific peoples, nutrition and physical activity fields. The principal investigator prepared and submitted papers summarising the study's main findings suitable for publication in related peer-reviewed scientific journals.

Detailed Sample Profile

Table 3.4 is a summary of more detailed demographic information about the study samples (parental composition, parental ethnicity, household size, average numbers of dependent children, parental SES and employment, average, NZ years of residence, church affiliation).

Table 3.4: Detailed household sample demographic variables

Demographic variable	Qualitative Interview Sample (<i>n</i> = 30 households)		Quantitative survey questionnaire (<i>n</i> =1518)	
	<i>n</i>	%	<i>n</i>	%
Two-parent households	28	93%	1092	72%
Mixed-parental ethnicity	9	30%	-	-
Bilingual households	26	86%	-	-
Employed households	25	83%	-	-
Combined parental income mid-low range \$30K-\$60K	23	76%	-	-
Extended family living^{vi}	21	70%	-	-
Demographic variable	Qualitative Interview Sample		Quantitative survey questionnaire	
Average household size	7	Range 3-13	6	Range 1-16
Average # dependent children	3.5	Range 1-7	-	-
Average years of NZ residence (for 83% of parents who migrated to NZ)	21 years	Range 2-48 years	-	-

^{vi} Extended families defined as households with other non-dependent adults (other than students' primary caregivers) usually resident in homes.

Chapter 4

RESULTS

This chapter outlines the findings of the study in the four main topic areas,

(A) Food Habits,

(B) Physical Activity

(C) Body Image

(D) Differences between obese and healthy weight students.

Each sub-section will re-state the specific research objectives, key questions, an overview of the main findings, results in detail and conclude with a short summary.

Food habits

Research objectives

The general objective of this study was to explore the socio-cultural factors; community attitudes, beliefs, values that may promote or prevent obesity in Pacific adolescents and their parents in New Zealand. The specific objective is to describe the attitudes, beliefs and values that are related to food habits and consumption.

The specific objectives of this part of the study were to:

1. To describe food practices, food supply and preparation processes and identify influences on current practices
2. To describe food consumption patterns and the influences on these among adolescents and their parents living in the same households
3. To describe food knowledge and identify key influencers on current knowledge and beliefs
4. To describe the context within which food habits occur
5. To describe differences by student weight status

This Food Habits results section will be presented in four parts, (1) Food supply and preparation (2) Food consumption patterns (3) Food knowledge and influencers (4) Food context.

Interview and Survey questions

Table 4.1 shows some of the key questions related to each sub-section. The list is not exhaustive as the interview procedure employed was open-ended to allow an exploration of the topics above. Survey questions related to the study objectives were also analysed to provide triangulation and contrast between survey and interview data. Significant findings across key variables are presented here. Data were also analysed across student weight and results between obese student and healthy weight students are presented.

Table 4.1: Food Habits Qualitative Interview and Quantitative Survey questions

Qualitative Interview Questions: showing food habits study objectives and some of the corresponding interview questions	
<p>1. To describe food practices, food supply and preparation processes and identify influences on current practices</p>	<ul style="list-style-type: none"> – <i>Who buys the food in your family? Explain the decisions you make when doing the weekly groceries for the family?</i> – <i>Where do you source / buy the food and why?</i> – <i>It it's bought (e.g., lunches from shop, dairy, canteen) where do you get the money from to buy food?</i> – <i>Who prepares the food and why?</i> – <i>When and where and with who do you eat with on a daily basis?</i> – <i>How do you prepare food and why?</i> – <i>When do you get to choose what you eat?</i> – <i>What types of occasions do you buy or prepare different (or special) foods from what you would normally buy or eat?</i> – <i>On what occasions would you share or gift food or receive food and why? And what types and volumes of food and why?</i> – <i>How important is it to eat the food offered to you at these occasions? If you did not eat it, what would happen to you?</i>
<p>2. To describe food consumption patterns and the influences on these among adolescents and their parents living in the same households</p>	<ul style="list-style-type: none"> – <i>What do you actually eat (typical foods) on a daily basis and why?</i> – <i>What meals would you have during the weekday? During Saturday? During Sunday?</i> – <i>What is the biggest meal event of the day?</i> – <i>(Ask if appropriate) Why would you not have breakfast, lunch & dinner?</i> – <i>Can you tell me about a time when you would eat more/less than you would normally? What is happening at this time? How often would this occur to you?</i> – <i>What do you like to eat and why? If there was no limitation, what foods/drinks would you like to eat? And prefer NOT to eat and drink?</i>

Qualitative Interview Questions: showing food habits study objectives and some of the corresponding interview questions			
3.	To describe food knowledge and identify key influencers on food habits and consumption patterns	<ul style="list-style-type: none"> – <i>What would you say (believe) are foods that are good / bad for your health? If you know these foods are healthy (or unhealthy), why would you eat them?</i> – <i>Where did you get food information from?</i> – <i>Does anyone influence the amount and type of food that you eat? In what ways do these people influence you? Who would you listen to more, and Why?</i> 	
4..	To describe the context within which food habits occur	<ul style="list-style-type: none"> – <i>Drawing a timeline for a typical working/school day, can you help me fill in what happens during your day, from the time you get up, to the time you sleep at night. [Prompt: sleep, wake, clean, eat, travel, school/work, homework, active leisure activity, e.g., sports, dance, cultural activities, inactive leisure e.g. TV, computer, PlayStation, reading, homework, cooking, shopping, visiting others, hosting others, church events, other?]</i> 	
Quantitative OPIC Survey Questions: Showing food habits question, possible responses and categorisations formed for analysis			
<i>Measure</i>	<i>Question</i>	<i>Responses</i>	<i>Analysis</i>
Frequency of breakfast consumption on school days	In the last 5 school days, on how many days did you have something to eat for BREAKFAST before school started?	0 days 1 day 2 days 3 days 4 days 5 days	Split into 3 categories: 0-1 days = low frequency 2-3 days = midrange 4-5 days = high frequency
Source of breakfast on school days	On school days, where do you usually get your breakfast from?	Home School canteen or tuckshop Shop (outside school) From friends I don't eat breakfast	Split into 4 categories: Home School canteen or tuckshop & Shop (outside school) combined = Purchased lunches From friends I don't eat breakfast

Quantitative OPIC Survey Questions: Showing food habits question, possible responses and categorisations formed for analysis			
Frequency of lunch consumption on school days	In the last 5 school days, on how many days did you eat lunch at lunchtime?	0 days 1 day 2 days 3 days 4 days 5 days	Split into 3 categories: 0-1 days = low frequency 2-3 days = midrange 4-5 days = high frequency
Source of lunch on school days	Where do you usually get your lunch from?	Home School canteen or tuckshop Shop (outside school) From friends I don't eat lunch	Split into 4 categories: Home School canteen or tuckshop & Shop (outside school) combined = Purchased lunches From friends I don't eat lunch
Rating of mother support to eat healthy foods	How much does your mother (or female caregiver) encourage you to eat healthy foods?	A lot Some A little Not at all Don't live with my mother	Most students chose response 'A lot' to rate mother's support. This response was used for analysis.
Rating of father support to eat healthy foods	How much does your father (or male caregiver) encourage you to eat healthy foods?	A lot Some A little Not at all Don't live with my father	Most students chose response 'A lot' to rate father's support. This response was used for analysis.

Overview of Food Habits findings

This study found that mothers were typically responsible for food supply and preparation of household foods. Food supply was reliant on available resources and for low-income large-member households, food insecurity occasions were regular. Employment time particularly for those on shift work arrangements encroached on food preparation and takeaway ready-made meals was the default choice for family evening meals. The most popular food items supplied, prepared and consumed were those that were cheap and took little time to prepare. Typical household meals were a mixture of traditional Island and New-Zealand based foods and dishes, with parents preferring Island foods and adolescents preferring New-Zealand based foods. Key foods like vegetables were present in the healthy weight students and parents' list of typically consumed food items, but it was not identified by obese students and their parents.

Patterns of food consumption differed by weight status with obese students more likely to have irregular breakfast and school lunch consumption compared to healthy weight students. This pattern was matched with parents' consumption practices. However, the sources of breakfast and school lunch foods were similar amongst Pacific obese and healthy weight students. Pacific students were significantly more likely to purchase breakfast food items on the way to school and school lunches than other ethnicities. Parents confirmed convenience, compensation and valuing students' independence as three reasons for choosing to make money available for students to purchase breakfast and lunch food items.

Particular traditional Island high status foods and ways of preparation and distribution were identified to be important for special but irregular occasions. The practice of toonai, the midday meal prepared for Sundays in respect of the Christian Sabbath day, was practiced by church going members of the cohort. Particular types of foods are prepared for this day only.

Both students and parents showed good knowledge of healthy versus unhealthy foods and identified the home and school environment as key sources of influence relating to food knowledge. However, both students and parents were able to explain that food knowledge alone was not a major influential factor in food choice. Cost, affordability and time restraints were the most influential on actual food choices and habits.

The Results section for Food Habits is presented in four parts: (1) Food supply and preparation (2) Food consumption patterns (3) Food knowledge and influencers (4) Food context. Where relevant significant patterns found in the analysis of the quantitative survey are presented first and then compared to the findings from the qualitative interview data.

Food supply and Preparation

Food Supply

During the interviews, students and parents were asked to identify who supplied the household food. The person who purchased household foods was asked further to explain food purchasing decisions and processes. Mothers were typically reported as the purchaser of household food and made decisions about the foods they fed to their families. They often have to budget very carefully and food pricing and affordability was the key purchasing factor. Cheap meats like brisket and sausages were often the meat choices. Food insecurity was normal for large families, especially those living on government welfare. Not having enough money was a cause of stress for parents as illustrated by some of the parental comments below:

“Well most times we get about \$100 dollars left over for us and the kids, left over from our pay, I usually get it on a Tuesday, so then I take it and say like after four days, I would use about \$50 dollars just on the kids lunches and then there would be \$50 dollars left over to buy our food for the week, this is all I can spend for the week so I make sure it gets distributed evenly to last and make all our meals.”

Samoan Mother of 7 dependent children, at-home parent, household size 9.

“Probably \$150 a week I spend on groceries, you know, because they always give me money to do the shopping and I say to them ‘this is not enough’ and they say ‘mum, I have to pay my bills’, ‘what bloody bills’ and I just stress out and stress out, about the money so I can get everything that we need.”

Samoan Mother of 2 dependent children, cleaner, household size 6.

For most parents, as illustrated by a mother’s comment below, there were always food grocery-shopping occasions when there were foods they would have liked to purchase, but were unable to due to not having enough money.

“Sometimes I want to buy fish fingers and flounders, but it’s too much, and we can’t get it. I say to him (husband), I’d really like some flounder and fish fingers, but there’s not enough money. Food like that, we don’t have here (at home).”

Samoan/Niuean Mother of 5 dependent children, at-home parent, household size 7.

Comments below showed that sometimes parents will go without food and make food available for the children first. Some families grew root and other vegetables to supplement their food supply, or they relied on other extended family members or grown children not usually resident in the homes, who supplied food as and when needed. Parents' comments highlight these points;

"Yeah, its true sometimes you know if I make the dinner and its not enough, sometimes I never eat, you know, mums are always like that, I have to feed them [the kids] first, it doesn't matter about me. No I think mothers always feel like that, you can't eat and leave your kids hungry. Sometimes you know my husband he always tries to eat first and then I say 'you better be second, so the kids can eat first and then we see what they left that's for us'"

Tongan Mother of 7 dependent children, at-home parent, household size 13.

"We shop weekly, but sometimes its not enough the money, you know we are on the benefit and you have to see how much you can get. But, sometimes, we run out, we normally do the shopping on Thursday, but when its going to Monday that's when we run out, so we go out and buy again. Food is very expensive...But sometimes the people [extended family] they make heaps of food in their place and they come and give us some food."

Tongan Aunty of 6 dependent children, beneficiaries, household size 10.

Takeaway meals or "junk foods" (e.g. energy dense snack foods like potato chips, chocolate, sweets, fizzy drinks) were usually referred to as treats or used as rewards by parents to purchase for children when they achieved something important. Extended family members, typically aunts and uncles, would bring treats for the children on a weekly basis.

Food preparation

Stay-at home parents often have the responsibility for food preparation particularly of the main meal in the evening. For this cohort, it is the mothers who normally prepare the foods for the family and they are often influenced by the food preferences of their family members, particularly the children. They like to make for example chapsuey, chicken meals, rice and pasta based meals which are enjoyed by their children. Food preparation is dependent on time availability. Employment time encroaches on food preparation and the default choice is takeaway meals for the family, as illustrated by a mother's comment below.

"Sometimes during the week, if I don't cook cos normally I have to go early [to work] like today, then I say to them [kids], 'what are you going to have for dinner?', 'oh, I don't know', 'get some fish and chips or buy some takeaways', and then they will have that."

Samoan Mother of 2 dependent children, cleaner, household size 6.

In the weekends, church activities can encroach on food preparation and takeaway meals becomes the choice for the main meal. Older children are expected to be independent and when parents are busy and or away from home due to work commitments, food preparation is left to them. Older students confirmed that they would be expected to prepare meals when needed and would choose easy prepared meals like tinned foods for the evening meal. A student explains below;

“Our mum normally cooks it [dinner] before she goes to work. Yeah sometimes I cook. When there’s nothing there, she hasn’t cooked anything cos she’s too tired

[Interviewer] And so what would you normally make?

Something like tuna or something with corned beef, [which] I fry with onions in it really, or I just fry it with spaghetti.”

Samoan/Niuean female, Age 17, Classified Healthy Weight.

Shared family meals were difficult in households with both parents working full-time. The comment below illustrates how two working parents would organise household meals by ensuring the pantry was filled with easy-to-prepare meals for their children to make themselves to eat after school, while dinner prepared later at night, was often only eaten by parents. In this kind of household-working environment, it became difficult for a family to sit down together to share an evening meal.

“The kids just stay home until their father gets home and at 5pm o’clock. Sometimes I like stay at work till 5.30pm and make up my time when I’m late and so whoever gets home first cooks the dinner. Dinner we eat about 7pm.... I usually buy stuff that the kids you know mainly the kids eat, like I buy heaps of cans of fruits they love that, and spaghetti, there is like tuna things, that’s the thing they easily [can make for themselves]. They just come to the cupboards after school and have tuna and lots of cereals. I fill up my trolley with any kind of cereal they eat and what else, sandwich things like cheese, easy to make toast. When we cook [dinner] like mostly it’s me and him [husband] will eat the most and mostly the kids go ‘oh I’m maona (full belly/satisfied)’ from after school, so they just don’t eat [dinner] with us.”

Samoan Mother with 4 dependent children, administrator, household size 6

Food consumption patterns

Typical household meals

Students and parents reported that typical everyday food meals were a mixture of traditional Island food dishes and New Zealand food items. Table 4.2 shows typical “every day” foods consumed and items defined as typical “special” foods, usually prepared only for special occasions like birthdays or Mother’s Day, Father’s Day or White Sunday Children’s Day celebrations.

Table 4.2: Food items defined by Students and Parents in the Qualitative interviews as typical “every day” and “special” food items consumed, separated by Student weight status, in descending order of most stated items

	Students		Parents	
	Obese	Healthy weight	Obese	Healthy weight
Typical foods	Chicken Taro Rice Pisupo (canned corned beef) Sapasui (chopsuey) Soup Potatoes Fa'i (green bananas) Hot chips Kumara (NZ sweet potato) Takeaways Fish Chinese takeaways /chowmein/stir-fries Curry Noodles Kapisi (cabbage) Steak Biscuits Fruits Salad Burger king Fizzy Fishnchips Fried pork Cabin biscuits Gravy Tea Eggs Tuna Palusami/lu/luau (baked or cooked taro leaves)	Chicken Taro Rice Chinese takeaways /chowmein Potatoes Pisupo (canned corned beef) <u>Vegetables</u> Fa'i (green bananas) Palusami/lu/luau (baked or cooked taro leaves) Sapasui (chopsuey) Fish KFC Lamb chops Fishnchips Gravy Pork ribs Noodles Curry Soup Spaghetti (canned) Mince Tea Toast Seafood Beef Kebab Steak Doughnut Boil-up Cookies Cakes	Chicken Eleni (tinned fish) Bread Taro Soup /sua i'a (fish soup) Rice Fa'i (green bananas) Fish <u>Sausages</u> Potatoes Sapasui (chopsuey) Pisupo (canned corned beef) Kumara (NZ sweet potato) Stews Beef Pork Chinese takeaways Fishnchips Mince Koko alaisa (cocoa rice) Curry Macaroni cheese Fizzy Pasta KFC Steak Tapioca Yam Seafood Palusami/lu/luau (baked or cooked taro leaves)	Chicken <u>Vegetables</u> Rice Fish Taro Roast pork Beef steak /schnitzel /roast/mince Pisupo (canned corned beef) Potatoes Lamb flaps Chinese takeaways /chowmein Gravy Soup Eleni (tinned fish) Fa'i (green bananas) Palusami/lu/luau (baked or cooked taro leaves) Spaghetti (canned) Koko alaisa (cocoa rice) Pasta Yam Tomatoes Kumara (NZ sweet potato) Bread Curry Noodles Eggs Kopai (cocoa dumplings) Cordial Oka (Raw fish) Seafood salad

Note: Foods highlighted in **bold font** and underlined were the main food differences across weight status

	Students		Parents	
	Obese	Healthy weight	Obese	Healthy weight
Typical foods	KFC (Kentucky fried chicken) Casserole Pasta	Milk BBQ meats Takeaways Pizza	Toast Spaghetti (canned) Noodles Fruit Takeaways	Cookies Takeaways Green salad KFC Coconut cream Tongan pancakes Manioke (manioca) Cereals Boil-up
Special foods	Taro Fish Chicken Sapasui (Chopsuey) Oka (Raw fish) Roast pork Seafood /mussels Fa'i (green bananas) Kumara Pisupo (canned corned beef) Palusami/lu/luau (baked or cooked taro leaves) Crab meat salad BBQ meats Takeaways Chinese takeaways Curry Yam Butter chicken Rice Bread Juice Cake Ice-cream Fruit salad Gravy Vegetables Tapioca	Taro Chicken Sapasui (Chopsuey) Fish Fa'i (green bananas) Palusami/lu/luau (baked or cooked taro leaves) Pisupo (canned corned beef) Roast meat Chinese takeaways Ice-cream Mussels /seafood Oka (raw fish) BBQ meats Rice Takeaways Pork Mayonnaise (Cook Is. dish) Cakes Fruit salad Soup Yam Povi masima (salted beef) Roti (Indian) bread	Chinese takeaways Taro Chicken Fish Oka (raw fish) Fa'i (green bananas) Sapasui (chopsuey) Palusami/lu/luau (baked or cooked taro leaves) Fried rice Pisupo (canned corned beef) Seafood Salad Yam Kumara (NZ sweet potato) Crab salad Butter chicken Povi masima (salted beef) Hot chips Poke (Cooks Is dish of cooked arrowroot, cassava or green banana) Mayonnaise (Cook Is. dish)	Fish Taro Sapasui (chopsuey) Mussels Oka /raw fish Palusami/lu/luau (baked or cooked taro leaves) Chicken Roast chicken Crab salad Yam Vegetables Potatoes Povi masima (salted beef) Pork Pisupo (corned beef) Mayonnaise (Cook Is. dish) Fa'i (green bananas) Chowmein BBQ meats

Note: Foods highlighted in bold font and underlined were the main food differences across weight status

For most families, Sundays was usually a day for preparing special foods for the midday meal to honour the Christian Sabbath day. For some parents, there would be sacrifices made in the weekly meals to ensure “proper” foods were prepared for the Sunday toonai (lunch/meal/feast), as explained by one mother below;

“I still go and buy chicken pieces because my kids like chicken pieces, and the other thing I consider, is that it depends on the money left over from our pay, I think carefully about whether its best to buy four tinned fish, which is cheaper, which we would eat one per day, but on Sunday that is when I can buy some taro, maybe two pieces and some biscuits to make other things with. Maybe this is the only day [Sunday] when I would buy properly, for Sundays.”

Samoa Mother of 7 dependent children, at-home parent, household size 9.

For most families there was a discrepancy in food items enjoyed and eaten by children that were different to the foods enjoyed and eaten by parents. Sometimes it would not be unusual for parents to prepare two meals, usually New Zealand based meals like mashed potatoes and steak for the children, and traditional Island food like fish and taro for the parents or elderly members in the household. A student’s comment highlights this point.

“Because my grandma, she likes to eat fish but like the rest of us kids we don’t like to eat fish, that’s why they cook another thing for us and everyone else, like my auntie and my mum and dad they eat the fish but the kids, we eat the steak and rice. Just my grandma and dad or sometimes we eat it with them as well, like corned beef and taro, banana, yeah.”

Cook Island female, Age 16, Classified Healthy Weight.

Students and parents were asked what foods they would typically have for their main meal of the day. Table 4.2 highlights some typical food items consumed, which were different between students or parents according to student weight status. That is, healthy weight students and their parents identified vegetables as a typical food item consumed at home, particularly for the main evening meal, whereas obese students and their parents did not. Parents with a classified obese student stated sausages were a typical food item, while parents with a classified healthy weight student did not. In the ‘Special foods’ category, parents with a classified obese student stated Chinese takeaway foods as a typical food item consumed on special occasions while parents with a classified healthy weight student did not. Parents with healthy weight students chose seafood as the most typical ‘special’ food item consumed.

The parents' comments below showed that takeaway meals were a regular feature in all homes, with at least one day of the week reserved for no home cooking and purchased dinner meals became the substitute. Older grown working children or children with access to their own finances, (i.e., on government benefits), would contribute to household meals, often by purchasing cooked takeaway meals as suits their taste preferences. New migrants talked about the food nutrition transition behaviours observed in their children, with younger members of the household preferring to eat bread, eggs and breakfast cereals at all times, and rejecting traditional Tongan or Samoan foods like yam, taro and fish.

"Friday is the only day I don't really have to cook because my other kids get paid they come home and bring Kentucky [fried chicken] or they ring me up and say "don't worry about cooking we are bringing something home" that's when I rest from cooking, that makes me happy sometimes."

Samoan Mother with 2 dependent children, at-home parent, household size 6.

[Interviewer] "What's a typical dinner that you would have in your house?"

Well, beneficial foods, like taro, chicken, fish, heaps of vegetables, and rice, we mainly have lots of vegetables, because this is best for preventing illnesses ay? Especially those with high blood pressure or diabetes. Well, this is the thing that they [children] do, I make the food for them to eat, but they don't want to eat it, they leave the food we make, and go and buy the food that they want to eat. There's been heaps of time, when I say to them, don't bring any takeaways or things like that, but most times they go and buy fish and chips, but not every day, other days they bring Kentucky, other days they would bring pies, things like that, but they don't eat the food we cook for them. They just go and spend some more money.

And where do they get their money from, do they get pocket money or do they work?

Well, they get it from their benefit and we top up their money sometimes, but they are spending their own money."

Samoan Father of 3 dependent children, unemployed, household size 8.

Breakfast

Student Ethnicity

In the survey, students were asked “In the last 5 school days, on how many days did you have something to eat for breakfast before school started?” Analysis of the quantitative data showed there were significant differences in the frequency of breakfast consumption between Pacific students compared to other ethnicities, with Pacific students (49.1%) less likely to regularly consume breakfast on most school days (i.e., 4-5 school days) compared to other ethnicities, (for Maori students 53.4%; Asian/Other 72.8%; European 76.3%). (p value<0.0001 adjusted for age and sex; see Figure 4.1).

Figure 4.1: Students’ breakfast consumption (%) across 5 school days by Ethnicity (n=2740)

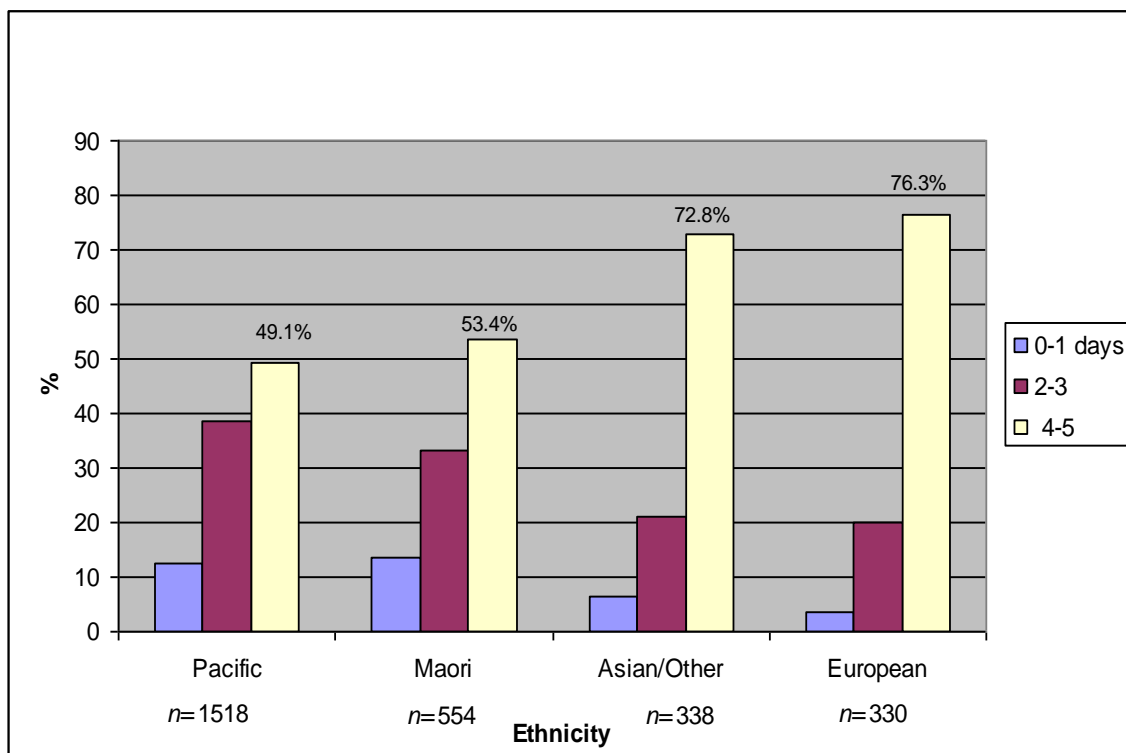
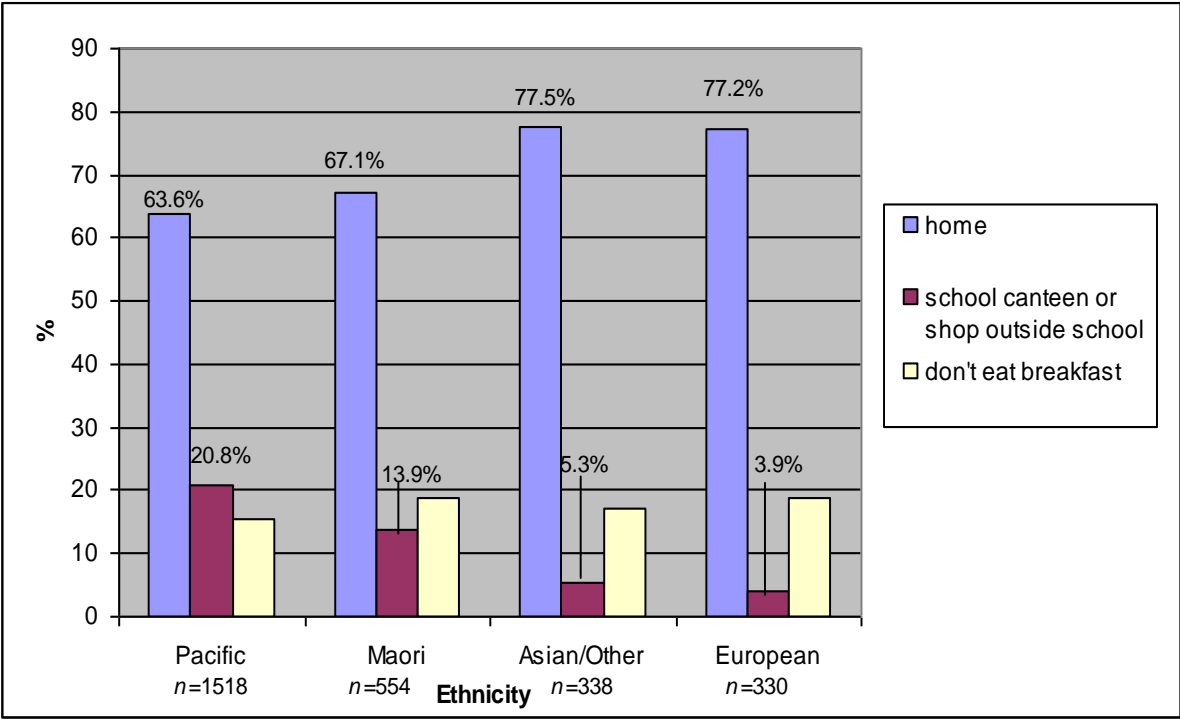


Figure 4.2 shows that there were significant differences in the source of students' breakfast by ethnicity. Pacific students were less likely to source breakfast foods from home and more likely to purchase breakfast foods from the school canteen and or a shop outside of the school boundaries, compared to other ethnicities (p value<0.0001).

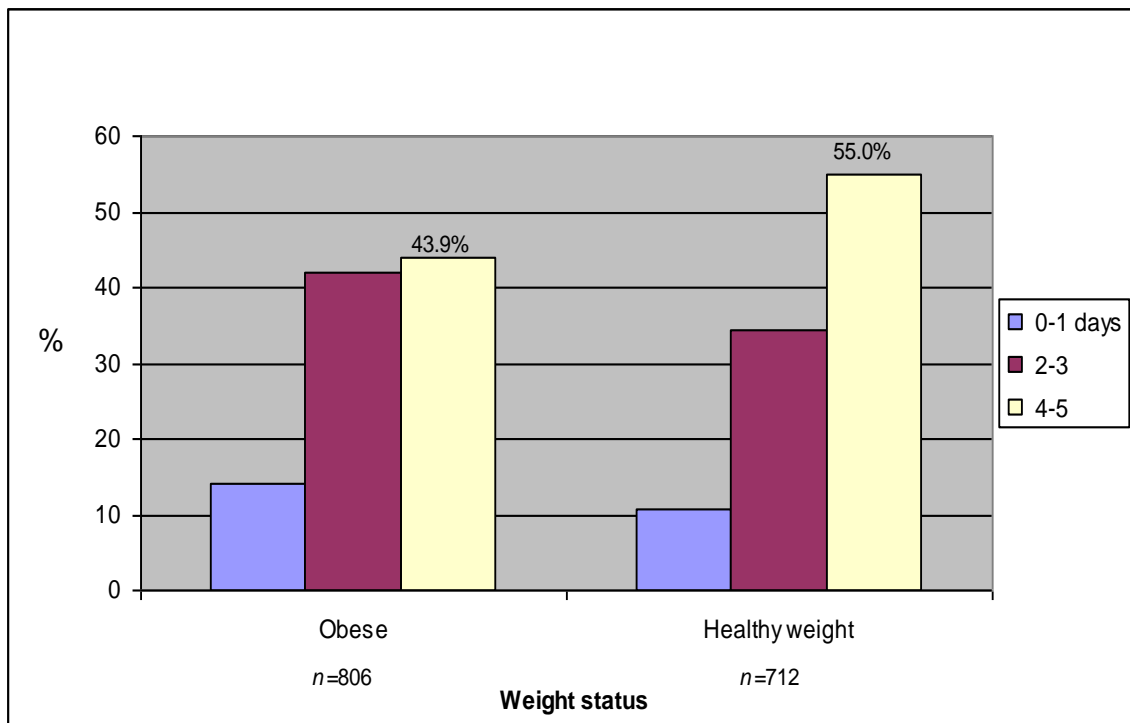
Figure 4.2: Students' source of breakfast (%) by Ethnicity (n=2740)



Student Weight Status

Analysis by weight status showed there was a significant difference in the frequency of breakfast consumption by weight status, with more healthy weight Pacific students (55.0%) consuming breakfast regularly compared to obese Pacific students (43.9%) (p value <0.0036) (Figure 4.3). There were however no significant differences in the source of breakfast between obese and Pacific healthy weight students with most students sourcing breakfast from home ($n=1518$).

Figure 4.3: Pacific students' breakfast frequency (%) by weight status ($n=1518$)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

The qualitative data confirmed the frequency of breakfast consumption patterns showed by the quantitative data. More healthy weight Pacific students (12 out of 17 or 70%) regularly ate breakfast on most school days compared to only 5 out of 16 (or 31%) of obese Pacific students. Interestingly this was matched with similar proportion of parents who were interviewed. More parents of healthy weight students (11 out of 15, or 73%) reported regular consumption of breakfast but only 5 out of 15 (or 33%) of parents with an obese student reported regular breakfast intake. The matching of students who did not eat breakfast regularly to parents who also did not consume breakfast signals household dynamics and or external environmental constraints (like employment type) may have a greater influence on food consumption behaviours rather than individual factors, like food preferences.

Students reported lack of time and no previous habit of having breakfast as the main reasons for not having regular breakfast. Some students stated that they did not know why they never had breakfast. Likewise for parents who did not consume breakfast regularly, lack of time to prepare and sit down to consume breakfast in the morning, or lack of previous habit was also stated reasons. Sometimes work employment time and activity would encroach on parents' food break times making it harder to ensure adequate nutrition throughout the day including breakfast times particularly for those on shift work arrangements.

Cereals, toast or bread, porridge and purchased food items such as pies and fizzy drinks were regular breakfast foods for students. Parents reported coffee, tea, porridge, kokoalaisa (Samoan cocoa-rice dish) and dinner leftovers as typical breakfast foods consumed. Breakfast was not regularly consumed together by all members of the household at the same time in the morning. Often students were left to prepare or purchased their own breakfast foods. Most parents did not have rules about breakfast consumption and students were expected to regulate their own breakfast intake as desired, as explained by a mother below.

“Sometimes they [kids] don't want to have breakfast that's the thing, cos we have cornflakes and everything but it depends on them whether they feel like having it, because kids in the morning some will have breakfast and some won't, cos you don't want to force kids, cos they will end up getting all hoha (annoyed).”

Cook Island Aunty with 4 dependent children, teacher, household size 8.

Lunch

Student Ethnicity

Analysis of the quantitative data showed there were significant differences in the frequency of lunch consumption between Pacific students compared to other ethnicities, with Pacific students (62.2%) less likely to regularly consume lunch on most school days (i.e., 4-5 school days) compared to other ethnicities (for Maori students 65.1%; Asian/Other 69.2%; European 71.5%). (p value<0.0035; see Figure 4.4).

Figure 4.4: Student's lunch consumption (%) across 5 school days by Ethnicity (n=2740)

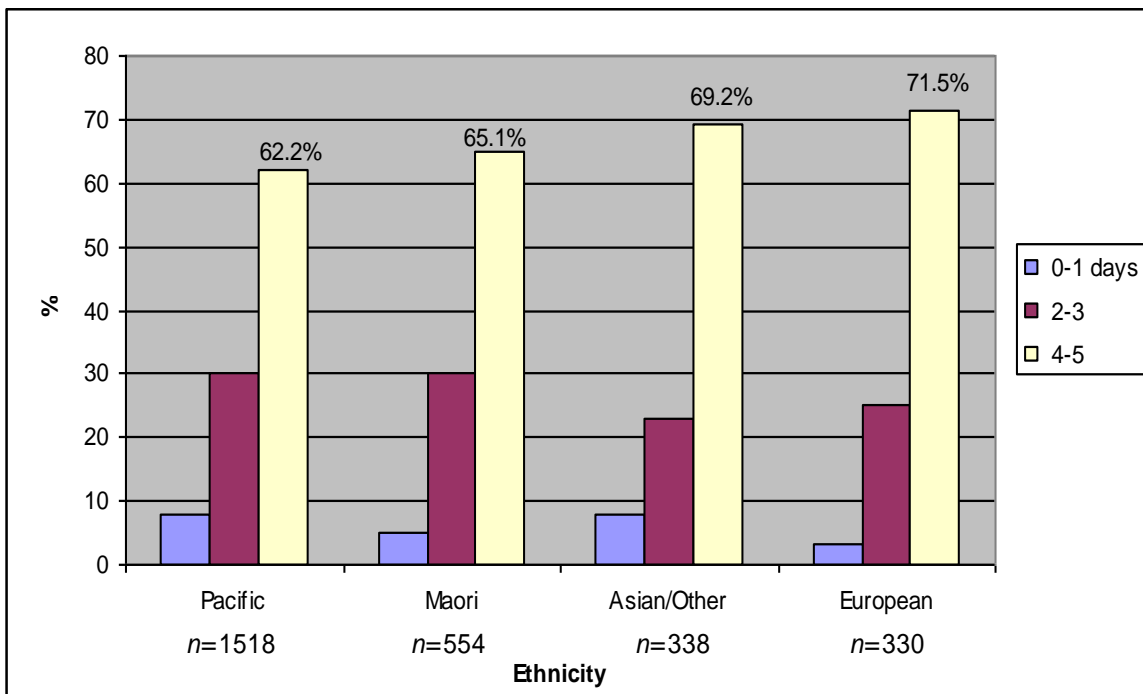
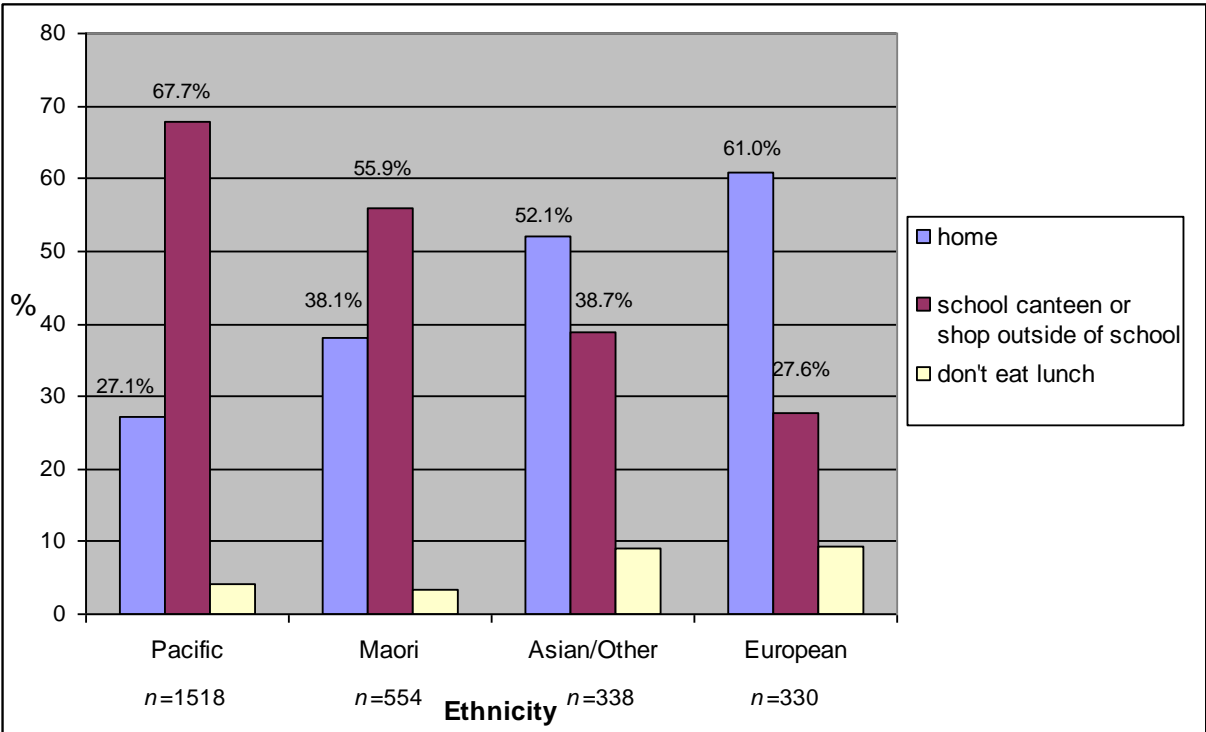


Figure 4.5 show that there were significant differences in the source of students' school lunches by ethnicity. Pacific students were less likely to source school lunch foods from home and more likely to purchase lunch foods from the school canteen and or a shop outside of the school boundaries, compared to other ethnicities (p value<0.0001). Approximately two-thirds (67.7%) of Pacific students purchased school lunches but only just over a quarter (27.6%) of European students did so, and this trend was reversed for lunches sourced from homes, with 27.1% of Pacific student lunches sourced from home, while 61.0% of European student lunches were homemade.

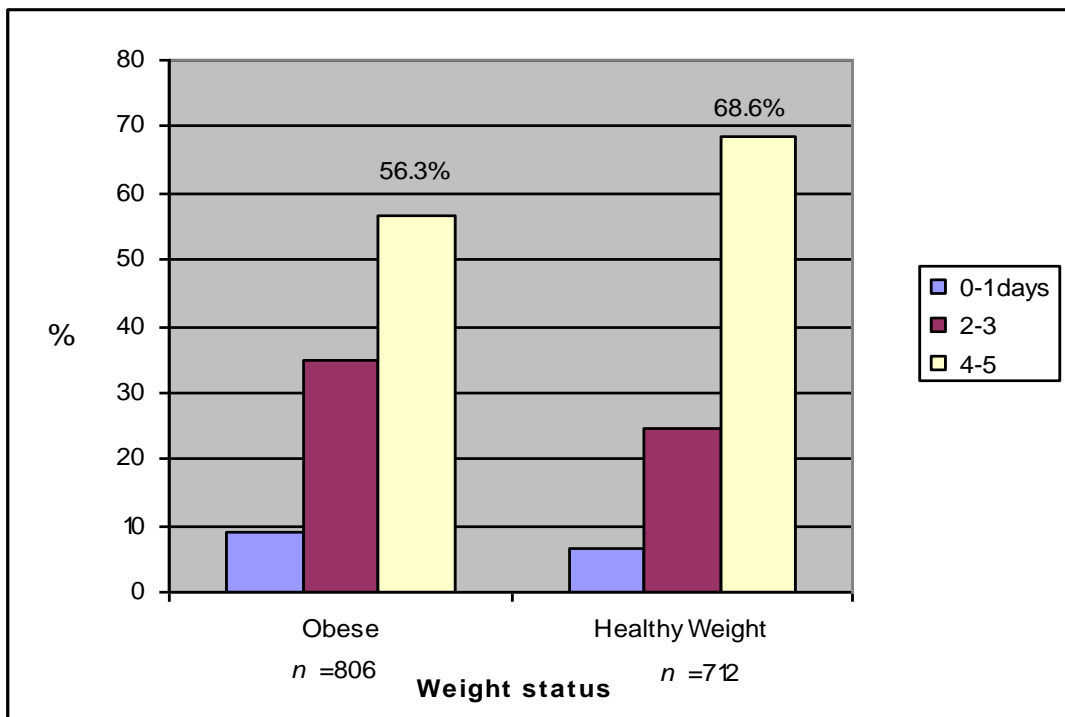
Figure 4.5: Students' source of school lunch (%) by Ethnicity (n=2740)



Student Weight Status

Analysis by weight status showed there were significant differences in the frequency of regular lunch consumption between obese and healthy weight students, with healthy weight students (70.1%) more likely to consume school lunch on most days of the school week (i.e., 4-5 days) compared to obese students (56.3%) (p value <0.0001 ; $n=2740$). Figure 4.6 shows this pattern stayed constant when selecting for Pacific students by weight status ($n=1518$), with healthy weight Pacific students (68.6%) more likely to eat lunch regularly compared to obese Pacific students (56.3%) (p value <0.0001 ; see Figure 4.6).

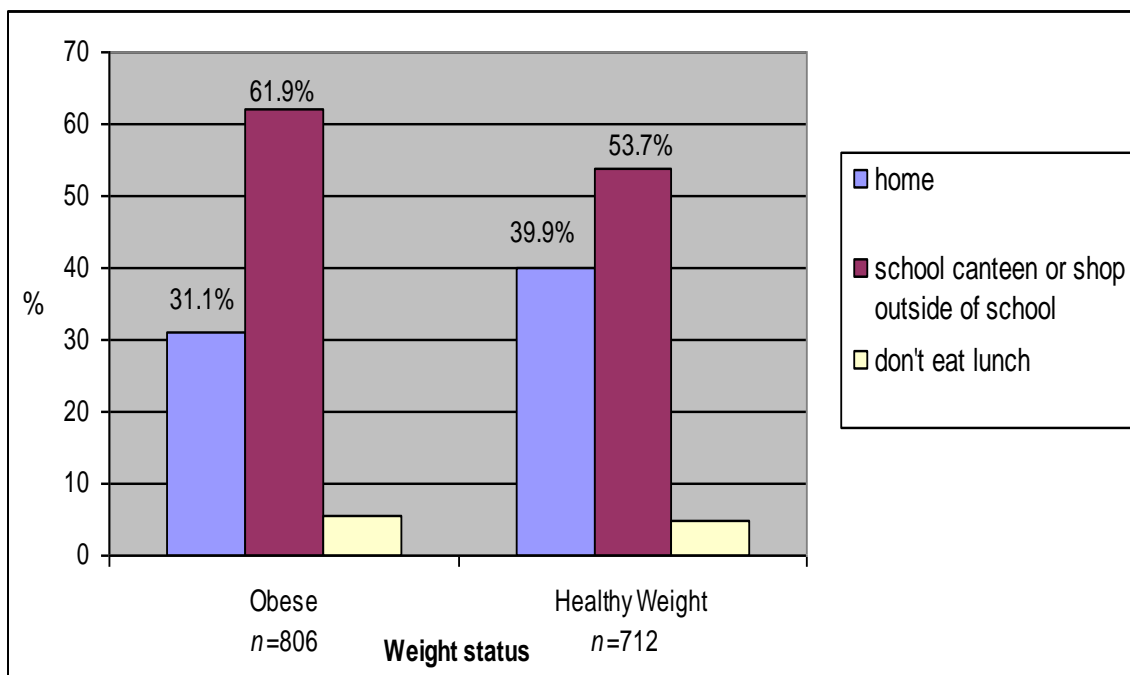
Figure 4.6: Pacific students' school lunch frequency (%) by Weight Status ($n=1518$)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

In the survey, students were asked to indicate their usual source of school lunch, by responding to the question 'Where do you usually get your lunch from?' Results of the analysis showed a significant difference amongst the total student sample ($n=2740$, p value <0.0001) with obese students (61.9%) more likely to purchase lunches compared to healthy weight students (53.7%), and healthy weight students more likely to have homemade lunches (Figure 4.7).

Figure 4.7: Students' source of school lunch by Weight Status ($n=1518$)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

However further analysis by selecting the Pacific student sample only ($n=1518$), showed no difference in the source of school lunches according to Pacific weight status. That is, equal proportions of healthy weight (68.8%) and obese (66.7%) Pacific students, approximately two-thirds sourced their lunches by buying it from either the school canteen or a shop outside of the school gates. Likewise approximately a quarter of the Pacific students, both obese (26.6%) and of healthy weight (27.5%) consumed homemade school lunches ($p>0.05$).

The qualitative data were consistent with the findings from the quantitative data, with similar proportions of healthy weight (15 out of 17, or 88.2%) and obese (14 out of 16, or 87.5%) Pacific students reporting regular school lunches were purchased rather than homemade. The most stated foods purchased by healthy weight and obese Pacific students were pies, fizzy drinks, cookies, hot chips and chocolates. Pacific students reported that they brought items that were cheaper and readily available at the school canteens or local dairies.

Money was readily available from parents and extended family members usually living within the same household and lunch money would often be given on a daily basis. Twenty-nine students from 33 (or 87%) received weekly pocket money ranging from five to fifty dollars per week. An average of \$23 dollars per week pocket money was available for students to purchase food items. Some students explained different adult members or older working siblings were often approached for money daily and students would collect whatever money was given for lunch, as highlighted by a student's quote below.

"Yeah I buy something from the [school] tuckshop. [I buy] Pies and drinks, fizzy...I usually get \$3 to \$6...Everyday yeah.

[Interviewer] And where do you get your money from?

From my Dad

Does Dad give you lunch money every day?

Oh well some days, nah, but on those days, I go to Shane [older brother] and ask him and he gives me some...Cos he works after school...Sometimes I ask my uncle for some money and he normally gives me about \$6 and then I ask the oldest [sister] for some money again, cos she's 21 [years], and then I ask Shane [older brother] for some more money

So after asking around everybody for some money, how much would you get?

About \$10 bucks."

Tongan male, Age 15, Classified Healthy Weight.

Parents confirmed the role of extended family members in making money available to students for purchasing school lunches, as illustrated by a parent's quote below.

[Interviewer] “And do all the kids have lunches?”

Yeah, all of them prefers money. They buy their lunch...With Esaia [son/student] I give him \$10 bucks on like three days, but with these little ones because their Nana give them money too and like I know they have money so I just don't give them money [and] I say 'when I give you \$10, so that is to last for three days, so whatever you get snacks from here that helps you with whatever you buy at school', ...Yeah the Nana she loves those kids so she just gives them money and but I don't give them money once I know they got some money [from Nana].”
Samoan Mother with 4 dependent children, administrator, household size 6.

Parents' rationale for purchased school lunches

Parents were asked to explain why they chose purchased school lunch arrangements for their children. Parents' rationale for purchased school lunches for the students fell into three categories. 1. Convenience; 2. Compensation; 3. Valuing independence.

A parent's statement below highlights that convenience was a key factor in making money available for students to purchase daily lunch. Parents were often constrained by long working hours, particularly those that worked double shift work and no time or energy was left to prepare school lunches. These parents felt it was more convenient within these constraints to make money available for students to purchase lunches, as one mother explained,

“I finish [work] at 11pm at night, but sometimes I work double shift, I start at 3pm and I come home at 7am o'clock, and when I get home, I always prepare lunch for them or like if I'm tired then I just give them money, like \$5 dollars each, especially for the little ones

[Interviewer] Do they tell you what they buy for lunch?

Oh I ask them, they buy pie, chips and a drink. I don't know what kind of drink they buy at school. Yeah and sometimes they went to the shop and buy those \$2 snack bags, yeah my little ones do that...I give them, if I have enough, I give them [high school daughters] about \$40 dollars each to cover for the other week, cos I get payed fortnightly, so \$40 dollars a fortnight, to buy their lunch or anything they want.”
Niuean/Samoan Mother of 4 dependent children, homecare worker, household size 7.

Most home-based parents often prepared homemade lunches for younger primary school aged children but made money available for older children. Some home-based parents were constrained by being busy looking after younger children, elderly or chronically ill family members. Parents were not necessarily aware what types of foods were purchased by students and had expected that most students would buy whatever foods were available at the school canteens or tuckshops. Some parents were concerned students were not eating homemade lunches and felt it was more convenient for them to make money available for their children to purchase food items that they desired mitigating their concerns for lack of nutrition during the school day, as highlighted by the parental comments below;

“Oh the lunches for the kids, when I grow up my kids, you know, I try to making a lunch for her to go with it to school but everyday that she coming back she couldn’t eat anything, just only the things she can drink but the sandwiches that I gave it to her to go to [school with] she don’t eat it. So just only for me I just feel that its better for me to pay her lunch money, as long as she got something to eat during the day, more than just a drink, [because] she cannot eat for the whole day. You know, its quite good for saving money to make lunch from home more than give them the lunch money to buy their own lunch at school, but just only for what we feel inside, is better for them to have something to eat at school, you know?...yeah for her [daughter/student] we give her no more than \$5 [per day].”

Tongan Mother with 2 dependent children, commercial cook, household size 5

“Well its best if I explain to you this story about our kids, we make their lunch, but they come right back and bring it back home, and it sits there [in their bags], so I get tired of making lunches and we give it to them [but] when I look I find them rotting in their school bags, so now the kids go and they take five dollars each, or well like twenty dollars per child for one week, yeah,It’s hard work [to make lunches] and the next thing is, I find the lunches still inside their school bags, so I think its best to do this save my energy because they don’t [eat their homemade lunches].”

Samoan Grandmother with 3 dependent children, superannuate, household size 8.

Secondly, parents expressed feelings of compensation for their and their children’s poverty status as a reason for making money available for students to purchase desirable lunch food items. Comments below highlight that parents were concerned about the assessment their children may make with other children at school and not wanting them to feel that they may have less than others. Parents particularly on welfare, as explained by comments below, were motivated to compensate for poverty by making desirable foods available for their children despite experiencing money insecurity.

“Yes, they [children] get lunch for school. I make sometimes, but sometimes, I’ll give them some coins to go order [school lunch]. Sometimes they sick of making the lunch from home (laughs) you know, the little kids here they say, “oh mummy I’m sick of that”, they go to school they see their friends there, and they want to follow, so I give them a little money so they buy whatever they want.”

Tongan Aunty of 6 dependent children, at-home parent, household size 10.

“I make lunch for them at home, even Risati [son/student], I do a sandwich for him and usually a bottle of juice, but sometimes if I feel sorry for them, just only once a week, I give \$3 for the pie and \$1 drink [laughs] to buy their lunch

[Interviewer] When you say, you feel sorry for them, what do you mean by that?

because I don’t want them to, because like Risati [son/student], because he can see those other kids like eating that or wear good clothes, something like that, so its hard for me, so that’s why I tried to, even if I can’t afford to, so I try to faasoaso (distribute/hand out/give) to them.”

Samoan Mother of 4 dependent children, beneficiaries, household size 6.

Third, parents explained that homemade lunches were often prepared for younger children, particularly primary school aged children, but as children grew older, they expected older students to regulate their own food intake, to prepare or purchase and make their own daily school food choices. Parents were willing students to become more independent. Valuing children’s independence by giving students money to purchase their own lunch was related to larger household size and greater numbers of dependent children.

“Yeah I make them lunches but they don’t take them so I just give up and only the little ones I make lunches for them. But the older college ones, I just don’t bother anymore, they prefer money...[they get] about three [dollars] per person [per day].”

Cook Island Aunty with 4 dependent children, at-home parent, household size 10.

“Half past seven I get up, do their [children] breakfast and prepare their lunch, but my oldest ones, I just give them money cos they’re old enough now.”

Niuean/Samoan Mother of 4 dependent children, homecare worker, household size 7.

Only 4 households from 30 (or 13%) confirmed that student lunches were regularly sourced from home. Cost was the main factor for these parents and a lack of money particularly related to the numbers of dependent school-aged children in the household. More children meant care was taken to budget food resources carefully and discretionary money was not always available to give out to children to purchase school lunches. These parents were also not concerned about compensating for poverty status and as highlighted by a parent's comment below, despite feeling pressured by their children's desire for particular foods, monetary constraints were not negotiated.

"Sometimes the kids they say, I need McDonald, I said no, [laughs], I just tell them straight 'no, we have no money, eat our food' and they already get used to do that. Maybe they go to school they heard the [other] kids they eat what, and what and what, they come home they trying to ask me, I said 'no money' and they understand."

Tongan Father with 7 dependent children, labourer, household size 9.

Lunch – parent

Most parents would have lunch either in the middle of the day or mid-afternoon at three o'clock. Parents who worked during the day would have light lunches of sandwiches, leftover dinners, fruits and a hot drink (e.g. coffee or tea). Sometimes, not having enough time to eat lunch particularly when work activities encroach on lunch breaks means working parents can often miss lunch altogether. A few parents, as highlighted by the comment below, regularly did not have lunch and would be satisfied with a hot drink and cigarette smoke and would have a heavy dinner meal at home to compensate.

"Sometimes at work, its hard for me to eat, because I have been working for about 8 years now and I don't know why, but most of the day I can't eat at work, yeah just only a coffee and smoke, but when I come home, oh I have to just eat, oh [emphasising extreme hunger]. Sometimes I just feel so hungry and I come home and then nothing to do yet [no food has been cooked], it makes me feel grumpy you know but its not, its my own problem, because I working around the food but I hardly I don't know why, maybe the smell of the food or maybe I don't have regular breaks [from] working."

Tongan Mother with 2 dependent children, commercial cook, household size 5.

Stay-at-home parents would often cook lunches particularly if elderly and younger children were also at home. Taro, green bananas and chicken soups were regularly stated prepared lunch food items. However, lunch food choices were always influenced by the affordability cost factor as explained by one mother below;

“Yeah because I need to make the lunch for my mother-in-law and my baby, cook some meat, like a chicken and some potatoes or taro, banana sometimes that depends if got enough money for that day, I buy taro, banana but not enough money just only the potatoes or rice.”

Samoan Aunty with 3 dependent children, at-home parent, household size 7.

Main meal

The main meal for most participants (defined as the meal event where the most substantial amount of food is consumed for the day), is the evening dinner meal. The usual exception is on Sundays when most Pacific families would prepare toonai, and this midday lunch meal becomes the main meal of that day. For some students and parents, particularly those that miss eating lunch during the day, mid-afternoon or after-school time is the time they report when they would eat the most amount of food for the day. Work employment time encroaches on the practice of sitting down together to eat a meal together, particularly for shift work parents who make up the majority of the working household arrangements for this cohort of parents (13 from 23 working households on shift work, or 61%). As explained by one mother, staggered eating times was often the norm, with younger children eating mainly straight after school and older children, eating later when they arrive home later in the evening after after-school practices.

“When they [children] get in, I am getting ready to go to work, but sometimes on a weekend that’s when we have dinner together. On other days they sit down and eat together, because with Cassie and Carmen [daughters/students], they will get home quite late, so I just serve my little ones and just wait for them, those two [daughters] to come and eat together. Sometimes if I don’t work on Mondays and Tuesdays then we eat together.”

Niuean/Samoan Mother of 4 dependent children, homecare worker, household size 7.

Parents would either eat their main meal at work, if they worked a night shift, or eat much later in the evening after coming home from work. Older children were expected to be more self-dependent and were not expected to eat what is prepared at a certain time. Older teenagers were free to purchase other foods they would like to consume and to consume it at a time that suited them.

Table 4.2 (on pages 78-79) presents the typical consumed foods Pacific families would have for their main evening meal. Chicken, rice, taro, pisupo (canned corned beef) were the top rated similar items across both obese and healthy weight student households. However, vegetables was reported as a typical food item for dinner meals by healthy weight students and parents, but was not for obese students and parents. Obese parents stated sausages as a regularly consumed dinner item, which healthy weight parents did not mention.

Food practices at special occasions

Both students and parents articulated the importance of special foods particularly at special occasions. These occasions, like birthday celebrations to mark significant milestones, like first, 21st or 50th birthdays and wedding and funeral occasions were irregular throughout the year. High status foods were deemed important to prepare and offer at these occasions and much effort went into acquiring enough money to purchase these particular food items. For Tongan parents, the roast whole pork was a high status food item, for Samoan parents roast pork was also important but also root vegetables taro and a traditional seafood dish oka (raw fish). Cook Island parents stated speciality dishes like mayonnaise (potato and vegetable salad with mayonnaise) and poke (grated arrowroot or cassava) as being important to prepare for special occasions. The dialogue below with a married couple, a Tongan father and Samoan mother highlights the role of food in these special occasions which are tied to traditions and ensuring communal well-being by providing service and honouring of elderly family members and guests by providing particular high status foods.

“Father- At birthdays with [the extended] family we have a barbeque

Mother- For barbeque, we buy pig, cos some people, when there’s no pig, it’s not nice, ay? I always say, make sure you get a pig, because that’s a special food for other people and all of us too, we all want to eat pork. For them (referring to Tongan husband) the most important thing, is the pig, that is the food item, if it’s a wedding, birthday or funeral, or any other thing, the most important food for them is the pig, because they say they don’t look nice if there’s no pig. I don’t know about other people, but he always say, make sure, whatever we are supposed to do (cook food), but must have a pig to eat. But some of our family in Samoa, if there’s no pig, then we just barbeque lamb, chicken or fish, ay?

[Interviewer] Let’s talk about this, is this something that’s come from your dad or your mum, can you remember, where did you learn this from?

Father- you know when we grow up in Tonga, we saw what they do in the islands, we still do the same thing here [NZ], we see it when we’re young

Mother-But for us (Samoans) it’s the oka (marinated fish) ay? Because if there’s no oka (marinated fish), they say to you “hey, is there oka for lunch?” that’s what the old people say “oh no, there’s no oka”. Yes, I think it’s the oka.

So you do the oka [prepare it for special occasions]?

Yeah I do the oka, cos a lot of the Sunday lunch I go to, they ask “did they make an oka for lunch” and I reply “no”, then they say “E! I don’t feel like eating now”, you know, some people ay? I feel like that too. I think for Samoans, if there’s no oka, it’s like that, ay?...We come here [NZ] we still do it, we think about it, a? And the taro for us (Samoans), if there’s no taro, they ask “what’s the saka (boiled root vegetables)”, “its bananas” “E! why didn’t they make any taro?” those old people when you listen to them, cos that’s why then, I would go and cook the taro.

What happens... how do you feel if you didn’t do the pig and you didn’t do the saka (boiled root vegetables) and the oka (marinated fish)? What will happen then?

Father – you feel shame if you got nothing, the only thing you have to try and do is to get the money to buy it

Mother - For me, I would feel ashamed. The people who come to the birthday party, if there’s no taro to have with other food, people will say “it’s because there’s no pig”, but we feel shame, so I [will] go and find the money to spend on [these] things. Yes cos we must do that.”
Samoan/Niuean Mother & Tongan Father of 5 dependent children, at-home parent & unemployed, household size 7.

Being able to provide enough food for attending guests meant great effort went into food preparation at special events as one mother stated below, under-provision was a cause of shame for hosting families.

“Yeah, we always have to make sure that there is more than enough for everybody, it’s a shameful thing if you haven’t got enough, for people... It’s just the way we were raised in my house and in Greg’s [husband] especially in the Island way.”
NZ Maori/Cook Island Mother of 4 dependent children, nurse, household size 6.

At these special events, it can be expected for attending guests to return from a party occasion with plates of foods to take home. Some parents noted that this practice was to ensure leftover party food was shared out so that food would not be wasted and thrown out. Other parents noted that this was traditional Island practice for distributing foods out at these special occasions.

The custom of toonai the main Sunday meal, usually eaten around midday and usually after church service, is practiced by church going members of this cohort (25 from 30 households or 83%). Particular high value foods like root vegetables taro and seafood dishes would be prepared for toonai. As illustrated by a mother's comment below, this meal is usually shared between extended families, and two or more households would meet at a family members' house with their prepared meals to share amongst one another. Often food is coordinated between households so that different households bring different prepared dishes.

“Every Sunday we have toona'i (Sunday lunch) at our mum's house, we take chicken, you know eat taro, fa'i (green bananas), do oka (raw fish). Me and my brother and my sister we share the food for toona'i (Sunday lunch), like yesterday I cook the sapesui (chopsuey), and she came with the crab salad and roast or whatever. So every Sunday we go to our mum's house.

Samoan Mother with 2 dependent children, at-home parent, household size 6.

This meal would often be prepared in the morning, before attending church service and it is normal practice for left over food to be shared between households, who would take food back to consume later in the evening. No other meal is usually prepared on Sunday evening, just a light meal or supper, like fresh bread and a cup of tea in the evening or usually traditional supper dishes like koko alaisa (cocoa rice) or kopai (cocoa dumplings) for Samoan families. Other parents compensate for the traditional heavier foods consumed for toonai (lunch meal) on Sundays by having lighter meals on the Saturdays. As highlighted below, Sunday toonai is often the one regular time during the week when all members of the household would share a meal together.

“Yes, sometimes we change it, like on Saturdays we have light supper/foods, because Sunday is coming and that's when we have toonai (Sunday lunch)...For toonai we would have a roast, to have with taro, or green bananas, or chowmein, chopsuey, things like that, crab salad, everybody in the family would eat this.”

Samoan Father of 3 dependent children, unemployed, household size 8.

Food preferences

Students and parents were asked to identify their favourite foods. There was a sharp contrast in the food items preferred by students compared to parents and early taste experiences seemed to mediate food preferences. Parents raised in the Islands reported that their favourite foods included seafood, root vegetables taro and yam, chicken, pork, povi masima (salted beef) and (canned) corned beef. Two parents' comments below highlight these points;

[Interviewer] "If there is no limit, like no money limit, and you can have any foods you like to eat, what are your favourite foods to eat?"

Fish, any kind, raw fish or cook, what about seafood, mussels...Once a week on Sunday I have fish but because my kids doesn't like fish I hardly buy fish. When I go to my auntie or my uncle's [house], I buy and take it there, they cook it there for us to eat, cos I don't buy it and cook it here, cos then if I cook it I have to eat it by myself and I don't feel like eating fish by myself.

Where did you get your taste or your liking for fish?

I used to grow up in the island and we eat fish everyday and where I come from its not from the main island but Hapai, so we get fish everyday, so I get used to it."
Tongan Mother of 4 dependent children, factory supervisor, household size 8.

[Interviewer] "What are your favourite foods, if you had all the money in the world, what foods would you prefer to eat?"

Its chicken ay? And the green bananas or taro, that's the main ones. If I don't eat these things its like my stomach is empty, with us Samoans, if you don't eat the taro or the green bananas, this is better than anything else, plus the fish

You got your taste for this food from where?

Well when I grew up in Samoa, that was the thing we ate, cooked taro"
Samoan Mother of 3 dependent children, kitchen-hand, household size 8.

Most students however were raised in the New Zealand environment and preferred New Zealand-based foods. Student food preferences were related to taste. The most tasty foods were takeaway food items and students cited burgers, hot chips, potato chips, pies and fizzy drinks as their favourite foods. There were no differences in the food preferences between healthy weight and obese students and likewise between parents. As highlighted by a student's comment below, despite knowledge that takeaway food items were unhealthy, taste was key to purchasing and consuming these particular food items.

"I just buy what tastes nice, its not good for you, but because we just like it too much." Cook Island female, Age 15, Classified Healthy Weight.

Eating more or less

Students and parents were asked to think of instances when they would eat more or less than they would normally consume and try to identify reasons for such eating behaviours. Students who regularly miss eating lunch when they would either be too busy to eat or too busy to organize and prepare lunch for the school day, would state that they generally over-eat once they returned home from school to compensate for the lack of food during the school day. Students reported that being offered tasty foods, like desserts at special occasions was hard to resist and would often over-eat at these irregular occasions. Being bored at home was also a reiterated reason for over-eating, as explained by students' comments below. Students and parents try to mitigate this by filling student time with out-of-home activities, like joining a church youth group or sports team or getting a part-time job.

"When I'm stressed I obviously don't get a chance to eat much. However when I am bored, or when I'm not doing anything, I suppose that's why it's a good thing when I'm kept busy cos when I'm bored I just eat which is terrible

[Interviewer] What would you eat when you're bored?

Whatever is there to be honest, or if nothing is there, I go for a walk up to the shop and then buy me something to eat

Like what?

Pie or burger from the fish n chips store or chips or something like that."
Cook Island/NZ Maori female, Age 17, Classified Obese.

"At toonai (Sunday lunch) everyone just gets their own food...Most of the times we get our own, but sometimes my Dad says to me 'hey that's enough, that's enough"

[Interviewer] Why does he say that?

Cos he says I'm getting too big, cos at primary school I was thin but when I got to intermediate and high school I got big

How come? What happened at Intermediate and high school?

I don't know, I just eat too much

Why do you eat too much?

Cos there's nothing to do, so I just eat, that's why I try to go to church stuff, like I always go to church and that's why I'm applying for a job cos if I just stay home I will just eat."

Samoan male. Age 15. Classified Obese.

Being stressed or worried about studies, depressed or sad and being ill were occasions when students would eat less than usual. One student stated that being depressed about being overweight and being reminded of it by her parents caused her to eat more rather than less. Having an environment with easy access to discretionary money like regular lunch money and living near a shop on-route to school meant it was harder to control over-eating urges.

"I used to weigh 74[kg] and then end of last year I started putting weight on, and my weight was about 105kg, yeah I think because I been eating too much. I'm still trying to cut it down. Its cos it's when I come home [from school]...I normally get dropped off by the shops... and from there I'd come home and started eating all this junk fatty foods... Like chocolates, chips, fizzy drinks yeah,

[Interviewer] And who would give you money to buy it?

That would be my lunch money that I hadn't used

Does mum and dad give you lunch money everyday?

Yeah...five dollars [per day]

Have they always given you lunch money since you were young?

Yeah

So that was about a year and a half ago, and you kind of started to eat more junk food from what you would normally eat?

Yeah

Any reasons?

Oh probably because my parents are like put me down and that just causes me to maybe like just eat more

Why were they putting you down?

Yeah because they say that I'm getting too fat

And that just makes you what want to do it more [eat]?

Yeah

What about time when you eat less than what you would normally eat?

I would eat less when I am really really sick, I won't eat at all when I'm sick...[I don't get] sick often, just like the flu or something."

Samoan female, Age 17, Classified Obese.

Students were also able to articulate the role of extended family members in their lives with aunties and uncles or other adult members not living in their homes having regular contact time with them. These family members would often offer them food treats on special outings or regularly on the weekends when they would spend time with them and their cousins. Some students, particularly those who occupied the youngest sibling position in the family and had older working siblings, would often be treated out with desirable takeaway foods. The following group of student and parent comments below highlights these points;

"I go to my cousin's house on Friday after school and I stay there until Monday morning...My aunty normally buys takeaways from the bakery for breakfast...Yeah and then after that when we go to youth my aunty buys some snacks, takeaway stuff, like hot chips and pies...[After church on Sundays] sometimes we just have the foods we had for toonai (Sunday lunch) or my uncle buys some chips or some takeaways."

Samoan female, Age 15, Classified Healthy Weight.

"Father: Kavika is a very hard case boy, when one of his older brothers come, they take him with them for the weekend, and he gets shout all the time, cos he goes cos he is the youngest

Mother: Yeah if you see them, he is like their baby. This kid whatever he wants to eat, he phones his other brother and sister, they're working, to 'pick me up' and they go buy junk food."

Samoan Mother and Father with 3 dependent children, shop assistant, household size 5.

Parents stated that particular working conditions affected their nutritional intake. Parents on shift work arrangements find they can over-eat as a mechanism to keep awake on long night shifts or working long hours can affect hunger by decreasing it due to not having enough energy levels to prepare foods. On these occasions, the default choice when parents felt too tired to prepare home-made meals, is to buy takeaway ready-cooked meals for themselves and their families. The comments below highlight these points.

“Yeah, I eat more in the night shift, because I’m on at nights and it’s not a good shift for your body, and generally I’ve put on a lot of weight since I have been working in the night shift. A lot of it is trying to take in calories just trying to keep awake or trying to keep going. It’s not a natural shift, you know, I promised myself when Zack [son] starts going to college that I would try and get off the night shift, but my job pays extremely well, it is a very good job but it’s in the after hours. I have been trying to schedule my roster on the day shifts but I still have to do 2 nights. And when I come home and if I’m really really tired then I will just go straight into bed but if I’m not, then I will have some Weet-bix as well with the kids, but I don’t manage to do that very well.”

NZ Maori/Cook Island Mother of 4 dependent children, nurse, household size 6.

“Sometimes I eat more than normal like, like sometimes I work for 10 hours, or do double shift, I don’t feel like eating, feel tired, but like today is my day off, today and tomorrow and I feel like eating again that’s when I feel like eating proper food, or if I have enough money, I go buy takeaway when I can’t be bothered to cook.”

Tongan Mother of 4 dependent children, factory supervisor, household size 8.

Like students, parents reported that they can over-eat particular desirable foods at irregular special occasions, particularly seafood or roast pork. Some parents also look forward to Sunday toonai (lunch) for eating special traditional foods. Being sick and having mental stresses and worries, related especially to money insecurity were events parents reported often resulted in under-eating, as highlighted by parents’ comments below;

“Sometimes if it’s too much faalavelave (family events) over here [in NZ], never mind about Samoa, but especially over here [NZ], you know, how many money you can afford to give, so that’s why I am not feel hungry, I’m just thinking about where I can borrow some money for these things [family obligations].”

Samoan Mother of 4 dependent children, at-home parent, household size 6.

“But I don’t eat much, when I’m not feeling or thinking well...Yeah, sometimes when there is too much things [to think about], like when the bill is come and then you stress and or sometimes if something is happening with my kids, that’s the time yeah I don’t eat much.”

Tongan Aunty of 6 dependent children, at-home parent, household size 10.

Food knowledge & influencers

Food knowledge

Students and parents were asked during the interviews to state foods they deemed healthy and unhealthy. Without exception all students, regardless of weight status mentioned vegetables, fruits and water were examples of healthy foods. The most stated unhealthy food items by all students were also similar, with fizzy drinks, takeaways, and chocolates or sweets reported as unhealthy. Despite sound knowledge about unhealthy foods, students were not motivated to stop eating items they listed as unhealthy. When asked, what would make them stop eating unhealthy foods, most students stated making it less tasty would probably influence their eating behaviours. One healthy weight student commented that reaching an undesirable body weight could influence healthful eating.

[Interviewer] “And if you know that takeaways are bad for you and you’re eating quite a bit of takeaways, how come you know its bad for you right, but you still eat it, why?”

Because I am not that fat [laughs]...Yeah if I was fat I probably wouldn’t eat takeaways”
Samoan female, Age 15, Classified Healthy Weight.

No differences were also found between parental healthy and unhealthy food ratings according to student weight status. All parents stated vegetables, fruits, seafood, root vegetables taro and green banana as healthy foods. Unhealthy foods were the fat off meats including chicken skin, oil or dripping added to cooking, fried foods and fizzy drinks. Sweet foods, snack foods like potato chips and biscuits, and takeaway foods like McDonalds or fish and chips were less stated by parents as unhealthy food items compared to students’ ratings.

Food and eating influencers

Students and parents were asked to state the source of their food knowledge, that is, to state where and from whom they learnt about healthy and unhealthy foods. Students rated parents or family members, their schools, both primary and secondary as important sources of food knowledge. Particular school staff members and groups like the school nurse, coaches, physical education

teachers and the school health council were mentioned by students. Students also cited media like television programmes and advertisements, doctors and friends as sources of food knowledge but these sources were rated much less important than home and school environments.

There was a notable difference in food knowledge sources between obese and healthy weight students, with obese students rating parents or family members higher than other sources, while healthy weight students did not. The school environment was rated higher by healthy weight students than the home environment and particular subject classes like health, physical education or catering and hospitality classes. Some healthy weight students who took specialist food subjects like catering and hospitality as part of their curricular, were especially more likely to attempt to change food habit behaviours, as highlighted by one student's comments.

[Interviewer] "Does anyone influence you about food, so what I mean about that is, does anyone say 'oh you should eat this or no you shouldn't eat that'?"

Yup my catering teacher

What does she say?

She said don't eat too much of this foods that has high fat. Yup she showed us a picture of people that keep eating that kind of food and just sit around and they get fat and that just keeps putting us off ...Me and my friends we were just sitting around looking at everyone and one of the boys suggested having a healthy day, and everybody just started laughing...Yeah it was like you look at the kids they're like eating too much food and stuff and they are like getting big and stuff and we're like 'whoa man, these guys are getting big' so we thought, 'hey lets start up healthy day', so we said 'oh yeah Wednesdays', so every Wednesday that's we call that our healthy day, just a day where we want a change. Wednesday is the day where we just buy fruit and stuff, nobody is allowed to drink fizzy drink until the next day."

Samoan, Male, Age 16, Classified Healthy Weight.

However, one student was able to explain that despite all of the numerous sources of food knowledge resulting in good personal understanding of healthful foods it was still difficult to practice healthy eating surrounded by an obesogenic environment of easily accessible unhealthy foods.

[Interviewer] "Where did you get this information from that those foods are good food?"

Cos my mother's a nurse, and the health council at school I suppose, at my trainings, like my swimming training one time we had Jenny Pearce, the nutritionist came to talk to us, to our whole class and she broke it down for us and she got us to stand up and tell her who would choose Chinese food, buy pizza, who would choose McDonalds, and some people lied, but yeah, but then on sometimes from TV, like those obesity programmes like Downsize Me and the Biggest Loser. I think those are great and they make plans for you for your diet and take all the bad foods out

What would you say are foods that are bad for your health?

Takeaways, coffee, fizzy drinks, lots, really I would say there is more bad food out there than there is good, so, its kinda hard to stop having all the bad foods that's out there, like takeaways, like I eat too much chocolate."

Cook Island/NZ Maori, female, Age 17, Classified Obese.

Parental support for healthy eating

In the survey questionnaire, students were asked to rate parental support for healthy eating. The question students responded to was "How much does your mother (or female caregiver) encourage you to eat healthy foods?" and this question was repeated for "father (or male caregiver)". Students were asked to choose support ratings from five options, '1. A lot; 2. Some; 3. A little; 4. Not at all; 5. Don't live with my mother' (or father). Most students chose option number one "A lot" to describe parental support for healthy eating.

Table 4.3 summarises the analysis completed for the total sample of obese and healthy weight students ($n=2740$) and then the sample of Pacific students only by obese and healthy weight status ($n=1518$). Essentially, there were no differences in the pattern between the total sample and Pacific samples. Similar patterns emerged, with no differences in parental support according to gender, but parental support varied with ethnicity, age and weight status. Figure 4.8 shows Asian/Other and Pacific ethnicity rated parental support higher than Maori and European students. Younger students rated parental support higher than older students (Figure 4.9). Likewise, obese students rated parental support higher than healthy weight students (Figure 4.10). Between parents, mother's support was always rated higher than father's support, by ethnicity, gender (data not shown), age and weight status.

Table 4.3: A comparison of the rating of parental support to eat healthy foods between total student sample and Pacific sample only, across Ethnicity, Gender, Age and Weight status variables

Variables	Total sample $n=2740$		Pacific sample $n=1518$	
	Mother support	Father support	Mother support	Father support
Ethnicity	<0.0001 Greater support for Asian/Other & Pacific cf.* Maori & Euro	<0.0001 Greater support for Asian/Other & Pacific cf. Maori & Euro	-	-
Gender	<0.0501 No differences	<0.46 No difference	<0.043 Small difference, greater support for girls (data not shown)	<0.97 No difference
Age	<0.0001 Greater support for younger students	<0.0001 Greater support for younger students	<0.0004 Greater support for younger students	<0.0008 Greater support for younger students
Weight status	<0.0001 Greater support for obese students	<0.0001 Greater support for obese students	<0.0001 Greater support for obese students	<0.0020 Greater support for obese students

Note: *cf. = compared with

Figure 4.8 shows the proportion of students by ethnicity that chose option 1. “A lot” of support, to describe parental support to eat healthy foods. Students’ rating of parental support was different by ethnicity, with Asian/Other students (mother 66.2%, father 50.0%) and Pacific students (mother 61.9%, father 49.7%) rating both their mother (p value <0.0001) and father’s (p value <0.0001) support to eat healthy foods, higher than Maori (mother 56.6%, father 35.2%) and European students (mother 50.3%, father 24.8%).

Figure 4.8: Obese and Healthy weight Students’ rating of parental support (% rated ‘A lot’) to eat healthy foods by Ethnicity (n= 2740)

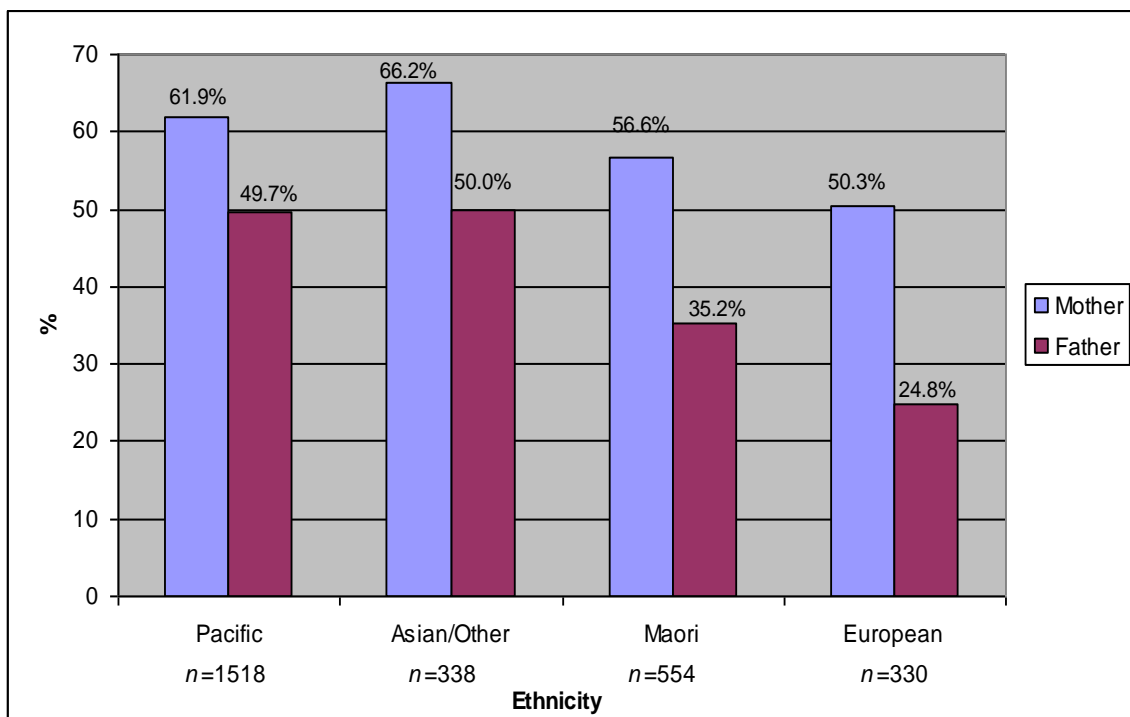


Figure 4.9 shows that parental support was mediated by age, with greater proportions of younger Pacific students, ages 12-13 years (mother 65.4%, father 52.9%) rating parental support to eat healthy foods higher compared to older students (mother 54.5%, p value <0.0001; father 41.1%, p value <0.0001).

Figure 4.9: Pacific students' rating of parental support (% rated 'A lot') to eat healthy foods by Age (n=1518)

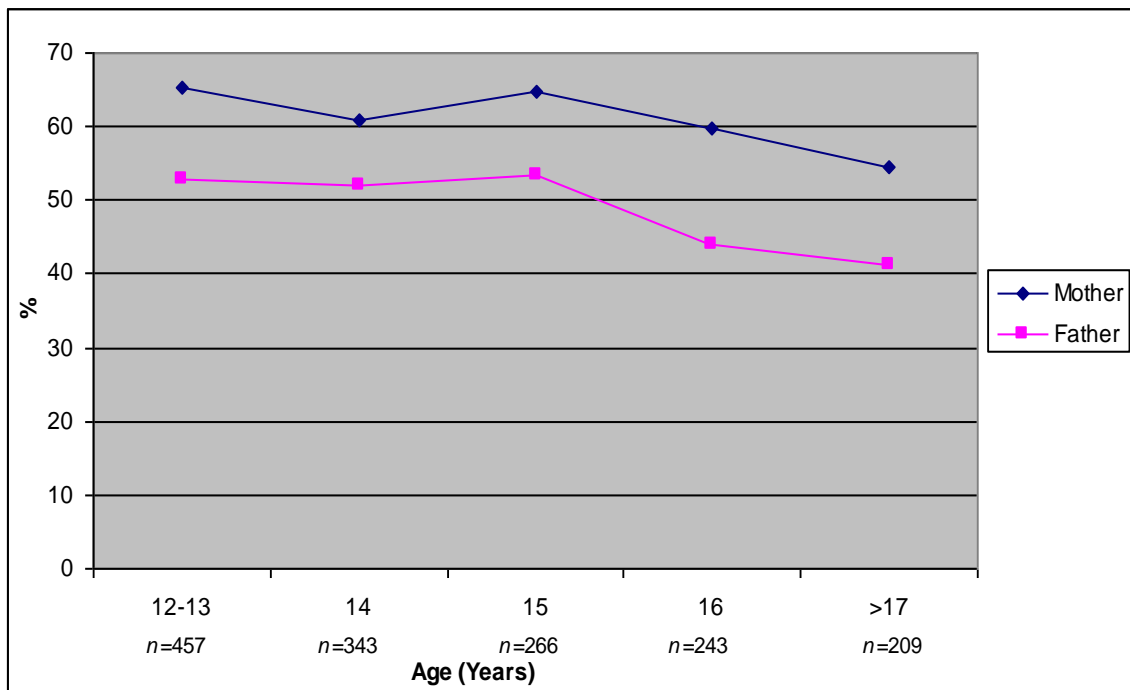
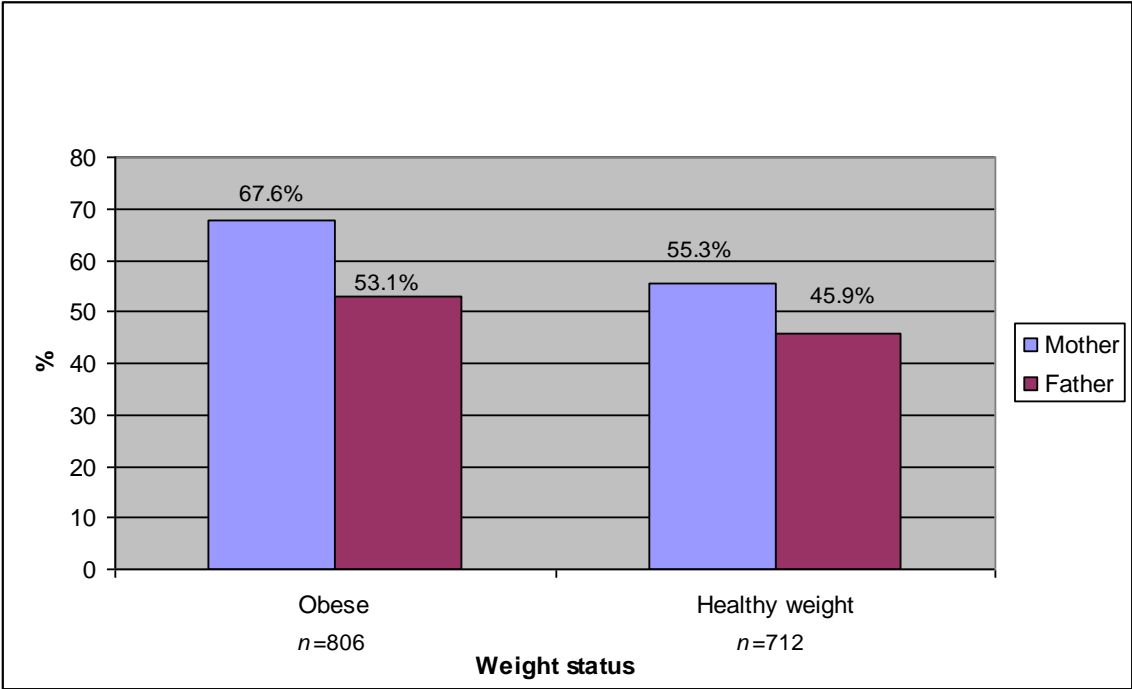


Figure 4.10 shows that the rating of parental support to eat healthy foods varied by weight status, with greater proportions of obese Pacific students (mother 67.6%, father 53.1%) rating parental support higher than healthy weight Pacific students (mother 55.3%, p value <0.0001; father 45.9%, p value <0.0001).

Figure 4.10: Pacific students' rating of parental support (% rated 'A lot') to eat healthy foods by Weight status (n=1518)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

Influencers on parents eating habits

Parents rated health professionals like doctors, diabetes nurses, dieticians, family members and media sources equally high as key sources of food knowledge. Employment places, church, and friends were less stated. There was a notable difference in the rating of sources between parents with an obese child versus parents with healthy weight students. Parents with healthy weight students talked about their children and the information they brought back from school as a key source of food knowledge, as highlighted by the comments below.

[Interviewer] “Does anyone influence you about the food that you eat and that you buy and that you cook?”

Yeah, only my kids say that to me especially loane [son/student], ‘mum you have to do that, you don’t use that’, cos you don’t go to school mum’. Oh, only he is the one always talk to me to do that, he learned that one from school...Sometimes its about the cooking, sometimes what to cook, ‘mum you always cook that, you always buy that, you have to buy that one its healthy and that one is not’. It’s good because he helps me, sometimes I try something and its really nice.”

Tongan Mother of 7 dependent children, at-home parent, household size 13.

[Interviewer] “And where did you guys get that information from, that that food is good for you?”

From the kids, yes, when they used to bring the little triangle thing from school, I learnt it from the kids.”

NZ Maori Mother with 2 dependent children, factory hand, household size 6.

Parents with obese students rated doctors, diabetes nurses and hospital dieticians as being more relevant food knowledge sources. Some parents noted that advice about food was sometimes contradictory between sources and made them confused, as highlighted by a married couple’s comment below.

Mother: “No when we heard the radio. They say this, ‘yeah this is good’, you know and then next time, they say, ‘oh this is no good’ and you know it makes me confused which one is better.

[Interviewer] Yeah like what do they say?”

Father: Like the other day, you go to the doctor surgery, and the doctor says ‘oh you eat the fruits good for you, the banana, the apples and the oranges’ and then you listen to the radio, and they say ‘oh the bananas and those fruits are no good for your health because they’re too sweet’. You know, that sort of things, now make people confused, you don’t know [what to do],

so we just think, well better just eat it, because we have been eating them for years and years, because you don't know what to do, if you go to the doctor, he says to you eat the fruits and you listen to the research, 'oh those food are no good for your health, cos they're too sweet.'
Samoan Mother and Father with 3 dependent children, shop assistant, household size 5.

Even though parents had good knowledge of healthy versus unhealthy foods, parents explained that knowledge alone was not significant in making good food choices. The major constraint overwhelmingly for this cohort of parents was cost and affordability followed closely by available time for preparing healthy foods for themselves and their families. Parents comments below highlights food affordability is a major barrier to healthful eating and furthermore to attempts to lose weight.

[Interviewer] "And where did you guys get that information from, that that type of food is good for you?"

Dad: yeah we learnt it at school, sometimes at work, but really those things are too expensive...like fish is way out of our price range, because all the kids like fish, can't have that everyday, we have chicken everyday, because its cheaper, I am saying the better foods, the foods that are healthy for you is too much out of our [price] range most times."
Cook Island Father with 2 dependent children, labourer, household size 6.

"People eat bad foods because it's cheap I think. Like you can go and get \$10 worth of fish and chips if we have that we could eat, our whole family would be eating that, you couldn't finish it. And then you get like 4 fish and 4 sausages, it just fills everybody up and then you just get a loaf of bread and then they'll eat bread with chips, you know, and then you're full and that's for \$11 to feed a family of six...Yeah and if you want us to go and get a family of six, food of the good stuff, oh [laughs in disbelief]. On \$10, if we got one thing of lettuce, that's \$3 and \$2 worth of luncheon, that's two slices each, what else? tomatoes, probably another \$3 worth and that's, \$10 nearly already on that, and that will only feed two of us probably...I do know what's right and what's wrong, for me its expensive, I am trying now, like trying to get the wholemeal bread or something like that, when its on special I will get some of that, instead of usually we will eat white bread, cheap, it's 89 cents a loaf, I can get two or three loaves of that and then the kids will get full up on that, but I know its not good for you...I mean I'm not going to go out and buy Vogel [bread brand] everyday cos they are like \$5 a loaf, you know, I only buy those ones that cost a \$1 something...I know what to do, but it's just hard, on the pocket...Lately we have been trying to do a bit more to have something healthy, like lettuce and that

[Interviewer] What's brought that on?

"Oh, we've always wanted to [lose weight] but we can't afford it, you know, I mean its alright for the media to say everyone is obese, but why don't they give us a little bit extra or put the things you can get, like prices down instead of making the prices higher. You know everything that's light [food] or for losing weight is all so expensive. So what do they expect us poor people to be skinny, either not having enough money to buy food or buying all the wrong foods

because they are cheaper. Its expensive you can't feed a growing family on veggies every night, it's gonna cost you \$30 just to buy veggies...I don't get too much fruit because its expensive but every now and then I get some apples and bananas because they are the cheapest. You know on those diet things you're supposed to go out and get those berries and all the others [different types of fruit] and like gor [shakes head]

What diet things are those?

I mean, you know, like if you watch those ones like 'Downsize Me', when they say, you buy nuts and all these stuff, if you want to have snacks, of course nuts is one of the most expensive things to buy....Cost is a major factor, yeah if we were rich we would be skinny, going to gyms and doing things that we should be. Mind you, I can't go walking now, because I can't walk very far because of my hip otherwise I probably would. I used to like walking"

NZ Maori/European Mother of 2 dependent children, part-time cleaner & beneficiary, household size 6.

Good nutritional knowledge was also related to prior experience and those that worked in health related fields or health employment places had working experiences that seemed vital in affirming knowledge about food. Affirmation of nutritional knowledge experienced often, seemed to help influence healthful eating and food behaviours, as explained by one mother below.

"Well with me, I work at the hospital, cos I been working over there over 15 years now, I'm in the kitchen and I can see the food that we fry and comes from fats. Fats are not good to feed to children... I then consider/observe, from the place that I work at, where there are lots of people who are diabetics, that there are different foods for those with diabetes and different foods for those who are normal, and I think, that this food, like the soup we make them, and taro and put in some cucumber, that when you make a soup, this is good you should make this so you don't get sick... It's therefore bad to be very big and fat and better to eat foods that promote good body growth, make your body strong, and ward off illness. To prevent illness, eat vegetables, to grow your body, eat meat, to promote a body strong it's the taro or a piece of potato. To be sure, you should eat all three of those different kinds of foods and not just one...Yes this is where I observed it, there are lots of people who come to the hospital because they are very big, and got diabetes and we give them different foods, this is how it is."

Samoan Mother of 3 dependent children, kitchen-hand, household size 8.

A few parents that grew up with rules about foods in their homes were more likely to instil these in their own families and talked about having rules about food and eating for their own children.

“When I used to live with my aunty when I came to NZ, she always makes healthy foods for us, and like go to the limit, you got one piece of meat and veggies but you get maona (full belly/satisfied) with it and then when I married into this family, they eat too much, and that’s most of them, I was amazed, wow they eat that much. Yeah I know when I started from my auntie’s house about the food and I tried it make it to my kids because before they didn’t used to eat peas, but now my daughter knows they got to have some greens so they know that they got to eat their peas/beans with nuggets or something and rice. Yeah she [aunty] is about 73 [years old] and she is still walking, my uncle is about 80 soon but he is still healthy, still active and go church...Our house rules is I tell them I don’t buy this biscuits because its got too much sugar or too fat that’s why I don’t buy it and you got to eat healthy food all the time see like on those [TV] shows, [I say to my children], ‘look look at those fat people, that’s what you’re gonna look like in 10 years time if you still eating this kind of yucky food’. But they know when I say no that’s it they live by it.”

Samoan Mother with 4 dependent children, administrator, household size 6.

On the other hand, parents with limited experience or opportunity for gaining nutritional knowledge developed their food knowledge from prior life experience. For the majority of Island raised parents this meant, knowledge was context specific. Parents rated Pacific Island foods seafood, root vegetables taro and green bananas as healthy and rated meats with a lot of visible fats as unhealthy, like povi masima (salted beef). Parent’s comments below shows active knowledge is related to the experience of typically prepared and consumed foods. Very few parents rated non-traditional foods like lollies, ice-cream, chocolates and takeaway foods like McDonalds, KFC and pizza as being unhealthy. This may highlight a potential area for interventions to emphasise educational opportunities for particular types of food knowledge.

[Interviewer] “What do you think are foods that are bad for your health?”

“Fatty foods, I don’t add much fat or oil in my cooking...Sometimes I grill the sausages or if the kids want to eat a roast chicken, I don’t put it in baking dish I put it on the top of oven and make the oil go strained down. Yeah that’s how I cook, I don’t like the fattening foods, I don’t like seeing your hands its all oily. You know, I don’t know much about (foods) but to me I don’t like fat.”

Samoan Mother with 2 dependent children, at-home parent, household size 6.

[Interviewer] “What foods do you think are bad for your health?”

Mother – “Only greasy oily food, like the head of a pig, pig heads are not good food, and some meats, like chicken sometimes, when you eat its skin, other food like briskets.”

Samoan/Niuean Mother of 5 dependent children, at-home parent household size 7.

Food context

The exploratory nature of this study utilised open-ended Talanoa³⁶⁴ interview style to try and gain an understanding of the typical life routines of participants within which recurring patterns of food habits exist. Participants were therefore not only asked questions related to specific study objectives on food habits but interviews began with participants being allowed to express how life is lived on a daily basis and discussions explored how these factors influenced food habits. Students and parents completed a timeline exercise at the beginning of the interviews to indicate typical life routines throughout a weekday and on weekend days.

Figure 4.11 summarises the contextual factors which surround participants’ food habits which were relevant for the majority of participants (see Table 4.4, page 118). When participants comments noted “tiredness” as a reason for choosing particular food habits, like the convenience of purchasing takeaway foods, contextual analysis showed that “tiredness’ was influenced by a number of factors. Participants’ accounts showed that managing insufficient income levels which must be stretched for greater numbers of people in the household (i.e. Pacific families live in extended family arrangements and had large household sizes) was part of their daily living reality. To provide enough income to support large families, parents would often work long hours, particularly extended shift work. Pacific households had young and elderly members to care for and it was normal for households to have chronic illnesses like asthma, diabetes, strokes and lupus that required regular medical attention. A few participants ($n=4$) who were from non-employed households voiced substance abuse and family violence issues also existed in their homes.

Figure 4.11: Contextual factors affecting Food habits

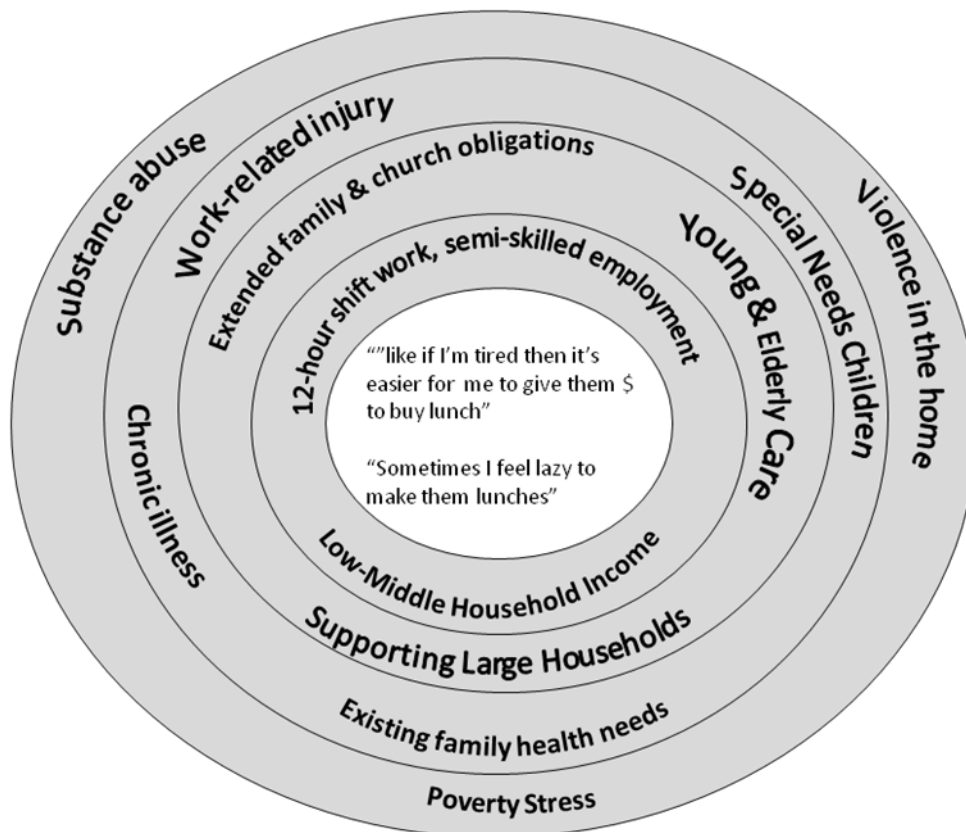


Table 4.4: Household demographic data

Household parental income level	23 out of 30 (76%) households on low-mid parental total income level (\$30-\$60K)*
Household size	7.35 average Household size, (Range 3-13)
Number of dependent children	Average of 3.5 Dependent Children (Range 1-7)
Place of birth	25 out of 30 (83%) Island-born parents
Average years of parental NZ residence	Average of 21 Years of NZ Residence for Island-born parents
Extended family living	21 out of 30 (70%) households with Extended Family members
Households with chronic illness	17 out of 30 (56%) households with chronic illness to manage

* not equivalised to household size.

Nearly three-quarters (73%) of the study sample reported low-to medium total household income levels which have not been equivalised to overall household size. Current measures of family poverty equivalise disposable household income taking into account the numbers of adults and children usually resident in homes.³⁷³ Given that the participants in this study had low levels of total parental income to large household size, study participant households can reasonably be described to fit within current impoverished standards of living definitions. This fits current statistical patterns showing the study area of Mangere being of a low decile area with lower economic standards of living²²⁴ and of Pacific people generally having lower personal median income levels, and of being over-represented in child poverty statistics compared to non-Pacific.^{213 373} Within this framework, daily life circumstances or contextual factors have been combined and described as 'Poverty Stress'.

Summary

Results showed there were key differences between healthy weight students and their parents compared to obese students and their parents. That healthy weight students and parents had regular consumption of fruit and vegetables, regularly consumed seafood at special occasions and had habitual levels of breakfast and lunch consumption. Parents of healthy weight students were also more likely to be part-time or full-time parents at home and had better practical knowledge of food's health protective effects. Household employment status was equivalent across both student weight status groups. However, obese students' parents had different working arrangements compared to healthy weight student parents, with parents of obese students undertaking more shift work employment. Extended family were influential in students' daily nutritional intake providing access to discretionary spending money and regularly treating children with desirable low-nutrient palatable foods on meeting occasions. All students and parents showed good knowledge of healthy versus unhealthy foods but explained that cost, affordability and time restraints were more influential on food choices and habits than food knowledge alone.

Physical activity

Research Objectives

The general objective of this study was to explore the socio-cultural factors; community attitudes, beliefs, values that may promote or prevent obesity in Pacific adolescents and their parents in New Zealand. The specific objective is to describe the attitudes, beliefs and values that are related to physical activity.

The specific objectives of this part of the study were to:

1. To describe physical activity levels and the influences on physical activity levels and behaviours among Pacific adolescents and their parents living in the same households
2. To describe physical activity beliefs and values
3. To document the experiences related to messages about physical activity from influential sources
4. To identify motives for future activity (or inactivity)
5. To compare and describe any differences in the socio-cultural factors related to physical activity behaviours, attitudes, beliefs and values between obese and non-obese Pacific adolescents and their parents

The Results section will be presented in four parts, (1) an assessment of student and parental activity status; (2) physical activity beliefs and values; (3) physical activity influencers; (4) desirability for future activity.

Interview and Survey Questions

At the interviews, students and parents were asked through a timeline exercise to indicate all activities from the time they wake till the time they go to sleep on both a weekday and on weekend days. This was used as a starting point for assessing current physical activity levels. They were then asked to clarify and provide additional information on current levels of activity, like for example on historical participation, on duration of activity, on intensity, on seasonal variation. For example for students, if they currently played netball, how many seasons have they played netball, how many trainings would they have a week, how many terms in the school or club year would they normally have netball trainings, what level or grade of netball, how long (time) would trainings normally go for. Activity status was then assessed against current definitions of activity and inactivity using Ministry of Health ¹⁰ and SPARC ¹⁹⁶ guidelines. Those students that completed at least 60 minutes of physical activity per day

on five or more days of the last week were classified active. Parents' activity status was assessed against 30 minutes of physical activity for five or more days in the last week.

Students and parents were also asked to identify motives for current activity and also reasons for dropping out of previous activity. The timeline exercise also allowed interviewees to indicate incidental activity such as transportation to and from school and or workplaces and activity during school and employment break times. Inactive pursuits were also revealed and additional questions were posed to students about history, duration, type of activity, influencers, and motives for participating in leisure pursuits such as playing computer games, Playstation, mobile phone texting, watching television and or movie DVDs and shopping. These questions were repeated for parents' activity, particularly work-related activity, household activities for stay at home parents and weekend activities related to church attendance.

Questions that tested students' and parents' beliefs, attitudes and values about the health consequences of physical activity were also raised. Interviewees were also asked to indicate any key influencers on activity levels and when present, to talk about how the process of influence occurred. And finally, questions around future strategies for increasing physical activity were also included.

Survey questions related to the study objectives were also analysed to provide triangulation and contrast between survey and interview data. The OPIC questionnaire included four questions that assessed students' level of physical activity. These were questions that assessed levels of active transportation to and from school, and physical activity throughout the school interval, lunchtime and after-school periods. These items were directly replicated from the national New Zealand Children's Nutrition Survey (CNS),⁹ which was based on the Physical Activity Questionnaire for Children (PAQ-C).^{374 375}

Table 4.5 shows some of the key questions related to each sub-section. The list is not exhaustive as the qualitative interview procedure employed was open-ended to allow an exploration of the topics above. Significant findings across key variables are presented here. Data were also analysed across student weight and results between obese student and healthy weight students are presented.

Table 4.5: Physical Activity Qualitative Interview and Quantitative Survey questions

Qualitative Interview Questions: showing physical activity study objectives and some of the corresponding interview questions	
1. To document individual and family members level of physical activity, and describe current motives/reasons for current levels of physical activity or inactivity	<ul style="list-style-type: none"> – <i>What physical activity do you do on a daily basis and why?</i> – <i>How do you get to school or work on a daily basis? Why? (if school/work nearby and gets dropped off, why do you not walk to school or work? Why school kids get picked up instead of walking/biking?)</i> – <i>Which members of the family are least/most active? And why?</i> – <i>Why did you drop-off/stop doing your sports/ exercise/physical activity?</i> – <i>Did you used to be more active or less active than now?</i>
2. To describe physical activity knowledge, beliefs and values	<ul style="list-style-type: none"> – <i>Do you think there is any link between physical activity and being healthy? If yes, How? If you know, that there is a link between physical activity and being healthy, why do you not make time to do some daily physical activity?</i> – <i>How much physical activity/ exercise should people your age do each week?</i> – <i>Think of a person you know who is extra big, do you think that his/her size has anything to do with physical activity? If yes, in what way?</i> – <i>Think of a person you know who is skinny or too thin. Is there any link between his/her PA and him/her being skinny or too thin? If yes, in what way?</i> – <i>How important is it for you/and your children to do daily physical activity (exercise)?</i> – <i>Do you think there is any value in doing daily physical activity/exercise?</i> – <i>What value is your health (or physical activity) over and above all these other obligations (refer to timeline). Explain. (probe the cost/benefit decision making process).</i> – <i>How easy or how hard is it for you to be physically active every day?</i>
3. To identify key influencers on physical activity habits and describe the nature of influence	<ul style="list-style-type: none"> – <i>Who influences the amount of daily p.a. that you do?</i> – <i>In what ways do these people influence you?</i> – <i>Who would you listen to more? Who has the most influence? Why?</i>

Qualitative Interview Questions: showing physical activity study objectives and some of the corresponding interview questions			
4..	To identify motives for future activity (or inactivity)	<ul style="list-style-type: none"> - <i>Would you like to increase or decrease the amount of physical activity you are currently doing?</i> - <i>What would need to happen in order to increase/decrease your daily p.a.?</i> - <i>What other physical activities would you like to do right now? What is stopping you from doing this/these?</i> 	
Quantitative OPIC Survey Questions: Showing physical activity question, possible responses and categorisations formed for analysis			
<i>Measure</i>	<i>Question</i>	<i>Responses</i>	<i>Analysis</i>
To assess frequency of active school transportation	In the last 5 school days, how many times did you walk or bike to or from school? (walking from home to school and back on 1 day is 2 times: walking to school and taking the bus home is 1 time)	0 1 2 3 4 5 6 7 8 9 10 more than 10	Split into 2 categories: 0-9 = Inactive transportation 10-more than 10 = Active transportation
To assess duration of active transportation to school	How long does it take you to walk from home to your school?	Less than 15 minutes 15 – 30 minutes More than 30 minutes	
To assess estimated duration of active transportation to school	How long would it take to walk from home to your school?	Less than 15 minutes 15 – 30 minutes More than 30 minutes	

Quantitative OPIC Survey Questions: Showing physical activity question, possible responses and categorisations formed for analysis			
To assess frequency of activity during school morning recess /interval	Over the last 5 school days, what did you do most of the time at morning recess/ interval (apart from eating)?	Mostly just sat down Mostly stood or walked around Mostly played active games	Dichotomised into two categories: “Mostly just sat down” and “Mostly stood or walked around” combined = Inactive “Mostly played active games” = Active
To assess frequency of activity during school lunch time	In the last 5 school days, what did you do most of the time at lunch time (apart from eating)?	Mostly just sat down Mostly stood or walked around Mostly played active games	Dichotomised into two categories: “Mostly just sat down” and “Mostly stood or walked around” combined = Inactive “Mostly played active games” = Active
To assess frequency of activity after school	In the last 5 school days, on how many days after school, did you do sports, dance, cultural performances or play games in which you were active?	0 days 1 day 2 days 3 days 4 days 5 days	Dichotomised into two categories: 0-4 days = Inactive 5 days = Active

Overview of Physical Activity findings

Healthy weight Pacific students were significantly more active than obese Pacific adolescents. The currently inactive Pacific adolescents participated in structured sporting physical activities prior to entry into the high school. Self-efficacy, lack of money or transport, managing time from other activities like school work or church activities and needing social support were the main reasons for dropping out. Some Pacific girls were required by their parents to have more parental supervision, due to perceptions of neighbourhood crime and safety. This limited their sports participation. Obese students were more likely to desire to increase their physical activity in the future, and received more parental encouragement to increase activity. Most parents did not meet current guidelines for activity. Lack of time due to work and family commitments were the key barriers for Pacific parents to be active. All students and parents were knowledgeable about the health protective effects of physical activity and held strong values for participating in regular physical activity. Students' perceived barriers for future activity were similar to reasons for dropping out of activity. Pacific parents alluded to a different cultural understanding of the concept of exercise. However, most parents had sound knowledge of the health benefits of physical activity.

The Results section is presented in four parts, (1) Student and parental levels of physical activity; (2) Physical activity beliefs and values; (3) Physical activity influencers; (4) Future activity.

Student and parental levels of physical activity

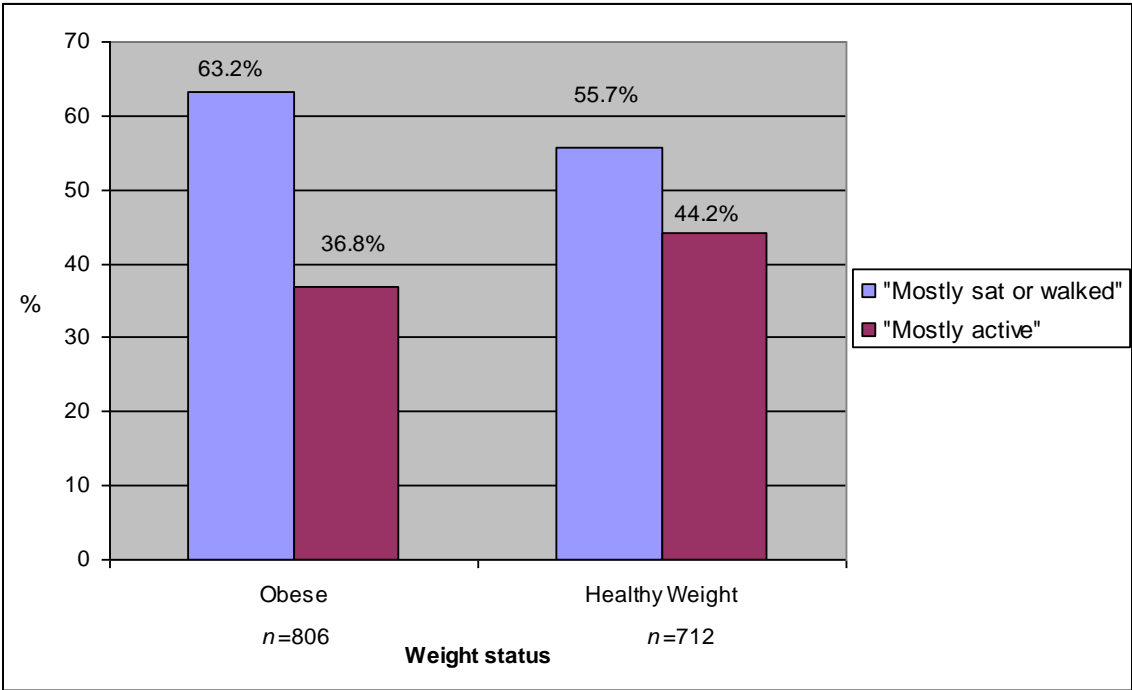
Student activity status

To assess frequency of student activity levels during recess (or morning interval) and lunch time school periods, students were asked to respond to the question 'Over the last 5 school days, what did you do most of the time at morning recess/ interval (apart from eating)?' The question was repeated for "lunch time" and students had three responses to choose from; 1. Mostly just sat down; 2. Mostly stood or walked around; 3. Mostly played active games. The responses were dichotomised into two categories, with choices 1 and 2 combined as the 'Inactive' category and choice 3 as 'Active'.

Results showed there were no significant differences found in the levels of activity across two school-based time periods for obese and healthy weight Pacific students. The proportion of students who were “mostly active” at interval times was 34.2% for healthy weight students versus 30.5% for obese students but the difference between the groups was not statistically significant (p value >0.05). The proportion of healthy weight students (28.7%) who reported being active in after-school events for all 5 days of the school week, was similar to that for obese students (24.6%,p value >0.05).

A statistically significant finding was observed though in the lunch-time school period, when a greater proportion of healthy weight students were mostly active (44.2%) compared to obese students (36.8%), (p value <0.0035, Figure 4.12).

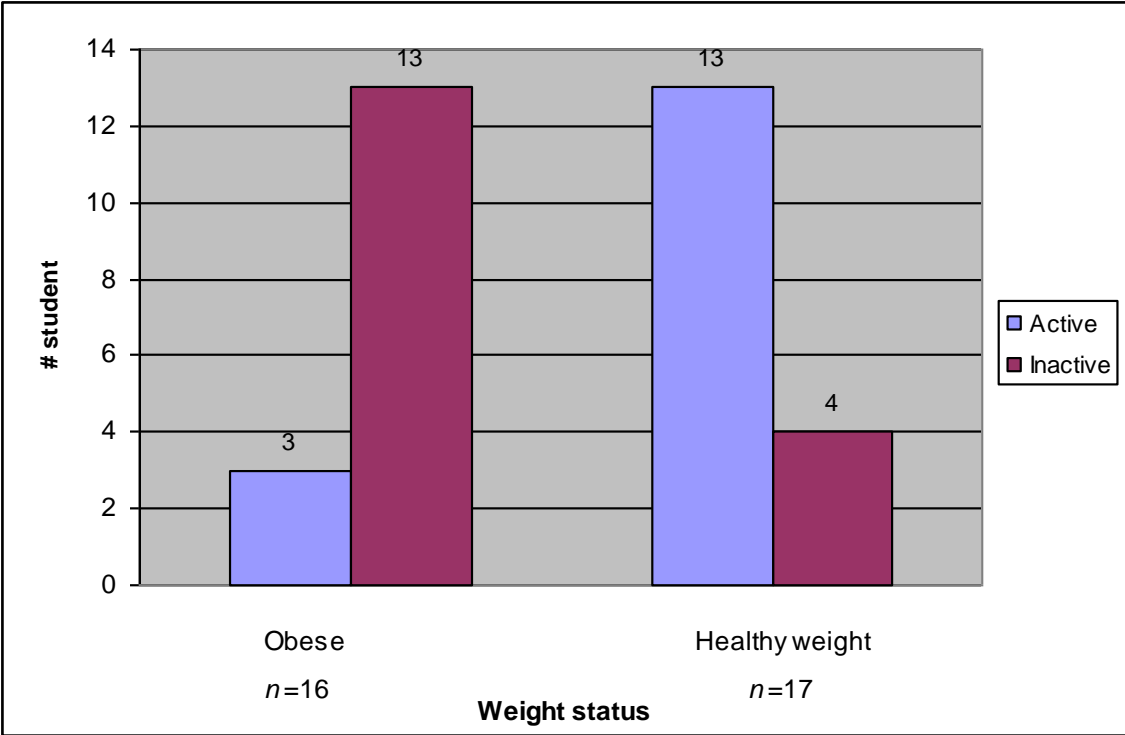
Figure 4.12: Pacific students’ activity (%) at lunchtime by Weight status (n=1518)



Note: Obesity defined as BMI ≥ 30kg/m².

Results from the qualitative interviews showed similar patterns with the quantitative data. 13 out of 17 (76%) healthy weight students were currently active and 13 out of 16 (81%) obese students were classified inactive (Figure 4.13).

Figure 4.13: Pacific students' activity status by Weight status (n=33)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

Of the three students classified as obese who were currently active, two of them may be anomalies through a high BMI score reflective of their muscle mass and not necessarily reflecting high adiposity. Both of these students are the most active and probably the most physically fit out of all the participants interviewed and indeed even within their whole school. Both students were regional representatives in several sporting codes playing high level sports on at least all of the weekly school days. One of these high achieving classified obese students explained in detail her regular weekly physical activity schedule.

“Usually I have a sports training at lunch time... Not every lunch time, it varies, but so far all my after schools are taken up for sports training for games... in the morning about 6.00am, I am up at about 5.00 in the morning for swimming training, [on] Monday, Wednesday, Thursday, and then [when] school finishes usually, I got some sort of training or game everyday after school, basketball, hockey or netball... Oh, training usually goes on about an hour and a half and games, each game is different times. Like basketball games go for 40 minutes, netball more, ok...[for hockey game] it will go for 20 min halves, yup, and I always play a full game cos I’m also the captain of the team. ...then during summer season, I play usually a singles game and one doubles game, yeah two games.”

Cook Island/NZ Maori, female, Age 17, Classified Obese.

The third student currently classified as obese but active, has only recently become active, by joining a sports team at the school year and term the survey was conducted.

Student motives for physical activity

From a total interview sample of 33 students, 16 were classified active. Most of the active students were of healthy weight (13) and 3 obese students met the current recommendations for adolescent physical activity. Students' current motives for physical activity in order of most important (cited) include: having fun, achievement motivation, finding challenges, for better health and historical habit (Table 4.6).

Table 4.6 Students motives for physical activity

Motives for activity	Students' comments
FUN	<i>"love my sports"; "I enjoy dancing"; "its fun"</i>
ACHIEVEMENT MOTIVATION	<i>"want to be good"; "runs in the family we're good at it"; "asked to play because I guess I'm good at it"</i>
FINDING CHALLENGES	<i>"to push yourself"; "be challenged try new sports challenges"</i>
BETTER HEALTH	<i>"keeps you healthy, keeps you active"; "feel energetic"; "keeps brain working too"; "keeps you fit"; "don't feel heavy, don't feel sick"; "keep in shape"</i>
HISTORICAL HABIT	<i>"usual life routine, like to keep busy"; "I've always played sports since young age, just keep doing it"</i>

Reasons for Student inactivity

Of the students interviewed, 17 out of 33 were classified inactive. Thirteen of these were obese students, and four students were of healthy weight. The four healthy weight students have long histories of being active through school sports teams from a young age. All four have recently dropped out of formal sports activity in the school year and term the survey was conducted. All of the obese students who were currently inactive bar one, used to be active in sporting activities when they were younger usually at primary or intermediate schools. Drop-out of sports activities usually took place once they entered high school or senior school levels. Students explained that this was related to

finding the school sporting environment competitive and it did not meet their primary motive for physical activity participation, which was to have fun and enjoyment of the activity, as highlighted by a student's comments below.

"Yeah, I used to play netball, that was for intermediate and primary [school]

[Interviewer] What made you stop playing?

Cos for previous seasons it was just for fun and now their too serious, whereas at intermediate [school] it was more like muck around and having fun. But now that we're at high school the trainings are really serious you have to be there, you have to be there on time, otherwise you get laps or something. But I think they're worth it cos they [team] won their grade"

Samoan/Niuean, female, Age 16, Classified Obese.

Reasons for drop-out and current levels of inactivity in order of most cited include: perceived lack of physical skills, lacking resources like money and transport, other competing activities, the need for social support or social affiliation, injuries, illness or because the activity was deemed "too rough", with the potential to cause injury, and lack of motivation (Table 4.7).

Table 4.7 Reasons for Student Inactivity

Reasons for Student Inactivity	Students' comments
NOT HAVING THE SKILLS TO BE SELECTED FOR SCHOOL TEAMS	<i>"I think for this year, the sports team is better"; "and people are really good"; "My cousin's team, they're too professional"; "Cos the team was too good and I didn't want to compete for my position"; "just felt out of place sometimes, cos the other guys I played with had more skills than me"</i>
NOT HAVING MONEY FOR JOINING ACTIVITIES / SPORTS / GYM FEES	<i>"For dancing, I need a car, money to travel out West"; "I would like to join a gym but I need to get a job first, mum and dad can't pay"</i>
NO TRANSPORT FOR SAFETY	<i>"but I loved playing netball or rugby but because my mum tell me to stop, yeah, she wants me to come home early, because no one will walk with me back home"</i>
NOT HAVING ENOUGH TIME FROM COMPETING ACTIVITIES LIKE CHURCH AND SCHOOL WORK	<i>"cos I have to go to church [on Saturday]"; "cos I want to get a job"; "Because I need to go to my cousin's place, in the weekends"; "I am not allowed to do anything after school, because I have to focus on school"; "I got youth, family, church and then I got sports, so I didn't really have enough time for everything, so I just cut down on sports"</i>
NEEDING FRIENDS OR FAMILY MEMBERS TO TRAIN WITH OR TO JOIN TEAMS WITH	<i>"Cos my uncle is too busy, at home I used to do trainings with my uncle"; "Too shy, to join a team without my mates"; "if I live closer to my mates then maybe I would do more physical activity, because we used to live [closer] but now we live in Massey"; "I would like to join a gym for exercise, hopefully if I can do it with someone"</i>
INJURIES OR ILLNESS	<i>"I don't want to play rugby cos I get injured all the time cos of the tackling"; "I am not allowed to, because of my doctor, because of the operation"; "my knee it broke and that's why I didn't want to play"; "I got lung damage, I cant play outside sometimes"; "I used to play netball for our school until I broke my leg"</i>
LACK OF MOTIVATION	<i>"I would probably like to start going to the gym and that, but I'm being lazy"; "I don't know, I need to just getting started"; "senior school is when I started getting a bit more lazy"; "I'm too tired to do anything"</i>

Students' weekend activities

The students' level of activity did not change significantly across from the weekdays into the weekend days. Greater proportion of students (9 from 16 students or 56%) active on the weekdays continued to be active on the weekend days, and this was the same result for inactive students. That is, students (11 out of 17 students or 65%) who were inactive during the weekdays continued to be inactive on the weekends. Obese students were more inactive on the weekend days than healthy weight students.

Parent activity status

Using current MOH ¹⁰ and SPARC ¹⁹⁶ guidelines for activity status, 25 out of 30 (80%) parents were deemed inactive and only 5 (20%) parents interviewed were classified active. Parents' daily activity came from having active jobs that required physical movement and or active daily transport to work, as illustrated by parent's comments below.

"I don't do any exercise except if I am working ...Um, generally, because I cover the whole hospital I can be walking through the hospital and can be walking 2kms a night just covering the whole hospital."

NZ Maori/Cook Island Mother of 4 dependent children, nurse, household size 6.

"We making biscuits, and I'm the team leader there, sometimes we make biscuit and I just walking around and I want to make sure the factory is clean before they come, before the other shift come in the morning, the toilet, the bathroom, that its all clean, that's in the morning, I do my exercise there."

Tongan Mother of 4 dependent children, factory cleaner, household size 8.

Perceived barriers for parental physical activity

The main reasons for parents inactivity was "not having enough time" or being "too busy" fulfilling other daily life activities. These included family related activities like looking after young children, looking after sick relatives, managing large households, participating in community church activities and working long employment hours. Lack of time was the key barrier to daily physical activity for most Pacific parents, as highlighted by comments below.

“Because of my job, because I work nights shifts, and I do minimal training when I’m taking the kids to swim training but as far as doing anything else is concerned, my time is precious and I’d rather catch up on one of life’s pleasures which for me is sleep or do whatever else I think needs to be done around the home.”

NZ Maori/Cook Island Mother of 4 dependent children, nurse, household size 6.

“yeah, that’s the problem, cos I work at night from 11pm to 7am and she [wife] works during the day, but sometimes when I get home, its like I’m drunk, its very dangerous to drive around, you have an accident on the road. I don’t exercise, because I’m very tired, that’s the only problem.”

Samoan Father with 3 dependent children, night shift factory worker, household size 5.

In particular, working long employment hours was the main time constraint factor for Pacific parents’ physical activity. One study participant was able to explain how work time encroaches on adult leisure time more and more, the impact this had of family well-being, and the enormous individual effort required to become more physically active.

“I think it’s gotten worsen, you know, trying to have a work life balance, home-life and that. I think that people are just work, work, work and there doesn’t seem to be any me time, and cos I’ve noticed it really bad just over the last 5 years. I remember, when my kids were little, I remember we were working, but we weren’t so focused on work alone, you know, we’d have Saturdays and Sundays or have holidays. But nowadays lots of organisers get burnt out, there’s a high turnover of staff. I think that people are just stressed out and going hard, you know. I mean, I know people that have killed themselves because they have done a lot of double shifts and then they’ve driven home and they’re that tired that they end up slamming into parked cars, or something like that. We also have a high rate of divorces as well among members, because work takes over and they take it home, back into their home life and their kids. I don’t want to end up like that

[Interviewer] So how do you manage that?

Well, I just turn off my phone, it goes off in the weekend, and come Monday, I turn it back on, and then I’ll have all these messages to go over. And um, basically you have to be well planned and just say ‘no, I can’t make it’, rather than before I would have said, ‘oh ok, I’ll be there right away’, blah blah blah, so its all about planning your day and not filling up your diary so that you haven’t got too much on your plate... When I come home [from work] I tell my family to just give me ten minutes to chill out and then talk to me, I do that to them often... We [husband] actually came up with a plan, I spend my time with my boys, playing volley and then on Saturdays, is our time together, with my time together with the girls in the morning, but after lunch on Saturdays, well that’s our [spouse] time. I didn’t realise, cos coming from a work factory life and going to work for the union full time, that I would have to organise that sort of thing, but its because of the work that I do, and I don’t want my work to be the centre of my

life. I want my kids and my family and my husband to be the centre of my life, work is secondary or third or whatever. Kids are my priority, I've seen it too many times, too many people fail at their marriages and end up in divorce. We've talked about it with my other half and definitely we don't want to go down that track."

NZ Maori/Cook Island Mother of 4 dependent children, union worker, household size 11.

A few parents talked about physical activity being "only for kids", being seasonal with exercise (like walking), being easier and more consistent in the summer seasons rather than winter, and the cost of gyms and chronic injuries or illnesses mentioned as barriers to physical activity.

Interestingly, when parents were asked, when in their daily schedule they felt they were getting their exercise, just over half of them defined exercise as completing household chores rather than as a separate structured activity. Household chores and fulfilling family activities took precedence over doing an individualised structured physical exercise that was different to household activities, as illustrated below.

"Heaps of exercise when I go outside because I do the gardening, the front garden and then do the bananas out the back... To me its heaps of work, some times I feel very tired so I rather go and sleep and have a rest."

Samoan Mother with 2 dependent children, beneficiary, household size 6.

"Well, its housework, when I finish, I would go for a walk, walk to the shop, I go for a leisurely stroll even if I don't have anything to buy, but I still go. When I get back, I go to the back of the house and work my hands like this, do some gardening, mow the lawns."

Samoan Grandmother with 3 dependent children, Super-annuitant, household size 8.

Parental weekend activities

Parents' activity status stayed the same through into the weekend days, with most parents engaged and fulfilling obligations that were mainly physically inactive. Weekend activities for parents included: attending church and church-related events which were meetings, choir practices, and or decorating church halls.; completing household chores, which included shopping for groceries and food items required for the Sunday lunch or toona'i; attending children's sports events as spectators; working weekend shift hours; and engaging in inactive entertainment pursuits like watching television or videos at home with the family. On weekend days, especially Sundays which is deemed a day of rest, active pursuits are discouraged as part of the Christian faith and this was adhered to by both parents and students, as explained below.

“Yeah, [on Sunday afternoons] you can go find your own room and do your own [things]. Yeah I think this a resting day for us, I suppose it’s a routine for our kids. Sometimes we not allow them to play outside on Sunday or making noise on Sunday. Just like when we grow up in Tonga, we were not allowed to going, playing outside on Sunday and just only what we believe, you know, they can allow to watching TV but not playing and making noises and you know, I think that Sunday is a rest day for us and then carry on for the same thing on Monday morning.”

Tongan Mother with 2 dependent children, hospitality cook, household size 5.

“[On Sundays] we’re not allowed to do anything else so then we just hang around [at home]

[Interviewer] Ok and when you said you’re not allowed to do anything, what do you mean by that, like who told you that you can’t do anything [active]?

Oh like cos mum and dad say Sunday is a resting day for the whole week, it just [means] doing something mild and not as active as like the whole week, so I sleep [on Sunday afternoon] yeah, and [then] like wake up around 6.00pm and we normally do a prayer from like 6.00 to 7.00pm, then I study a bit early so I can do my texting.”

Samoan/Niuean male, Age 16, Classified Healthy Weight.

Only a small number of parents ($n=3$) that were active in the weekdays continued to be active on the weekends due only to employment activity.

Parental-child physical activity link

Students’ activity levels were compared against their parents’ activity status to assess if there is a link between child and parental activity status. Only 5 parents were deemed active and this was only through active employment activities. There was no clear pattern observed between the activity status of parents and their corresponding child. That is, two out of the five active parents had a classified obese child. However, as stated earlier in this chapter, one child/student may be misclassified obese through a higher weight to height ratio due to higher muscle mass rather than adiposity. This particular student is the most active and probably the most physically fit student interviewed in the group. If this student’s weight status was therefore changed, then four out of the five active parents, would have an active child/student and therefore a more positive association is observed between parental activity and child/student activity.

Some parents talked about being more active and more involved in structured sports prior to having children but felt unable to continue their own participation and prioritised their children's activity over their own.

"When I was growing up, I used to love sports but when the kids come along, that kind of went out the door, I had to look after them, so I pretty much give up all the sports, but I used to be a very active person but not anymore, I probably play a game say once every three weeks."

Cook Island Father with 2 dependent children, labourer, household size 6.

"um, in the mornings, I take the kids to swimming, I swim also, but other than that I don't get any as much exercise as others in this household...and they [my children] will play their sports, Ann-Marie will have netball, Zachary's got rugby, Moana's got club hockey on a Sunday night and Olivia has Bring It On, so she's got dance...Yeah, I'm generally the taxi service and chauffeur as well."

NZ Maori/Cook Island Mother of 4 dependent children, nurse, household size 6.

Transport to school

Analysis of the quantitative survey question on transport to school showed there was no significant difference in the active transportation to school as measured over the previous school week between obese versus healthy weight Pacific students. Only 16.1% of healthy weight students did not walk or biked to school in the previous week as did only 15.4% of obese students. The proportion of healthy weight students who walked or biked to school daily (30.2%), as measured by ten trips over the past week, was similar to that for obese students (27.9%, $p>0.05$).

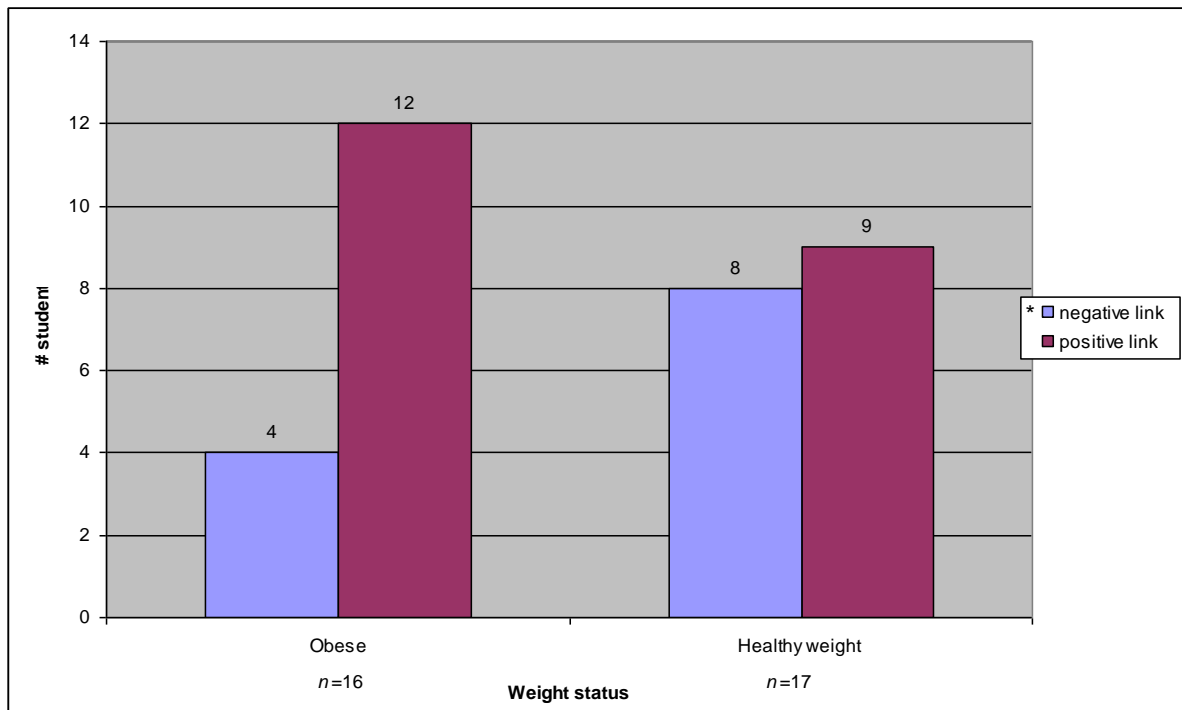
The qualitative data were consistent with quantitative results. There was no difference in mode of transport between obese and healthy weight students. Only a small number (4 out of 33, or 12%) of students used the car as their main mode of transport to and from school. Two of these students are classified as obese students and two classified as healthy weight. Neighbourhood safety, particularly for girls, was a factor in parents choosing car travel as a mode of transport despite close distances between home and school venues. Most students irrespective of weight status or activity status walked to and from school, due to the short distances between their home of residence and school with most trips by foot taking between five and ten minutes.

Physical activity beliefs and values

Students' physical activity beliefs and values

To assess students and parents beliefs about physical activity and its relationship to healthy weight, in the interviews, participants responded to the question, 'Do you think there is any link between physical activity and being of a healthy weight?' Figure 4.14 summarises the results from the qualitative data sources. There was an observed difference between obese versus healthy weight students with more obese students (12 out of 16, or 75%) stating there was a positive link between being physically active and body weight, and comparatively less healthy weight students (9 out of 17 or 53%) believed there was a positive link. Most students (21 from 33, or 64%) attributed body weight, described as bigness and thinness, to both inactivity and over-consumption of food.

Figure 4.14: Students' beliefs about physical activity's link to healthy weight by Weight Status (n = 33)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

* negative link = believe physical activity does not affect body weight

* positive link = believe physical activity does affect body weight

The finding that more healthy weight students did not believe body weight was determined by physical activity suggests that the intrinsic motivations for physical activity are much more salient than health-related incentives. Students participated in physical activity primarily for intrinsic reasons, such as for the fun of the activity and its social affiliation aspects. The latent effects of consequential increase in body weight due to physical inactivity could be affecting current beliefs. It is possible that the greater understanding of obese students with regards to physical activity's affect on body weight probably reflects their own personal experience of gaining body weight after a period of inactivity. Sixteen out of 17 students classified inactive, reported that they used to be active right up until middle school (ages 11-12 years), with most becoming inactive in the last two or three years. Smoking and hereditary factors like genes were also referred to as key influencers of healthy weight.

Most students valued physical activity and regardless of weight status, all students thought it was important to participate in daily physical activity. When students were asked why doing physical activity was important, most stated the health benefits of physical activity, for example, to increase energy, to live a long life, to be physically fit and healthy. Most affirmed this knowledge was derived from taking health class at their school. Most students were able to correctly identify the recommended dosage of physical activity required per week to gain health benefits. Whilst students can understand and have knowledge about the health benefits of physical activity, it is not necessarily the health benefits of physical activity that are the primary reasons for students' current participation at this point in their life stage. At the adolescent stage, other goal motivations are more salient, like affiliating with peer groups, achievement motivation and having fun.

Parents' physical activity beliefs and values

The majority of parents (27 from 30 or 90%) made a positive link between physical activity and healthy weight status. The three parents who made a negative link attributed an increase in body size to food consumption only and/or hereditary genetic make-up.

These parents' tendency to attribute their children's body weight to food and not physical activity, can probably be accredited to their opportunity of personal observation of their children's daily activity. When parents work long hours and are outside of the home, they do not have the opportunity to observe their children being active, particularly if their children's physical activity takes place in schools. However, they are able to observe what their children eat at home, and can therefore make more comments around their nutritional behaviours.

There was no link between parents' activity status and positive or negative beliefs about physical activity and healthy weight. Furthermore, parents beliefs' were not mediated by their child's weight status. Most parents had good knowledge about the health benefits of physical activity, including knowledge about the recommended dosage of physical activity required for health benefits.

Parents, like the students, valued physical activity however they talked more about the importance of daily physical activity for their children and their role as parents to provide this, rather than the value of physical activity for themselves. Parents valued physical activity mainly for the "good health" of their children, because it "kept them off the street", for increasing children's self-esteem, self-confidence and giving them a "competitive edge", because it was prescribed by doctors to manage chronic conditions, (e.g., child's disability) and lastly, because being active "is being part of a kid". Only one parent made comment about the need to keep personally fit but further explained, that being physically active was important for allowing her to "get more household chores done", to fulfil her role and obligations within the family.

[Interviewer] "And what do you get out of being fit?"

"If I don't do that, I wouldn't get up and do all this work before I go to work, you know, I have to get the house clean, the food ready, the washing done, make sure its already out."

Samoan Mother of 2 dependent children, cleaner, household size 6.

Parents valued physical activity for their children and were happy to sacrifice their own physical activity to support their children's interests. Fulfilling family obligations and interests was presented by some parents as the definition of good parenting but also an enjoyable part of being a parent, as explained by one mother below.

"Yes Eric plays rugby and the little one he plays league and Milly plays netball and the other one, he plays music...It is a busy schedule, and I get really tired too but it's just I do it for the family, and I love taking them wherever I go, church things and that, I love doing that and family things."

Samoan Mother with 4 dependent children, administrator, household size 6.

Having a semi-structured interview allowed parents to explain their living experiences both in the present and from the past. Some parents talked about the loss of traditional Island activity upon migration to New Zealand, for example, daily house cleaning, washing clothes, fishing, building houses, agricultural work, and work required for making and gathering food. These had now been

replaced with increased inactive employment hours and leisure time filled with inactive pursuits, for example, watching television, computer use and car transportation, as explained by one parent below.

[Interviewer] “Are you happy with your size, or would you like to be a little bit smaller or a bit bigger?”

“For me, I would like to be thinner, because I was thin in my earlier days, then I came here to New Zealand, and I got fat like I am today, because I eat and then sit, I don’t go to the back to tend taro in a plantation, tend the harvest, sew mats, prepare fine mats, do all those work, but here, when I finish eating, I just sit. The things we do here has changed, the life here is different. Samoan people are big and fat, here in New Zealand...in my estimation, it’s eating, over-eating. In Samoa, you eat, but then go and do some work, you get sweaty, you sweat, but here, you just eat and sit, you don’t get any exercise done because you just eat and sit, but in Samoa, because when you finish eating, even when you go to sleep, you get sweaty. You might have plenty to eat, but you also have plenty of work to do.”

Samoan Grandmother with 3 dependent children, Superannuate, household size 8.

Most parents (25 out of 30, or 83%) migrated to New Zealand as young adults and it would seem that modern lifestyle changes have impacted on daily incidental activity of Pacific people with a severe decline in daily physical activity upon migration. At the most, more daily time was now spent at employment places rather than completing active housework chores. Employment time and especially shift work arrangements or occupational types were the main encroachment on available time for daily physical activity of Pacific parents.

Physical activity influencers

Parental support for Physical activity

In the survey questionnaire, students were asked to rate parental support for physical activity. Two items were included in the OPIC survey to assess physical activity influencers. Students responded to the following questions, “How much does your mother (or female caregiver) encourage you to be physically active or play sports?” And likewise, the question was repeated for “father (or male caregiver)”. Five possible responses were presented: 1. A lot; 2. Some; 3. A little; 4. Not at all; 5. Don't live with my mother (or father). Most students chose option number one “A lot” to describe parental support for physical activity.

Table 4.8 summaries the analysis completed for the total sample of obese and healthy weight students ($n=2740$) compared to the sample of obese and healthy weight Pacific students only ($n=1518$). There was one difference found between the two samples, with parental support rated higher by obese Pacific students, while in the total student sample, healthy weight students rated parental support higher (Figure 4.17). There were no other differences in the pattern observed between the two samples. Figure 4.15 shows that by ethnicity, Pacific students rated parental support for physical activity higher than other groups. No differences were observed by gender and younger students rated parental support higher than older students (Figure 4.16). Between parents, mothers and fathers student ratings of support were comparatively equal.

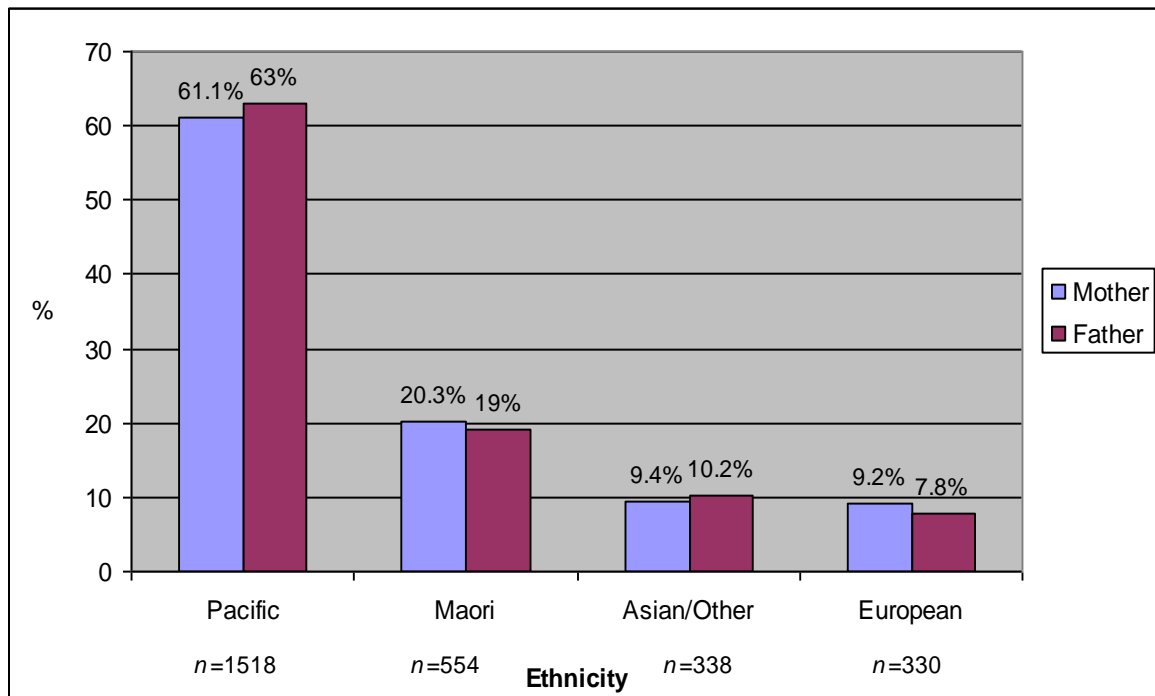
Table 4.8: A comparison of the rating of parental support for physical activity between total student sample and Pacific sample only, across Ethnicity, Gender, Age and Weight status variables.

	Total sample $n=2740$		Pacific sample $n=1518$	
Variables	Mother support	Father support	Mother support	Father support
Ethnicity	<0.0001 Greater support for Pacific cf.* Maori, Asian/Other & Euro	<0.0001 Greater support for Pacific cf.* Maori, Asian/Other & Euro	-	-
Gender	≥ 0.05 No differences	≥ 0.05 No difference	≥ 0.05 No difference	≥ 0.05 No difference
Age	<0.0001 Greater support for younger students	<0.0001 Greater support for younger students	<0.0001 Greater support for younger students	<0.0001 Greater support for younger students
Weight status	<0.0001 Greater support for healthy weight students	<0.0001 Greater support for healthy weight students	<0.0001 Greater support for obese students	<0.0020 Greater support for obese students

Note: *cf. = compared with

Figure 4.15 shows parental support was rated significantly higher by Pacific students (61.1% for mothers; 63% for fathers) compared to Maori (20.3% ♀; 19% ♂), Asian/Other (9.4% ♀; 10.2% ♂) or European students (9.2% ♀; 7.8% ♂) ($n=2740$, p value <0.0001).

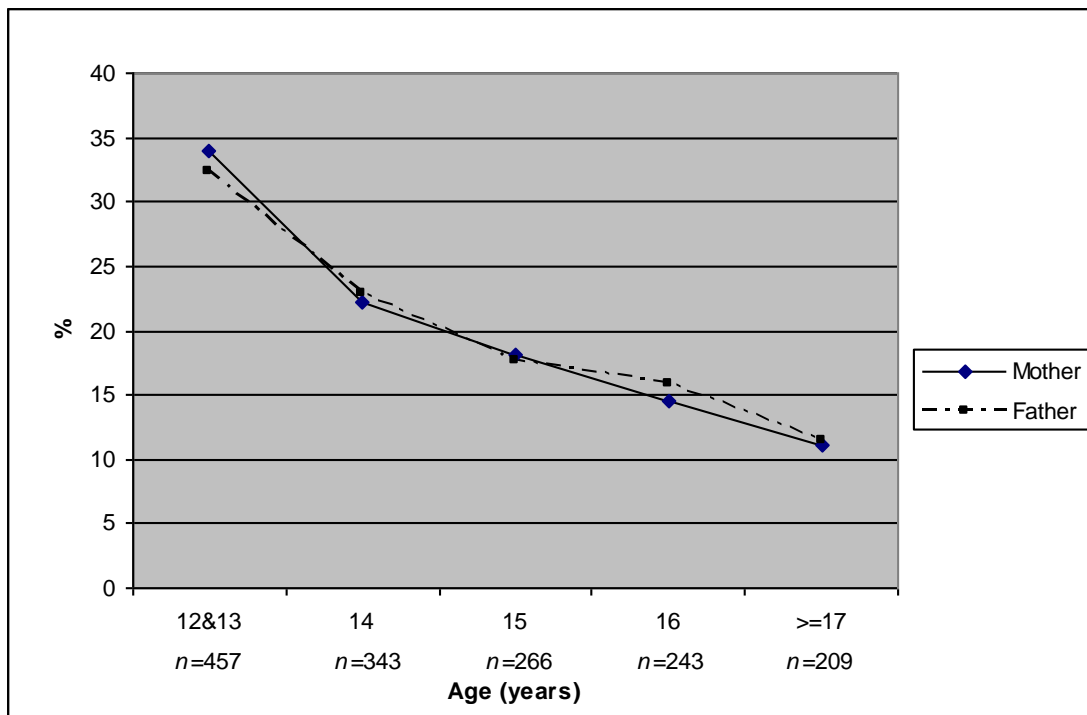
Figure 4.15: Students rating of parental support (% rated 'A lot') for physical activity by Ethnicity ($n=2740$)



No significant differences were observed in parental support according to gender for all students ($n=2740$) and for Pacific obese and healthy weight students sample only ($n=1518$). That is, Pacific girls and boys rated both mothers' and fathers' encouragement for physical activity as equally high, with less than 3% difference in gender proportions. Mothers' support rated high by girls at 51.5% and boys at 48.5%, and fathers' support rated by girls at 50.1% and by boys at 49.9% (data not shown).

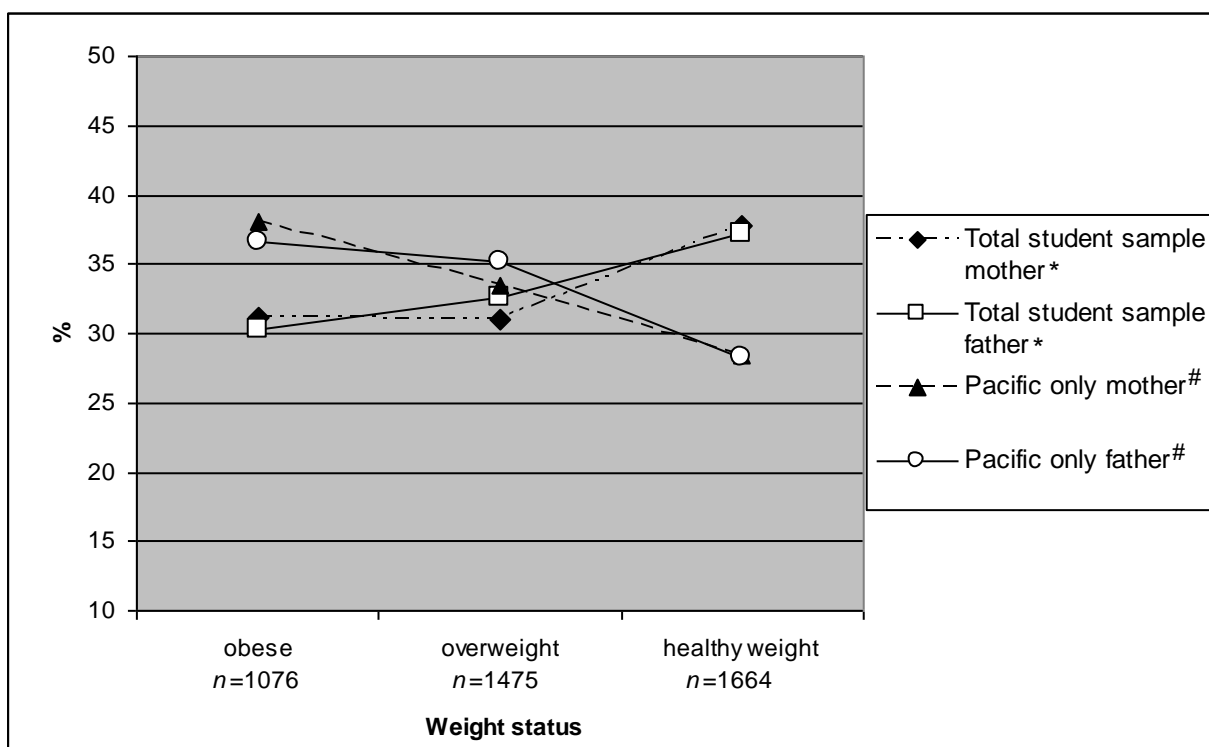
For all students irrespective of ethnicity, younger adolescents rated both mothers' and fathers' support for physical activity higher than older adolescents, with a clear trend of rating of support declining with increasing age. This significant age group effect was found across all sample sizes, that is for all students in the total baseline sample ($n=4215$, p value <0.0001), for the sample of students selected by obese and healthy weight status only ($n=2740$, p value <0.0001) and for the Pacific students only sample selected by obese and healthy weight status ($n=1518$, p value <0.0001) (Figure 4.16).

Figure 4.16: Pacific students' rating of parental support (% rated 'A lot') for physical activity by Age group ($n=1518$)



Parental support was also mediated by weight status but divergent trends were observed between Pacific and non-Pacific students. For the total student sample ($n=4215$), there was a significant difference in the rating of support between obese and healthy weight students, with higher parental support perceived by healthy weight students (37.8% for mothers; 37.1% for fathers) compared to obese students (31.1% ♀, p value <0.0001 ; 30.3% ♂, p value <0.0001) (Figure 4.17). Interestingly though, this was not the case for Pacific students ratings, with obese Pacific students (38.1% ♀; 36.5% ♂) rating parental support for physical activity higher than healthy weight students (28.3% ♀, p value <0.0001 ; 28.2% ♂, p value <0.0177). Ratings between mother and father by weight status were comparable and did not differ with any degree of significance.

Figure 4.17: Students' rating of parental support (% rated 'A lot') for physical activity by Weight Status ($n=4215$)* and by Pacific ethnicity ($n=1518$)#

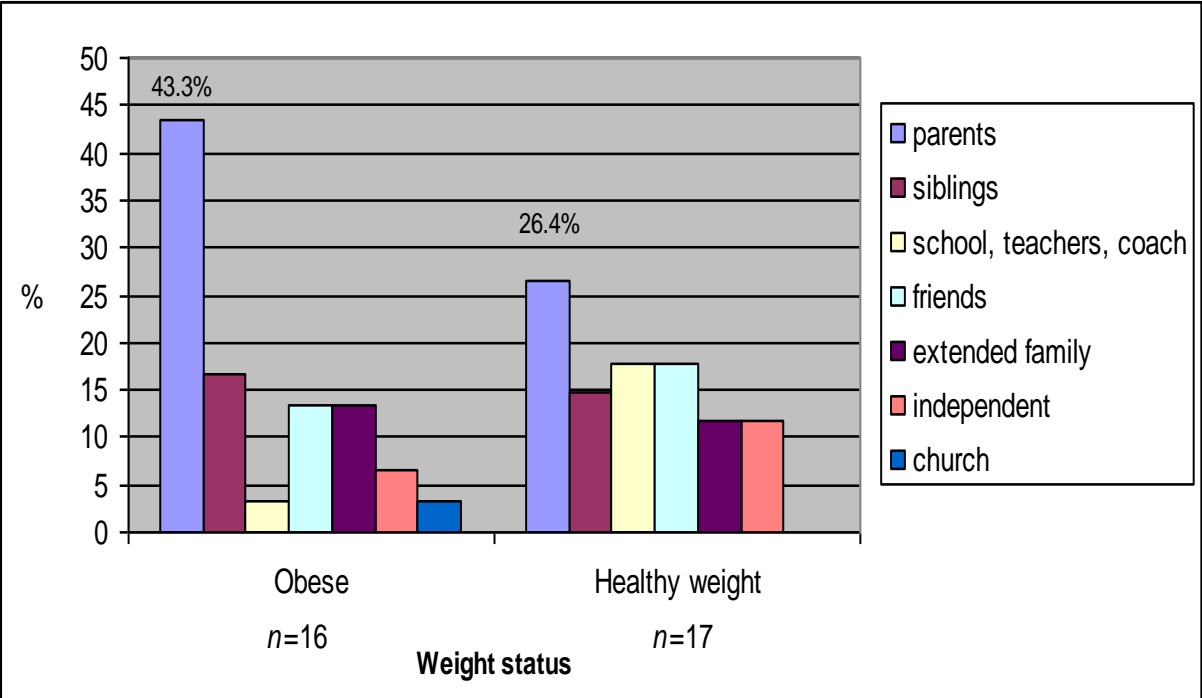


Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

*Total student sample size $n=4215$ used to add Overweight student category to show trend by weight status.

Results from the qualitative interviews were in agreement with the survey data for the comparison between obese versus healthy weight students. That is, the influence of parents was stronger for obese Pacific students, than for healthy weight Pacific students (Figure 4.18, shown as a percentage of overall counts). Regardless of weight status, parental influence was stronger than other influencers of physical activity behaviour. After parental support, the influence of the school, teachers and coaches was stronger for healthy weight students compared with obese students. Church was not mentioned by healthy weight Pacific students as an influential source on their physical activity. Friends or peers and siblings were the next strongest influence on Pacific students' physical activity behaviours.

Figure 4.18: Influential sources (%) on Pacific students' physical activity (n= 33)



Note: Obesity defined as BMI ≥ 30kg/m².

When combining family members, including parents, siblings and extended family members (uncles, aunts, cousins) together to reflect Pacific notions of family, and the current household configurations for the majority of interviewees (that is 70% of interviewed cohort live as extended family), then the influence effect is even stronger for both obese and healthy weight students (73% and 53% respectively), with the majority of students choosing a family member as the key influential source for physical activity.

The nature of parental influence on students' physical activity

In most cases, the student initiates their activity through the opportunities provided by the school (usually beginning at primary school) and in some cases, from the encouragement of school team coaches or teachers. A few parents initiated children's physical activity from a young age by registering them into structured sports competitions because they believed sporting activities can provide many benefits for their children. As discussed previously, parents valued physical activity mainly because it was good for the health of their children, but also because it kept them busy and "kept them off the street", it was good for increasing children's self-esteem, self-confidence and giving them a "competitive edge".

In addition, parents who valued physical activity and enjoyed physical activity through previous and or current experience, made strong investments in their children's sporting activities, by providing not only resources and transport for sports activities, but were also actively involved by being coaches, managers and sports club members of their children's sports teams. The following discussion highlights a mother's and father's sporting socialisation process on their children.

Father: "I was playing first and then when the kids come along, I just got them into it"

Mother: He stopped playing and then kind of concentrated on the kids because the girls play league too, they've always played league, And they've had their team and now we have the boys' teams. Right from when they were probably about 4 or 5 [years old], then they got into their sports and martial arts and all that...We both coach and manage them.

[Interviewer] And why do you guys do that, like, why are you motivated to put your kids through sports, what are the benefits?

Father: it's just to keep them active, to keep them busy

Mother: And to keep them off the streets, our main thing, is to keep them off the streets, you know, roaming around, yeah so that's why they are at either at sports or do martial arts and school but then if they like stop they would be out roaming with their mates. I don't mind their mates coming here, that's not a problem because at least I know where they are. But like Toma [son/student] is not allowed out, not allowed out by himself till recently, but he's still got to be home by 10pm. They all grow up that way, the girls are OK, just got to keep an eye on them, there's so much going on out there."

NZ Maori Mother and Cook Island Father with 2 dependent children, hospitality & labourer, household size 6.

In relation to parents' definition of physical activity as completing household chores, some parents talked about trying to increase their child's physical activity by getting them to be more active around the home, completing household chores, as highlighted by one mother's comments below.

[Interviewer] "Now if you can think of someone that you may know of, who is really big, why do you think that they are that big?"

They eat a lot and I think they eat out, like my brother, and they don't do any activities like household chores, there's another lady that I know of, she just eats and sits on her bottom the whole day, and it's something that I look at and think I don't want to be like that when I'm forty year of age or something. That's what I'm trying to encourage Ana [niece/student] to do [more physical activity] but it's hard.

And how do you encourage her?

Growl her, get her to do all the work at home when she comes back from school, but she helps out a lot."

Cook Island Aunty with 4 dependent children, teacher, household size 8.

Parents support their children's interest in physical activity by signing consent forms, paying school sports fees, and as spectators. Parents show support by displaying their children's trophies and certificate of merits in their home spaces for visitors to see.

Parental support by student weight status

All students bar one, (32 out of 33) regardless of weight status, indicated that they had always been active as children, participating in structured school sports in primary and intermediate schools. Students indicated that their parents were key influencers of this historical physical activity, and supported them in a number of ways: initiating their sports participation by actively signing them into new sports, by attending games to give support, by transporting them to games and paying for sports fees and by telling them to "go for it". Some students initiated their own participation, but always with the consent of parents and often with older siblings and or other extended family members, like older cousins, who acted as secondary support and role models. As younger children, no child was actively discouraged by parents from being physically active.

There was no difference in the support parents gave for their children's physical activity irrespective of weight status. Students' who have been classified inactive, had only recently become inactive in the last two to three years, all within the period of either entering high school or senior school levels. Most of these students indicated that they noticed their own body weight gain since entering high school and

or senior school. Most of these students, now classified obese, were actively encouraged by parents, and particularly mothers to become more active and to resume sports participation, if they had ceased participation.

Students' responses in the qualitative interviews corroborate the evidence in the quantitative survey, which showed that parental support for physical activity increased as their BMI increased and or as weight status changed from healthy weight to obese status. This confirms that parents already possess positive and healthy beliefs and knowledge about the link between physical activity and healthy weight, and readily give words of encouragement to their children, particularly when their child is becoming overweight. Students were able to explain further, that their parents words of encouragement, was almost always the most respected view to uphold, as highlighted by the dialogue below.

"My parents tell me to do more exercise and eat less, like they tell me to go for walk or go for a run yeah, they usually say that

[Interviewer] Who has the most influence on you, like your family or your friends?

My family, yeah, mum and dad. Usually they just tell me off, go do this and do that. My dad and I used to go walking, probably for an hour and a half, we go to Mangere bridge

And was it your idea or dad's idea to go for walks?

It was his idea, yeah

And why did he start having that idea?

To stop me from gaining weight...I think being size 14 [clothes sizing] is ideal... In the fourth form I was size 14, fifth form I started to change to size 16, this year I started getting to size 20.

What happened this year that is different from the last year?

I don't know, I just stopped walking

How important is it to you to be this ideal body size [size 14], is it important?

Oh well, I guess size really matters to my parents

Why would size 14 be important to your mum and dad, do you reckon?

Cos they think that would be the perfect size for me, you know, that that would make me look like everybody else, yeah."

Samoan female, Age 17, Classified Obese.

Parental gendered expectations

However, physical activity support was not always equally distributed by parents towards sons and daughters. Some parents had gendered expectations, with boys getting more parental support for sporting activities, while some girls were actively discouraged with more expectation for them to focus on school work rather than sports. In addition, some parents talked about girls' sporting activities requiring more parental supervision than boys and sporting schedules that meant girls walking home in the dark by themselves was potentially unsafe for them. Neighbourhood safety was often cited by parents as a key factor in discouraging physical activity especially for their daughters, as highlighted by a mother's account below.

"Yeah, sometimes I stop her (daughter/student) from going and join those basketball and something like that, its just because she comes back, they are having exercises after school and then when I come back home from work and she is not home and then I get worried and I go back there [to school] to look for her. Yeah, my grandmother when they don't come early from school, she is starts to worry too much... Yeah, she likes doing it [sports], but sometimes how they go to schools and do the games over there and they don't get home like after 6pm and I get worried that's why I wanted to stop her from doing that.

[Interviewer] What about your boy, are you going to encourage him into sports?

Oh yeah, he loves soccer, he is boy, he can do it, but not with the girls...Its just a part of our culture in Tonga to watch out for the girls, but not the boys, they will be alright, you can watch them, but you know they are boys, boys are boys [laughs], but they can go out there, but girls you have to keep a close eye on the girls."

Tongan Mother of 3 dependent children, administrator, household size 7.

Furthermore, students were able to explain how this affected their sports participation and daily physical activity in a critical way. One particular student was able to explain how this safety issue is salient in her neighbourhood.

[Interviewer] "How come you get dropped off [by car to school]?"

Because there was a guy and he was following me and he would walk at the back of me and then whack my arse, and I started getting scared. At first I didn't tell my parents or told anyone, and I got to school the next day and I told my friend, and then she said "oh come on we going to tell a teacher". So we told a teacher and then the teacher told my mum and from there I wasn't supposed to walk to school by myself anymore. So now I usually get dropped off and get picked up."

Samoan female, Age 17, Classified Obese.

Some boys were discouraged from continuing physical activity if they received injuries or became ill from physical activity, for example, being a chronic asthmatic. One student explained why her father had discouraged her physical activity in the last year and the effect this was having on her physically.

"I just played netball, soccer and touch last year, but [not anymore], my dad wants me to concentrate on my studies, cos he thinks if I join any sports activities that I might concentrate on that instead of my studies. Oh yeah, always when I was growing up, I used to be in like school teams and like region teams and that. I've always played soccer. Netball I just started that when I was in year 4 and also last year I used to play touch, and ever since I was in kindergarten I used to play hockey but now I don't.

[Interviewer] How are you finding that [not playing anymore]?

Kind of hard, I always feel lazy now, but before that I was always feeling energetic, always doing this and that, but now people think I am lazy, I look lazy, like how I walk it's so slow and they always tell me to hurry up.

Yeah, so do you have to listen to your dad about that or could you, if you really wanted to play, could you?

If I really really wanted to play, I'll ask my dad, but still my dad wouldn't let me and plus, he's not just thinking about how it will affect my studies and all that but also about how am I going to get a ride back home [from sports] cos we live all the way at Papatoetoe and he doesn't want me to like come home late. Like people of this age, people do silly stuff, like I might go around with my friends, go wandering around."

Tongan female, Age 15, Classified Healthy Weight.

Influencers on parental physical activity

For the few parents who were currently active, the main influential factor on their physical activity was work-related activity. A few parents ($n=3$) talked about their children providing encouraging words to do physical activity and other parents with health conditions to manage ($n=3$) mentioned doctors were influential on their activity.

Future activity

Students

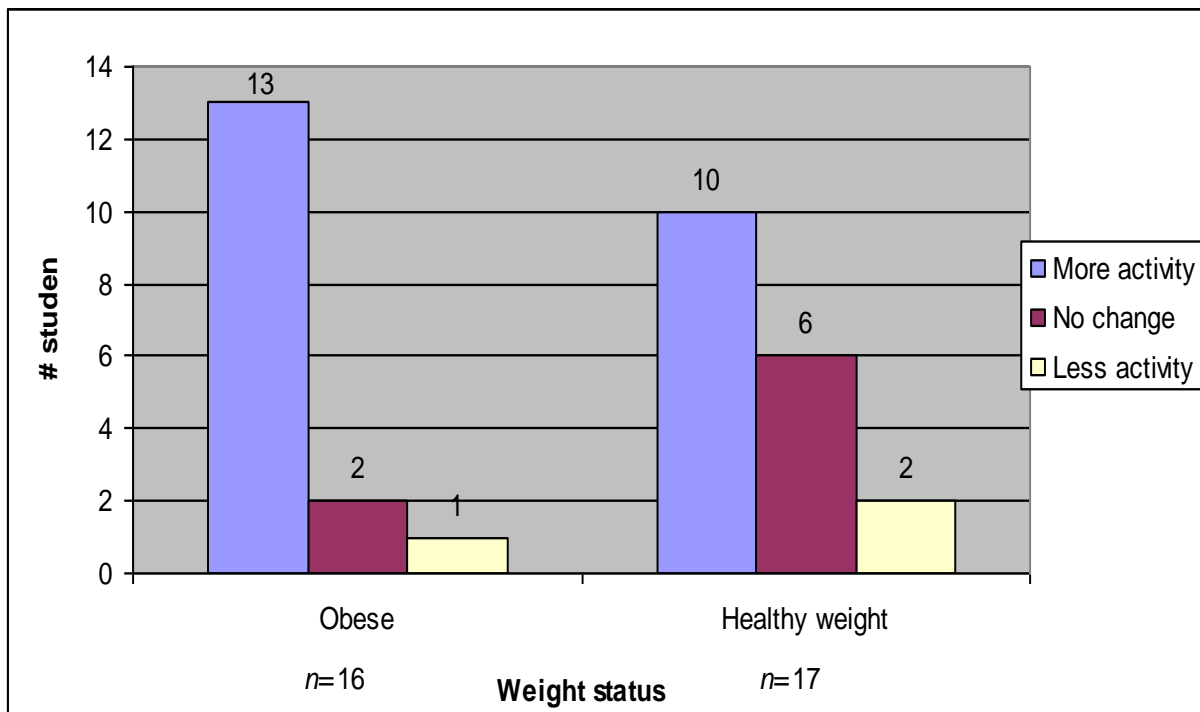
Analysis of qualitative data showed most students wanted to do more physical activity (21 from 33 or 64%) in the future but had difficulty resolving immediate barriers for participation. Perceived barriers to future physical activity were: needing friends or family members to train with or to join teams with, not having money for sports fees, not having transport particularly for safety, not having the skills to be selected for school teams, and not having enough time from competing activities like church and school work. Interestingly, the reasons for dropping out of previous activity matched students' perceived barriers for future activity as summarised in Table 4.9.

Table 4.9: Students' reasons for inactivity and barriers for future activity (n=33)

Reasons for drop-out / inactivity	Barriers for future activity
<ul style="list-style-type: none">▪ Not having the skills to be selected for school teams▪ Not having money for sports fees▪ No transport for safety▪ Not having enough time from competing activities like church and school work▪ Needing friends or family members to train with or to join teams with▪ Injuries or illness	<ul style="list-style-type: none">▪ Needing friends or family members to train with or to join teams with▪ Not having money for sports fees▪ No transport for safety▪ Not having the skills to be selected for school teams▪ Not having enough time from competing activities like church and school work

Figure 4.19 shows that more obese (13 out of 16) students wanted to increase their physical activity in the future, whilst more healthy weight students were happy with their current level of activity and desired no changes to current levels. For the two healthy weight students who wanted less activity, one wanted to do other non-active activities such as attending church youth group and “hanging out at my cousin’s house” and the other because of physical discomfort, “get too tired”.

Figure 4.19: Pacific students’ desire for future activity by Weight status (n=33)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

Parents

An overwhelming number of parents (23 from 30, or 77%) did not desire to do more physical activity or make changes to their inactivity status. Two explanations are possible for this. Firstly, parents defined exercise and physical activity as meaning household chores activities and when they were asked if they would like to do more exercise or physical activity, the overwhelming response was no, they would like more rest.

[Interviewer] “Are you happy with the amount of physical activity that you personally do?”

Yeah, yeah, because sometimes I know that like sometimes I sweat [when doing housework]. Sometimes I feel like doing less but that’s all right, but yeah, I reckon what I do now it’s alright.”

Cook Island Aunty with 4 dependent children, stay-home parent, household size 10.

“Oh not more [exercise], in summer time we can do more because we can go outside and plant more kumara and do things like that.”

Tongan Mother with 4 dependent children, beneficiary, household size 6.

Secondly, parents defined their own personal health in relation to their family’s health and activity. When the family was active and healthy, then they were healthy and active and therefore, they did not require more changes to their own physical activity or exercise routines, as explained by this mother.

[Interviewer] “What other physical activities would you like to do right now, if any?”

Myself? yeah there isn’t, I’m quite happy cos we’re an active family. I mean we go play tennis sometimes in the weekends.”

NZ Maori/Cook Island Mother of 4 dependent children, nurse, household size 6.

Seven parents (out of 30) desired to do more activity to “lose weight”, to do “more gardening”, to be more active “after winter time” and because they enjoyed being active. One set of parents who had recently migrated to New Zealand explained that since migration two years ago, the mother felt she had gained body weight over that short period of time and wanted to go to the gym to exercise to lose weight for both health benefits and to gain desirable body weight size. In addition, the mother highlighted the changes in environments, with the New Zealand environment being isolating with less opportunity for her to do more “work” than in Tonga. In this context, “work” means purposeful household chores which is her meaning of exercise or physical activity.

[Interviewer] “When do you mum and dad get your activity, the time that you feel you get to have your exercise?”

Mother: sometimes I meant to go to a gym, near here. I would like to go there I need to lose weight, because when I am in Tonga, I am not like this [big/fat]... Here at home [in NZ], I just do the same thing here, but in Tonga, if I bored I just go visit my neighbour and sometimes I do something there, some work there. Its different from here in NZ, mostly I just stay here [at home]. I only drop the kids and pick them up, so most of my time spending cooking and staying here. But sometimes when they come I need to go and have a gym. Yeah mostly I want to lose weight... mostly for my good health. [Since being] here in NZ, I don't like to be fat”.

Tongan Mother and Father with 7 dependent children, stay-home parent, household size 9.

Summary

Pacific adolescents classified within the healthy weight range were significantly more active than obese Pacific adolescents. Pacific adolescents enjoyed physical activity and most had participated in physical activity as young children. A significant number of students stopped being involved in structured sports activities once they entered the high school. Self-efficacy, lack of money or transport, managing time from other activities like school work or church activities and needing social support were the main reasons for dropping out. Due to perceptions of neighbourhood crime and safety, girls were required by some parents to have more parental supervision for their personal safety and this limited their sports participation. Obese students were more likely to desire to increase their physical activity in the future. Students' perceived barriers for future activity were similar to reasons for dropping out of activity. Lack of time was the key barrier for Pacific parents to be active. Work time encroachment, managing large households and households with members in ill health, was the environmental norm and many parents found it hard to manage a work-life balance. Pacific parents alluded to a different cultural understanding of the concept exercise, however most parents had sound knowledge of the health benefits of physical activity.

Body Image

Research objectives

The general objective of this study was to explore the socio-cultural factors that may promote or prevent obesity in Pacific adolescents and their parents in New Zealand. The specific objective is to describe the attitudes, beliefs and values that are related to body image. The key hypothesis was to examine whether Pacific adolescents and parents valued bigger body ideals and then go further to explore the consequences of these ideals particularly in relation to nutritional and physical activity behaviours that may promote obesity.

The specific objectives of this part of the study are:

1. To describe common body image patterns, beliefs and values
2. To describe body image ideals
3. To document experiences relating to messages about body image from the community and to identify body image influencers
4. To assess weight control strategies which may be relevant for future obesity interventions

Interview and Survey Questions

Table 4.10 shows some of the key questions related to each sub-section. The list is not exhaustive as the interview procedure employed was open-ended to allow an exploration of the topics above. Survey questions related to the study objectives were also analysed to provide triangulation and contrast between survey and interview data. The OPIC questionnaire included three questions pertaining to body image. Students responded to questions which asked them to assess and rate their current body weight status, to indicate their level of satisfaction with current body weight, and last, to indicate if they were undertaking any weight control behaviours. Significant findings across key variables are presented here. Data were also analysed across student weight and results between obese student and healthy weight students are presented.

Overview of Body Image findings

The findings indicated that both Pacific students and parents rated average sized bodies to be ideal but student weight status mediated body ideals, with healthy weight students desiring slightly smaller bodies than obese students. Both students and parents perceived overweight and underweight bodies to be undesirable mainly for adverse health consequences. Most students and parents did not believe there was an ideal body size according to ethnicity but were aware that non-Pacific, particularly Palagi^{vii} groups desired smaller bodies as their ideal. Students were highly influenced by parents and media personalities, while parents were influenced by their own patterns of body weight and extended family members. Obese students were more likely than healthy weight students to attempt to lose weight. Parents were aware of a cultural norm for body size and strongly encouraged students to fit these ideals mainly to mitigate the stigma their children may be subjected to if their body sizes were outside of this norm. Increasing physical activity was the main strategy employed by students to manage and control body weight. Parents rated social support, for example, exercising or dieting together with others within their immediate daily social environment, as a key factor in successful weight loss experiences.

This Body Image results section is presented in four parts, (1) Body beliefs (2) Body ideals (3) Body image influencers (4) Body management and control.

^{vii} Palagi is the Samoan term used to describe white European people in New Zealand.

Table 4.10: Body Image Qualitative Interview and Quantitative Survey questions

Qualitative Interview Questions: showing body image study objectives and some of the corresponding interview questions	
1. To describe common body image patterns, beliefs and values	<ul style="list-style-type: none"> – <i>What is acceptable weight / size and why?</i> – <i>How important is it for you to be this ideal body weight, size, shape, tone?</i> – <i>Do you think this weight, shape, size, tone, is healthy?</i> – <i>Do you think this would be the best (ideal/acceptable) body weight, size for all Samoan girls your age or do different ethnic groups have acceptable differing body sizes?</i> – <i>Is there any problem with being overweight/skinny?</i>
2. To describe body image ideals	<ul style="list-style-type: none"> – <i>Given the chance is there anyone you would like to look like? and why?</i> – <i>What things do you willingly give up (sacrifice, pay, miss out on...) to gain this particular body weight, size, shape, tone, if any? Why?</i>
3. To document experiences relating to messages about body image from the community and to identify body image influencers	<ul style="list-style-type: none"> – <i>Who has the most influence over anything to do with your body weight/size?</i> – <i>In what ways do these people influence you? Who would you listen to more?</i> – <i>What influences do 'significant others' have on your perception of ideal weight / size?</i>
4. To describe any current and future weight control and management strategies	<ul style="list-style-type: none"> – <i>How would you describe your weight right now?</i> – <i>Are you doing anything right now to change your weight, shape or size?</i> – <i>Have you lost/gained weight before? What has worked for you in the past?</i>

Quantitative OPIC Survey Questions: Showing body image question, possible responses and categorisations formed for analysis			
<i>Measure</i>	<i>Question</i>	<i>Responses</i>	<i>Analysis</i>
To assess perception of current weight status	How would you describe your weight?	Very underweight Slightly underweight About the right weight Slightly overweight Very overweight	Split into 3 categories: 1. Very underweight & Slightly underweight combined = Underweight 2. About right weight 3. Very overweight & Slightly overweight combined = Overweight
To assess satisfaction with current weight status	How happy or unhappy are you with your BODY WEIGHT?	Very happy Happy In between / OK Unhappy Very unhappy Never thought about my body weight	Split into 3 categories: 1. Very happy & Happy combined = Happy 2. In between / OK 3. Very unhappy & Unhappy combined = Unhappy
To assess weight control behaviours	Which of these statements most closely applies to you? I am...	Trying to lose weight Trying to gain weight Trying to stay at my current weight Not doing anything about my weight	n/a

Body beliefs

Body Image and Ethnicity

During qualitative interviews, students and parents were asked whether they believed and expected different ethnic groups to have differing body types and sizes and body weight ideals. (i.e. 'What do you believe is the ideal or acceptable body weight, for all Samoan girls of your age?' 'Are there some differences in ideal body weight between different ethnic groups e.g., Palagi, Samoan, Tongan, Maori etc. Yes, no, why?' 'Do you think that idealised weight is healthy?') Most students (21 out of 33 - 64%) believed and had expectations for all ethnic groups to be of the same body size. As highlighted by the comment below, students believed all ethnic groups should have the same body sizes, and expected both Pacific and non-Pacific people to be of a range of sizes.

"No, I reckon most Samoan boys are big and some are thin, cos everyone has different bodies, some eat healthily and most of them are skinny, but some just eat a lot and they get big...Yeah Daniel Carter, his body is just the right size, he is not too skinny not too fat but like just the right body and I think yup everybody [all ethnic groups] should have that size."

Samoan, Male, Age 16, Classified Healthy Weight.

Fewer students (12 out of 33, or 36%) were able to reflect that Palagi groups were usually of smaller body sizes and Pacific groups were of both bigger and smaller body sizes. Students went further to state that they believed these body types that were of the norm (that is, Palagi body types were smaller and Pacific body types were usually both smaller and larger) were both acceptable ideals for the two different groups, as highlighted by one student's comments below.

"Yeah they [Palagi girls] have different [body size], because they look a lot better when they're skinny but not when their fat"

[Interviewer] And what about Cook Island girls?

They are all right, some girls are pretty when they're skinny and some girls are pretty when they're fat, but not too fat."

Cook Island, female, Age 16, Classified Obese.

These beliefs though were related to weight status, with obese students accepting a greater range of ideal body weights for Pacific groups and healthy weight students commenting that all ethnicities should be of the same ideal body sizes.

Analysis of parents' responses as to whether Pacific and non-Pacific ethnic groups have different body types, sizes and ideals, showed no clear patterns with equal numbers of parents making comments for the affirmative and negative. Half of the parents group (15 out of 30) believed there was a different healthy size for persons of Pacific ethnicity compared especially to Palagi groups but mainly that this Pacific ideal body size should be the model for everyone regardless of ethnicity. This ideal body size was explained mainly by women to be of bodies that could fit into women's clothing sizes 14-16 range. The other half of parents (15 out of 30) believed that different body sizes between Pacific and non-Pacific groups was not a natural phenomenon but was due to overeating, under-exercising, changes in New Zealand versus Island lifestyles, genetic make-up and changes in lifestyles, for example, marriage and having children. Comments below illustrate these points.

"People that have a nice body are like, they are not too big but not too little/skinny/small either. With the skinny ones it's not too bad, but the big fat people, it's only if they start exercising then they will know how nice their bodies can be. Us Samoan people, there's too many who are big and fat, they don't exercise and the other thing is, what they eat doesn't match up, their food is not balanced."

Samoan Mother of 3 dependent children, kitchen-hand, household size 8.

"[Ideal size is] that's size 12 up to 18, but not more over than [size] 18...Yeah, when I came to NZ, because if you see that's my photos over there in the corner, I was size 14 that time. At that time I am not married I got no kids that time...When I got children, husband that's why I am like this [bigger bodied]."

Samoan Aunty with 3 dependent children, at-home parent, household size 7.

"Maybe like 75 or 80 kilos [is the ideal weight]. I think for us Samoans and Tongan people, we eat too much, eat too much beef but especially roast pork, I think that is the major weakness for Samoan and Tongan people...Well, I am trying to cut down on eating roast pork."

Samoan Father of 3 dependent children, at-home parent, household size 8.

Interestingly, those who made comments ($n=8$) about body size being influenced by genes, explained that they or their child had always had a larger body size growing up or were from a family of people with the same larger body sizes. In this regard, long term weight status seemed to mediate body weight beliefs, with those perceiving themselves to be overweight since childhood, crediting a genetic influence on current body weight status.

Perceptions on overweight and underweight bodies

Students and parents were asked to comment about what they believed was good or bad about bodies that were overweight and underweight. Most interviewees, students and parents alike, likened overly-large and under-weight bodies with health concerns, for example, getting “heart attacks”, “diabetes”, “stroke”, “lacking energy or strength”, “early death”, “anorexia and bulimia”, and “becoming immobile or restricting movement” were the most stated health effects. Some key differences were noted between obese and healthy weight students, with obese students noting “getting teased” or “getting mocked” as a negative consequence of having overly-large bodies. In addition, obese students believed there were no negative effects for being underweight, while healthy weight students believed being underweight or “skinny” was unattractive. Gender differences were also observed, with boys asserting that overweight and underweight bodies was undesirable for not “being able to run faster” or “for breaking bones” in sporting activities, and associating weakness particularly with underweight bodies.

Parents disliked overly-large body sizes because they saw the body as a functional entity, particularly in relation to the body fulfilling daily tasks like housework and childrearing. In addition, Pacific women talked about the practical implications for body sizes, with ideal body size to fit readily available clothing sizes. Comments below highlight these points.

“For myself, I would prefer to be smaller, so I can fit into clothes, and so I am able to do housework. If you’re big, just only sit there watching TV, waiting for the food to be cooked, that’s all, that’s why I don’t want fat, cos I works at home for my kids and my family, but when you’re big I can’t do any housework. Size 16 or 18, because that’s the kind of size where you can still move, still working. For me, for myself my size is 18 and 16, so I can still working at home for my kids, cos if I eat, I get up to those large sizes 20, 22, 24. I don’t think so, about those sizes because you can’t do anything, ay? The best size for me is size 16 and 18, that’s all, for myself, that is healthy.”

Samoan/Niuean Mother of 5 dependent children, at-home parent, household size 7.

“To me, skinny, being skinny/thin is good, its easier to carry your body, makes it easier to do your housework, you can do it quickly, its easier to put on clothes, its easier to find your sizes, things like that, but if you are big/fat, its harder to find your size, you get tired easily to get up and go, and lazy to do housework and all you want to do is go back to sleep because its harder to carry your body around.”

Samoan Grandmother with 3 dependent children, superannuate, household size 8.

A number of comments were made about body beliefs and its relation to spiritual health. Some parents were not overly concerned about their own or their children's body weight, but prioritised their spiritual health, their happiness or their state of mind that was free from worries or mental stresses as a measure of a good state of health. Below is dialogue with a Tongan mother illustrating these points.

"A nice body size for me is if I stay healthy and happy, doesn't matter if you are skinny or fat as long as you are happy and healthy. .. And happy, that's the main thing, like my husband, he is a happy fella, he's not stressed and that's why I think his body doesn't get anything happening to him [doesn't get sick]...but Susana [daughter/student], like I think she is like that [big body] because maybe she is eating a lot, but she is happy staying here with mum and dad, she can do whatever she wants

[Interviewer] You are not really concerned about her [bigger body weight] or sometimes do you worry about her?

I do, for her health yeah, but fat doesn't mean, well I think if she is happy that is good

How would you describe your weight right now, do you think you are about right weight or slightly overweight or slightly underweight?

Overweight, yeah

And are you doing anything right now to change your weight?

No, I always fit and I am happy, I am just not worried about anything

Does anybody in your family or maybe your extended family or work colleague, does anyone says anything about your weight?

They do. My friends at work

What do they say?

"You get fatter", and I say, "It doesn't matter, even though I'm fat, as long as I am happy."
Tongan Mother of 4 dependent children, factory supervisor, household size 8.

The subsequent comment by a student goes further to state that a range of healthy body sizes exists and health status should emphasise spiritual health balanced with functional physical health, as opposed to measuring health by body size alone.

[Interviewer] “What do you think is the ideal size to be, that you would say that is a healthy person, for girls around your age?”

Anything, really not too sure, but when you start to hit a size 20 something or when you're hitting a size 4, that's unhealthy but really sizes 8 to 16 I think are quite healthy, even 18 is quite healthy if a person is happy with themselves. Cos I think that any person who is happy with themselves and their appearance then will be healthy and still do physical activity then you will be healthy, its about mind, body and lifestyle.”

Cook Island/NZ Maori female, Age 17, Classified Obese.

A few comments were made by both students and parents about the relationship between body size and morality and the stigma related to body sizes that fitted outside the norm or cultural ideal. The comments below illustrate the pervasive nature of body image in the New Zealand context and how the stigmatisation of larger body sizes and difference influences health behaviour.

“I think that should be the ideal, cos its all about appearance, cos with people, if you don't have a good appearance, then they think you're not a good person and that, so I think body image is a big factor here in South Auckland. That's just my opinion. [A good body image] gives you confidence and stuff to actually do stuff.”

Cook Island/NZ Maori male, Age 17, Classified Healthy Weight.

“Yeah, when he [husband] was a boy he was a very chubby little boy, a fat boy and he's not anymore... But it comes from the stigma of teasing that he got as a youngster and so he is very very conscious that a child with a bigger body or looks different will be teased, so he's really concerned more with what will happen particularly to Wanda [our daughter/student] but with all his children, who may sit outside the norm.”

NZ Maori/Cook Island Mother of 4 dependent children, nurse, household size 6.

Body Ideals

Students

The majority of students (23 out of 33 or 66%) had views about ideal body sizes and or weights, with most identifying media and sporting celebrities as their ideal body size role models. For girls, popular music and fashion model media celebrities like Beyonce, Jennifer Lopez, Tyra Banks and from New Zealand, Aaradhana were the most mentioned ideal body aspirations. For boys, rugby stars like Tana Umaga, Carlos Spencer, Maa Nonu, and Daniel Carter were the ideal body size, weight and shape preferences. It must be noted that apart from Daniel Carter, the majority of body ideal role models are people of non-Western ethnicity, either of Pacific ethnicity or of African-American or Hispanic-American extraction. A few students made remarks about desiring to look “Tongan” or “Samoan” by having a particular body size, as illustrated by one student’s comments below:

“Um, I think for Tongan people like Tongan girls, they are not this type of body [her own, slim build] they’re like a little bit chubbier than me but normal. But I don’t really know about sizes, [I just want] a little bit chubbier than me, yeah that’s what I reckon...Yes, I wish I could be like them [Other Tongan girls, laughs], I want to stick to like my sisters, yeah man, I just don’t like it [being of slim build]. ...You know how, they mostly say, how Palagi are like these [slim] sizes.”
Tongan female, Age 15, Classified Healthy Weight.

Three students mentioned an older sibling or cousin as their ideal body size or weight aspiration, and seven students had no preferences for body ideals, and it was clear, that some of these students had not thought about body image or looked to compare their bodies with others. There were no differences in the body image role model ideals between obese and healthy weight students.

Female students in particular were able to explain that bodies that could fit into clothing sizes 12-14 range were ideal. This range was mediated by weight status, with more healthy weight students confirming size 12 as ideal, and more obese Pacific students stating size 14 as the ideal. All male students regardless of weight status, rated average-sized mesomorphic bodies as their ideal body aspiration.

Parents

Parents measured ideal body weight or size according to functionality, being able to do housework, and to fit clothes. Pacific women were able to explain ideal body size according to clothing sizes with preference for being of a body size range of 12-18 (clothing sizes), accounting for age, bone structure and height differences. The majority of Pacific mothers preferring women’s sizes 14-16 as the ideal for Pacific women.

Parents body weight ideals were less influenced by media personalities. In most cases, parents alluded to being of a different, and in all cases, smaller body size at a younger adult age and based their body size and weight ideals on pre-marital and for the women, also pre-childbirth standards, as illustrated by the quote below.

“Because I don’t like getting lapo’a (fat). It’s hard for me to do that, do that [housework]. I feel lazy if I’m fat. Skinny is nice, I think size 16. But now I am getting fat but before I was skinny. I think it’s because I got four kids that’s why my body is [like this] [laughs]. When I had my kids, yeah and I feel my body is mamafa (heavy), like my clothes are getting big, I think that’s why. But before I had Ricky [first born son], my body is still the same, but with my second one, still the same, my third one, oh lapo’a [I got big]. Because sometimes I told my kids that I am getting fat, I want to go back to my normal size.”

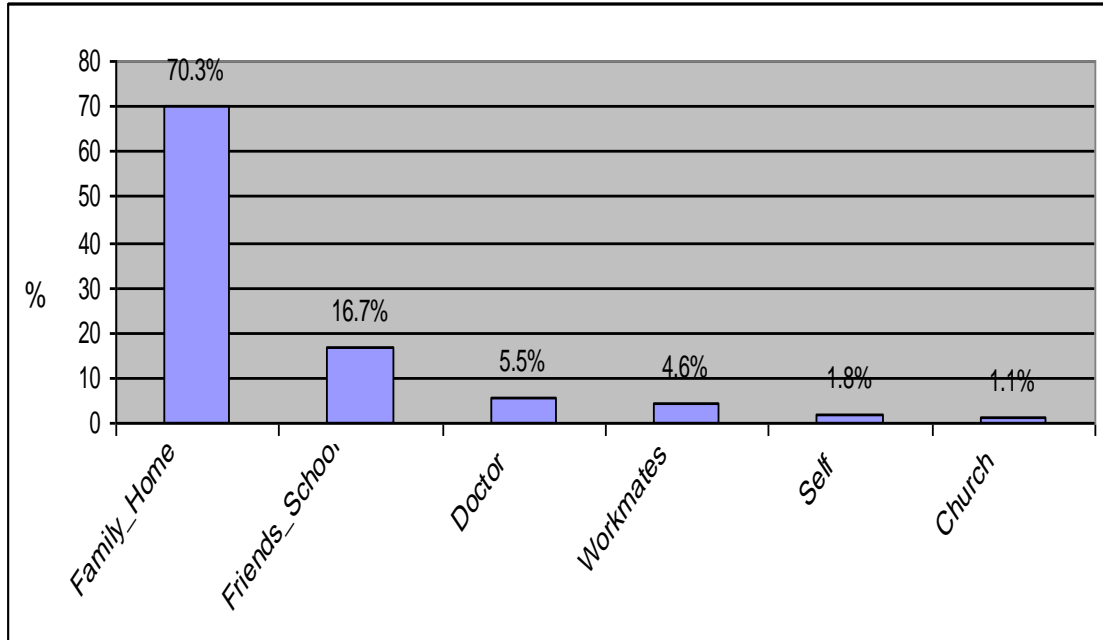
Samoan Mother of 4 dependent children, at-home parent, household size 6.

To test current literature hypotheses of an acculturation effect, analysis by place of birth and years of residence in New Zealand was completed, to see if parents that have been socialised in the New Zealand environment over time may be beginning to accept dominant Western body image ideals (i.e. desiring smaller body sizes). No differences were found in parental ideal body sizes according to place of birth, most parents were Island born (24 out of 30, or 80%). Likewise, analysis by years of residence, did not show any differences in parental body size ideals. The average years of residence for parent participants was twenty-one years (range 1-48 years). The results of this study did not support this theory, although, the small interview sample size ($n=35$) is a limitation to note.

Sources of influence on Body Image

Students and parents were asked to identify significant influences on body image. The question asked in the interviews was ‘Who or what has the most influence over anything to do with your body weight, size, and shape or muscle tone?’ Figure 4.20 shows the percentage of the total numbers of references made by both students and parents with regards to influential persons on body image. Students and parents mentioned persons within their home environment as the most influential on body image. For students, the key influential sources were their parents, with a few stating aunties, uncles, grandmothers, older cousins or siblings to be important also. For parents, the relationship was reversed and children were the most likely to influence them, as well as husbands, mothers and aunties mentioned as key influential family members. There was no difference in key influencers according to student weight status.

Figure 4.20: Sources of influence on student and parental Body Image (n = 63)



The nature of parents influence on students' body image

Pacific parents showed great concern for the body image of their children and would provide firm encouragement for their children to watch what they eat or to become more physically active. As has been shown in the previous chapter, results from both the quantitative and qualitative data, shows that Pacific parents are more vocal on encouragement when their children's body size increases, which indicates that Pacific parents hold ideal body image standards for their children. Parents influenced their children by providing resources, for example, gym memberships, by being role models and participating in physical activity together with their child, or by scolding them particularly when they feel frustrated that words of encouragement are not being heeded. The following quotes provide these examples.

“Sometimes I do worry about Wanda [daughter/student] only because she’s my child and I try to help her or encourage her to eat the right foods so that she won’t have these body image issues. She’s a little bit worried about her weight, and it’s ball season now and there’s pressure to look good. She did ask me to get her a gym membership, so I done that, because she is not in a pool now, she doesn’t swim, she did up until this year, she was regularly swimming which was helping keep the extra weight down. But she gets in exercise with all the school activities she does, but now she goes to the gym as well.”

NZ Maori/Cook Island Mother of 4 dependent children, nurse, household size 6.

“I say a lot of things to her [daughter/student] like ‘you have to watch what you eat, look at you, you are too young but look at your body, you are the only biggest child of the family, you know’ [mother says this with some sadness & disapproval]..., but [mother crying] I don’t know, just what to think about the problem, like what started it for her [daughter/student], to get to that size.

[Interviewer] What’s your concern about her [Rosa/daughter/student]?

You know, sometimes I say to her ‘you know what, sooner or later your heart will can’t afford to control your body cos of your weight, ‘its not like I hate you or something, I love you, you know, but you have to do something for yourself, not for me, but for yourself, because, sooner or later, you will get a heart problem or things like that, so you have to cut down your eating’, and sometimes I say, ‘if you’re hungry, just go and eat some fruit, have a fruit’, I’m like that [get frustrated], ‘just go and have it’

E faalogo la ia oe? (does she listen to you?)

Sometimes she doesn’t, she doesn’t want to, oh well its up to her.”

Samoan Mother of 2 dependent children, cleaner, household size 6.

Parental influence was put upon both girls and boys with clear messages about parental expectations for ideal body sizes or weight that are not too skinny and not too big. Students were encouraged to be of a certain size, either to lose weight when body size is deemed too large or to bulk up in size when body size is deemed too small. Bulking up in size was particularly important for boys and having functional bodies related to sports performance. Other males like brothers and fathers would encourage boys to have stronger and bigger-sized bodies.

Students' perceptions of parental influence

Most students explained the influence their parents had on their body image and the respect they hold for parental advice. Students were able to explain how they felt by comments made about their bodies but they were also able to make judgements about the motivations behind parental advice and could conceive that advice was given in good faith.

[Interviewer] "What do you believe is the ideal body size or body weight for girls your age?"

It varies, I'm a size 12 and I think that's ideal...like my grandma always says I'm too skinny and that I should eat. She would just tell me to eat and when they tell me to go eat, and I said 'yeah I already ate', they would be like "oh yeah, what have you eaten?"

And why do think they say that?

Cos they think I'm starving or something, but sometimes, yeah cos once this other time, they [grandma and mum] said I was too fat, and I was like "oh ok"

Is it like they sort of expect you to be a certain size?

Sort of, cos it's just because their parents, she's my mum and she's my grandparent and they care, yeah."

Samoan/Niuean female, Age 17, Classified Healthy Weight.

Other comments revealed the nature of parental and child relationships with clear hierarchical lines. Pacific students confirmed the authority of parents within the home and the influence they have in their lives, as illustrated by the quote below.

"My mum, she mocks me, she tells me I got manly legs, and my thighs, stomach and my feet. My calves are too muscly, they call me "kalo-vae" (taro legs). My mum says if I were more skinnier I would have more fashionable clothes.

[Interviewer] And what do you say when she says that?

"Yeah whatever"

How does it make you feel when she says that?

[Laughs], ok I will try [to lose weight]. I try but it doesn't work."

Samoan/Tongan female, Age 14, Classified Obese.

The quotes above reveal the strength of parental influence on Pacific adolescents' health promoting behaviours with attempts to make body weight and size changes according to parental standards. Students were also asked why they rated their parents as the most influential source over others and the following quotes summarises their perceptions.

"Because whenever they tell me to do something, I got to do it."
Samoan/Niuean female, Age 16, Classified Obese.

"Because sometimes you get into trouble if you don't listen."
Tongan male, Age 15, Classified Obese.

[I have to listen to] my mum because she is scary (laughs)."
Tongan female, Age 16, Classified Obese.

The nature of influence by family members on parents' body image

Likewise, parents were able to explain the nature of the influence their children and other key family members had on their health promoting behaviours. Family members within the home and extended family members who visited their homes regularly, provided feedback about body size and influenced their ideals about acceptable body size and weight, as illustrated by a mother's account below. In the same manner as parents influencing children, children and family members would exert their body image standards on parents who were encouraged either to lose weight or gain weight to meet these ideals.

"Well, my mother's sister, she often comes and brings food over for our kids, she says things about my tummy, she asked me whether I was pregnant again, and I said "no", and she said "why don't you tighten up your tummy to make it even with your body", well, that's my auntie, and I would say "well what can be done about my tummy I've given birth to too many kids"

[Interviewer] And do you listen to your auntie?

Yes, I think that's why I started not to like eating as much, but I don't know what can be done to tighten it, and the other thing is, maybe its best if I start walking like long walks. The other week, do you know, she (auntie) came back and said to me I had gone skinny and I said to her "well of course I gone skinny I haven't eaten because you guys tell my tummy was hanging down" [laughs]."

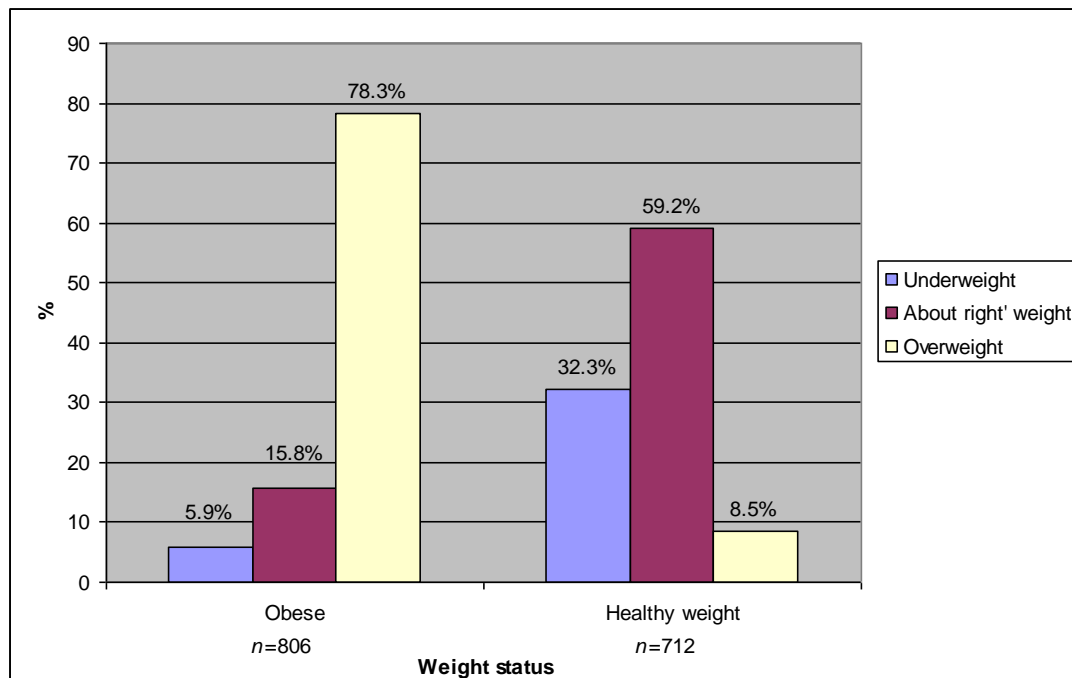
Samoan Mother of 7 dependent children, at-home parent, household size 9.

Body management and control

Weight Control Behaviours

In the OPIC questionnaire, students were asked to describe their weight, with five possible responses: 1. Very underweight, 2. Slightly underweight, 3. About right weight, 4. Slightly overweight, 5. Very overweight. Options 1 and 2 were collapsed into one 'Underweight' category and options 4 and 5 combined into one 'Overweight' category. Analysis on this weight perception variable showed that most obese and healthy weight students were able to correctly perceive their weight status ($n=2740$). Approximately 80% of obese students perceived they were 'overweight' or 'very overweight' and 90% of healthy weight students perceived they were in the 'about right' or 'underweight' categories combined. These results stayed constant when selecting for Pacific ethnicity sample only ($n=1518$). A significant p value <0.0001 was observed between the proportion of obese students who were accurate in perceiving their obese weight status (78.3%) and the proportion of healthy weight students (91.4%) who were accurate in their 'About right' and 'Underweight' status categories combined.

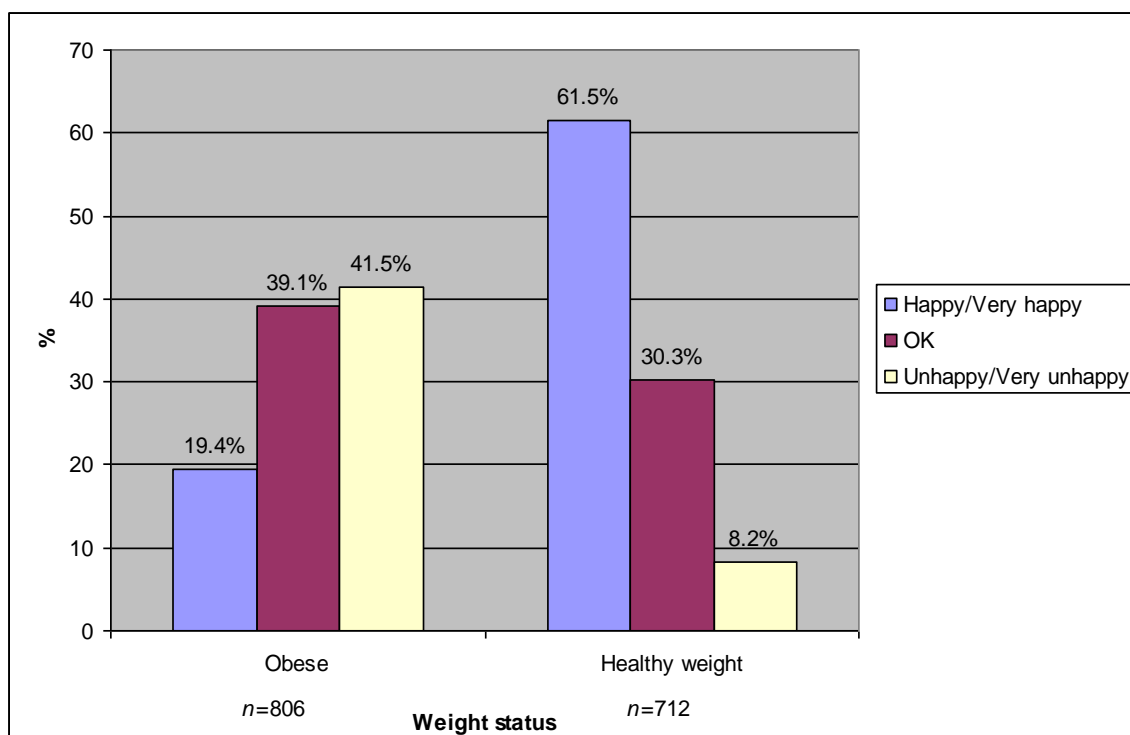
Figure 4.21 Pacific students Perception of body weight (%) by Obese and Healthy weight status ($n=1518$)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

Students were asked how happy or unhappy they were with their body weight, with 6 possible responses; 1. Very happy, 2. Happy, 3. In between / OK, 4. Unhappy, 5. Very unhappy, 6. Never thought about my body weight. For all ethnic groups, responses by weight status were significantly different ($p < 0.0001$) with 40% of obese students choosing categories 4 and 5, 'unhappy' or 'very unhappy' about their weight, but only 10% of healthy weight students reporting unhappiness about their body weight ($n=2740$). Equivalent results were found with Pacific ethnicity sample only, with 41% of obese Pacific students 'unhappy' or 'very unhappy' with their body weight but only 8% of healthy weight Pacific students reported unhappiness ($n=1518$, $p < 0.0001$), see Figure 4.22. There were no gender differences amongst Pacific girls or boys, with the level of satisfaction or dissatisfaction with perceived body weight.

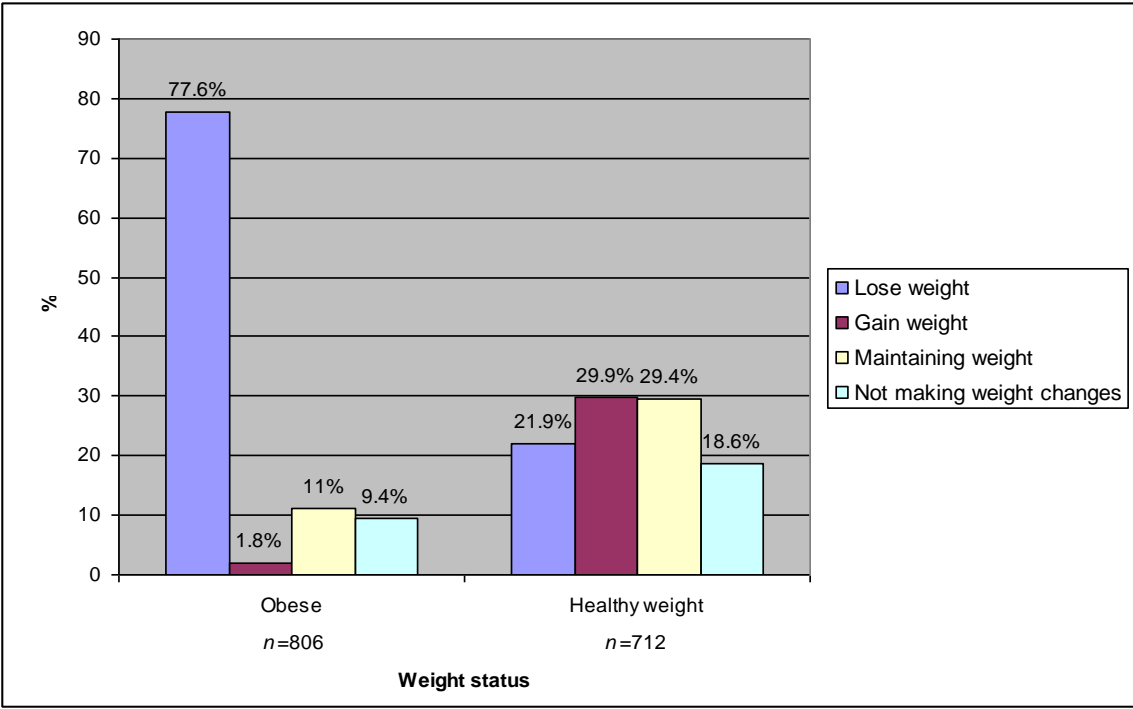
Figure 4.22 Pacific students levels of satisfaction (%) with current body weight by Obese and Healthy weight status ($n=1518$)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

Figure 4.23 below summarises the results of student responses to the question on weight control; 'Which of these statements most closely applies to you?' with four possible choices; 1. trying to lose weight, 2. trying to gain weight, 3. trying to stay at my current weight, 4. not doing anything about my weight. Significantly more obese Pacific students (77.6%) were trying to lose weight compared to healthy weight Pacific students (21.9%). Comparatively, more healthy weight students (78.1% compared to 22.3%) were trying to gain weight, maintain weight or not make any changes to body weight ($n=1518$, $p<0.0001$).

Figure 4.23: Weight control behaviours amongst Obese and Healthy weight Pacific students ($n=1518$)



Note: Obesity defined as BMI $\geq 30\text{kg/m}^2$.

Results from the qualitative interviews mirrored those found from the quantitative sample. Fourteen out of 17 obese students (or 82%) wanted to lose weight but only 8 out of 16 healthy weight students (50%) wanted to change their weight, 1 student to decrease weight and 7 male students wanted to increase weight. No differences were found amongst parents from the two groups of obese and healthy weight students, as most parents desired to lose weight (24 from 30, or 80%).

Weight control strategies

Most students (21 from 33 or 71%) used increasing physical activity as the strategy to lose weight or to maintain weight. Students' preference for undertaking more physical activity, or to keep being active as a way to maintain ideal weight may reflect their historical activity prior to gaining weight. Most students who had gained weight over the last few years, were able to credit weight gain through lack of activity, and this may influence their beliefs about effective body management through increasing physical activity. It may also reflect a lack of nutritional knowledge about foods, specifically the energy nutrient calories in energy dense snacks which are typically aggressively marketed foods to adolescents.

Parents used both increasing physical activity and food restriction as strategies to control weight. As highlighted by the quote below, a parent was able to explain that social support was critical in their successful weight loss experiences.

“because I used to do that before, just eat and maybe do some housework and then after the housework, you do nothing, just come and eat, lie down watch the box [TV]. And I found, I get sick from my joints, I could hardly move my arms and my legs, cos I just eat and do nothing, that’s what I was doing for a long time. I was fat back then, and I know it would make my life short, so I changed. That’s what I know, about how people get fat. People get fat from eating the wrong food, you know?”

[Interviewer] So you have changed that?

Yeah I lost heaps of weight.... I just work, do that toagafa'i (banana plantation) outside, see I do that in summer time and that makes me sweat heaps. Working in the toagafa'i (banana plantation), the vao (weeds) was about this big, [shows tallness with hands] and I work a lot and I sweat a lot. And then my son in law comes at night time and we go for a walk, and then when I look at me, I was losing a lot of weight and it makes me happy and happy to do it all the time, and that’s how I end up like this, and it makes me strong too and that’s how I can do all of that, cleaning out the back (outside work). ...Oh yeah, I am size 14 – 16 now , I used to be a size 24. I was size 24, so yeah I would like to stay here at this size, 16.

Why that size?

Because that is the size I can feel, I feel healthy, feel strong at this size I am now. Not like before, I was trying to get up and you know sometimes you try to roll over and have to hold onto something to try and stand up, but not anymore. I will be 50 (years old) in October and I know I feel very strong and healthy.”

Samoan Mother with 2 dependent children, stay-home parent, household size 6.

Parents and students also made comments about the differences in Island and New Zealand environments and how it affected their body weight. Students and parents were able to explain that they experienced a loss in body weight after spending some time back in their Island homelands. A lack of appetite, increasing activity and not having access to energy dense snacks or “junk foods” was a typical Island environment which helped changed body weight. A student’s comments highlight these points. This further implicates the environmental changes for promoting obesity in Pacific populations in New Zealand.

“When I am in the islands [Cook Islands] I am fit but when I come here, I put on weight

[Interviewer] Oh yeah, what’s going on there? Why do you think that causes your weight to do that?

Over there, we are independent, we don’t have sugar or lollies, only at maybe Christmas...Yeah, but when I get here [NZ], I have like lollies, chocolate, just whatever I want, I can buy it. In the islands, because, we do a lot of walking. Yeah, it’s just a small island and we walk, swimming, working outside. [Here in NZ] we hardly go outside to pick up rubbish, we just clean the inside and then that’s it, we just watch TV...Yeah, my mum she goes ‘when you come here [Cook Islands] you’re [body is] so nice but when you go back to New Zealand you always put on a lot of weight [laughs]. She always tells me to stop eating sugar, like lollies, so I’m calming it down.”

Cook Island female, Age 16, Classified Obese.

Smoking was used by some parents (3) and one student made comments about friends using this habit as a method for controlling weight. A few parents (3) also noticed body weight changes when moving from full time homecare roles into full-time employment roles. Employment and keeping busy schedules in occupational roles had as an unintended consequence resulted in body weight loss.

Summary

Most students expected all ethnicities to be of the same body size. However, body size beliefs and ideals were mediated by weight status. For example, female students thought bodies that fitted clothing sizes of the range 12-14 were ideal for Pacific girls, but healthy weight students chose size 12 as the ideal, while obese students preferred sizes 14. Male students were significantly more likely to attempt to gain weight and were influenced by male physiques that were competent in sporting activities.

All students regardless of weight status were aware of cultural norms for ideal body sizes and were particularly influenced by media portrayals of celebrities and New Zealand male sporting personalities. Students and parents perceived overweight and underweight bodies to be undesirable mainly for adverse health consequences, highlighting knowledge about the link between obesity and health. Obese students were significantly active in making attempts to change body weight and were strongly encouraged by parents to fit parental body image ideals. Parents were aware of a cultural norm for body size and were influenced to mitigate the stigma their children may be subjected to if their body sizes were outside of this norm. Increasing physical activity was the main strategy employed by students to manage and control body weight issues.

Parents, particularly women, thought body image ideals at clothing sizes of 14-16 were ideal not only for Pacific women, but also for other ethnic groups. Parents valued functional bodies, for example, bodies that could achieve daily tasks, like housework and childrearing, were classed desirable. Most parents alluded to being of a body weight status considerably smaller than is currently, particularly at pre-marriage and pre-childbirth stages, and were actively making attempts to change body weight and size to these standards. Parents like their children, were subject to family members body image ideals, and were themselves influenced by their children to make body weight and size changes to fit these ideals. Strategies parents took to control body weight included both increasing physical activity and food restriction methods. Parents rated social support, for example, exercising or dieting together with others within their immediate daily social environment, as a key factor in successful weight loss experiences.

Differences between habits of Obese vs. Healthy weight adolescents and parents

Research objective

The general objective of this study was to explore the socio-cultural factors; community attitudes, beliefs and values that may promote obesity and how these can be influenced. The specific objective of this part of the study was to compare the food, physical activity and body image beliefs, values and habits between obese and healthy weight students and their parents. Household demographic differences were also analysed and are presented here.

The key summary results are presented in four parts (1) Food habits, (2) Physical activity (3) Body image (4) Household demography.

Food habits

Table 4.11 shows the key food habit differences between healthy weight and obese students and their parents. Healthy weight students and their parents reported more regular consumption of fruit and vegetables, regular consumption of seafood at special occasions and habitual levels of breakfast and lunch consumption compared to obese students and parents. Permissive parenting styles were found more often for obese students' than healthy weight students although access to discretionary spending money, particularly from extended family members was readily available for both obese and healthy weight students. Healthy weight students were more likely to report the school environment as being the primary influential source of food knowledge while obese students rated the home environment and family members as their key source of food knowledge and the most influential on dietary habits. Obese students received significantly more parental encouragement to eat healthy foods than healthy weight students. Healthy weight students and parents had more affirmed health knowledge than obese students and parents, with healthy weight parents more likely to be working in health-related fields and healthy weight students stated subject classes such as health, physical education, catering and hospitality as key food knowledge school-based sources.

Table 4.11: Food habit Differences between Obese and Healthy weight student-parent pair households (n=30)

Obese weight Student-Parent Pairs (n=15)	Healthy Weight Student-Parent Pairs (n=15)
<ul style="list-style-type: none"> ▪ Vegetables and fruit not rated as typically consumed daily food items 	<ul style="list-style-type: none"> ▪ Vegetables identified as a typically consumed main meal food item
<ul style="list-style-type: none"> ▪ Chinese food takeaways rated a typically consumed food item for Special Occasions 	<ul style="list-style-type: none"> ▪ Seafood rated a typically consumed food item for Special Occasions
<ul style="list-style-type: none"> ▪ Irregular consumption of breakfast and lunch by both students and parents 	<ul style="list-style-type: none"> ▪ Student and parents had regular consumption of breakfast and lunch meals
<ul style="list-style-type: none"> ▪ Home and family members most influential source of food knowledge 	<ul style="list-style-type: none"> ▪ Affirmed health knowledge positive influence on health promoting behaviours.
<ul style="list-style-type: none"> ▪ “Spoiling” of children using treats by extended family members, elder working siblings and if youngest child and permissive parenting styles to compensate for poverty 	<ul style="list-style-type: none"> ▪ \$ an issue for large families, can be protective of obesity, by not making discretionary \$ available for students, but extended family still have a role in treating students with unhealthy foods
<ul style="list-style-type: none"> ▪ Obese students received more parental encouragement to eat healthy foods 	<ul style="list-style-type: none"> ▪ Healthy weight students rated parental support less compared to obese students

There was no difference between healthy weight and obese student households with regards to the food supplier, with mothers having the key responsibility for making decisions on sourcing, supplying and preparation of the household food. There was no difference observed with both household types experiencing food insecurity on occasions and money was a key restriction on food supply. The encroachment of employment hours on food preparation and family sit-down dinner meals was similarly experienced by both household types. Identical food consumption patterns included the practice of toonai Sunday lunch and having traditional Island foods eaten in the home while New Zealand based foods were typically eaten by adolescents outside the home. The enduring role of extended family members in adolescent life including being an access point for discretionary spending money was comparable across student weight status. The description of the importance of particular foods at special cultural occasions was identical from both household types as was the irregularity of such occasions over time. Students and parents were also congruent in their food preferences and both healthy weight and obese students rated taste as the key reason for preferring energy-dense high in fat and sugary type foods. Knowledge about healthy versus unhealthy foods also corresponded

regardless of student weight status and furthermore, both sets of parents gave particular Island foods as examples of unhealthy foods but did not rate commonplace regularly consumed New Zealand based foods as unhealthy.

Physical Activity

Table 4.12 below shows the physical activity differences found between obese and healthy weight students. The analysis on current student activity levels showed there was concordance between the quantitative and qualitative datasets which found that obese students were more inactive than healthy weight students. The interview data showed that more obese students believed physical activity contributed to the maintenance of body weight, desired more physical activity opportunities in the future and received more parental encouragement for physical activity compared to healthy weight students.

Table 4.12: Physical Activity Differences between Obese and Healthy weight student-parent pair households (n=30)

Obese weight Student-Parent Pairs (n=15)	Healthy Weight Student-Parent Pairs (n=15)
<ul style="list-style-type: none"> ▪ Less active during interval and after-school periods compared to healthy weight students but not statistically significant difference 	<ul style="list-style-type: none"> ▪ More active during interval and after-school periods but not statistically significant difference
<ul style="list-style-type: none"> ▪ Significantly less active than healthy weight students at school lunch-time periods 	<ul style="list-style-type: none"> ▪ Significantly more active during school lunch time periods compared to obese students
<ul style="list-style-type: none"> ▪ 81% or 13 out of 16 students interviewed currently inactive 	<ul style="list-style-type: none"> ▪ 76% or 13 out of 17 students interviewed currently active
<ul style="list-style-type: none"> ▪ 75% or 12 out of 16 students believed there is a positive link between physical activity and body weight 	<ul style="list-style-type: none"> ▪ 54% or 9 from 17 students made a positive link between physical activity and body weight
<ul style="list-style-type: none"> ▪ Received greater parental encouragement to participate in physical activity 	<ul style="list-style-type: none"> ▪ Received comparatively less parental encouragement to participate in physical activity
<ul style="list-style-type: none"> ▪ 81% or 13 out of 16 students wanted to do more physical activity in the future 	<ul style="list-style-type: none"> ▪ 58% or 10 out of 17 students wanted to do more physical activity in the future, more desired no change to current activity levels

There were no observed differences in the current physical activity levels, beliefs and values of parents according to student weight status. Only 5 out of 30 parents were currently active due to employment activity, two with an obese child and three with a healthy weight child. Furthermore the majority of parents (75%) did not desire to increase their physical activity levels in the future. Parental barriers to physical activity were also similar with most parents stressing lack of time as the main obstacle to being physically active. Likewise, students' reasons for inactivity also matched regardless of weight status and no difference was found for student mode of transport to school, with most students walking to and from school. All students and parents valued physical activity for its health benefits and the home environment was rated by both sets of students and their parents as the most influential setting for encouragement towards physical activity participation.

Body Image

Table 4.13 below shows the differences in body image beliefs, ideals and weight control behaviours between obese and healthy weight students. Obese students were more likely to believe that different ethnic groups have different body sizes with Pacific groups tending to have bigger range of body sizes than Palagi groups, while healthy weight students did not hold this belief. Obese students rated overweight bodies negatively for getting teased while healthy weight students disapproved of underweight bodies as they associated it with a lack of physical strength. Obese girls rated clothing size 14 as their body size ideal, while healthy weight girls preferred a body size fitting into clothing size 12. Obese students were significantly unhappy about their current body weight and were therefore engaging in weight loss attempts more often than healthy weight students.

Table 4.13: Body Image Differences between Obese and Healthy weight student-parent pair households (n=30)

Obese weight Student-Parent Pairs (n=15)	Healthy Weight Student-Parent Pairs (n=15)
<ul style="list-style-type: none"> ▪ 62% or 10 out of 16 students believed different ethnic groups have different body sizes 	<ul style="list-style-type: none"> ▪ 88% or 15 out of 17 students did not believe different ethnic groups have different body sizes
<ul style="list-style-type: none"> ▪ Students rated overweight bodies negatively for “getting teased” or “getting mocked” and rated no negative effects for being underweight 	<ul style="list-style-type: none"> ▪ Students rated underweight bodies negatively associating it with lack of strength
<ul style="list-style-type: none"> ▪ Girls rated ideal body size to be clothing size 14 	<ul style="list-style-type: none"> ▪ Girls rated ideal body size to be clothing size 12
<ul style="list-style-type: none"> ▪ Survey data showed 41% of obese students unhappy with current weight 	<ul style="list-style-type: none"> ▪ Survey data showed only 8% of healthy weight students unhappy with current weight
<ul style="list-style-type: none"> ▪ 77% of surveyed students trying to lose weight 	<ul style="list-style-type: none"> ▪ 21% students trying to lose weight and 78% trying to maintain or gain weight
<ul style="list-style-type: none"> ▪ 82% or 13 out of 16 of students interviewed wanted to lose weight 	<ul style="list-style-type: none"> ▪ 5% or 1 out of 17 students interviewed wanted to lose weight, 41% or 7 out of 17 wanted to gain weight (all boys)

The areas where there were no observed differences amongst students according to weight status were in their perception of overweight and underweight bodies, with both sets of students rating these negatively for unfavourable health outcomes. Both sets of students rated the same media personalities as their body ideal aspirations and ranked parents and the home environment as the most influential on body image. Surveyed students were also similarly correct in their description of their own current weight status, with 78.3% of obese students rating themselves in the overweight categories while 91.4% of healthy weight students assessed their current body weight in the “about right” or “underweight” categories.

Analysis of the parental interview data showed no differences amongst parents according to student weight status. That is, there were no differences in parents’ beliefs about different ethnic groups having different body sizes according to student weight status. Both sets of parents also perceived overweight and underweight bodies undesirable for producing negative health affects and for mothers in particular for restricting housework and being unable to find suitable clothes. Pacific parents rated the home environment and family members as most influential on body weight and size and both sets of parents rated their early adult-weight as their ideal. Mothers especially specified women clothing sizes 14-16 as the ideal body size for all women regardless of ethnicity. Most parents, regardless of student weight status, desired to lose body weight.

Household Demography

Table 4.14 shows the results of the analysis between weight status and various demographic variables. A key difference was found with parents of healthy weight students more likely to be part-time or full-time parents at home compared to the parents of obese students. Furthermore, parents of obese students were more likely to be parents on shift work arrangements compared to healthy weight student parents. Healthy weight students came from larger households with twice the numbers of dependent children than obese weight student households.

All other demographic variables were equivalent between students. That is, employment status, proportional parental income levels, parental place of birth, average years of New Zealand residence for Island-born parents, proxy educational status measured by current occupation, extended family household status, and presence of chronic illness in the home.

Table 4.14: Differences between Obese and Healthy weight student-parent pairs by various household demographic variables (n=30)

Obese Weight Student-Parent Pairs (n=15)	Healthy Weight Student-Parent Pairs (n=15)
Part time & Full-time parent 56% (9)	Part time & Full-time parent 71% (12)
Employed households 74% (11) Unemployed /Beneficiary 26% (4)	Employed households 80% (12) Unemployed /Beneficiary 20 % (3)
<u>Shift worker</u> 54% (6) 6 X more shift workers in obese category compared to healthy weight	<u>Shift worker</u> 8% (1) Most parents (71%) at home compared to obese category (56%)
▪ SES – 66% or 10 out of 15 parents of low-medium total household income levels	▪ SES – 80% or 12 out of 15 parents of low-medium total household income levels
▪ <u>5.84 average household size</u>	▪ <u>8.26 average household size</u>
▪ <u>2.54 average Dependent Children</u>	▪ <u>4.33 average Dependent Children</u>
▪ 86% or 13 out of 15 parents Island born	▪ 86% or 13 out of 15 parents Island born
▪ 24.09 average Years of NZ Residence	▪ 18.58 average Years of NZ Residence
▪ 3 x parental tertiary qualifications proxy by current profession	▪ 3 x parental tertiary qualifications proxy by current profession
▪ 80% or 12 out of 15 households with Extended Family members	▪ 73% or 11 out of 15 households with Extended Family members
▪ 61% or 9 out of 15 households with chronic illness	▪ 53% or 8 out of 15 households with chronic illness

Summary

The objective of this section was to analyse data across student weight status incorporating the three research topics of food habits, physical activity and body image. In addition, household demographic data were analysed according to student weight status to assess possible associations between household structural factors and behaviours across the three research domains. This study found healthy weight students engaged in more physical activity, had regular consumption of vegetables and regular patterns of breakfast and lunch meals compared to their obese counterparts. Healthy weight students and parents seemed to have more food and health-related knowledge and experiences than obese students and parents. Obese students received more encouragement from parents to eat healthy foods, to increase their physical activity, were more likely to be unhappy about their body weight and engaged in weight loss attempts more often than healthy weight students. The home environment and family members, which by Pacific definition includes extended members, was the most influential environment for food habits, physical activity and body image. The key difference amongst parents across student weight status was their presence in the home with parents of healthy weight students more likely to be full-time or part-time parents at home, while parents of obese students had a particular type of employment which required longer working hours and encroached on their ability to be present at home.

Chapter 5

DISCUSSION

This chapter discusses the findings of the study divided into four sub-sections, (A.) Food Habits, (B.) Physical Activity (C.) Body Image (D.) Differences between obese and healthy weight students. It will conclude with an outline of the strengths and limitations of the study.

Food Habits

Despite long-standing patterns of obesity prevalence being burdened on the most impoverished population groups in Western societies, surprisingly very little research has been completed in the area of poverty and its association with obesity. This is an obvious limitation which future research in the field should address. Results of this study confirm others in New Zealand which have shown that low income levels, unemployment, large household sizes, having greater numbers of dependent children and being of Pacific ethnicity increases the risk of being impoverished.^{373 376 377} Children bear the consequences of familial poverty stress with poorer health outcomes which are mediated through poor nutrition, substandard and overcrowded housing and barriers to quality healthcare services.^{9 28 38 378-380} The impact of poverty on families shows that spending on food is the most dispensable item on a weekly budget with households having more than five dependent children being less likely to always be able to afford proper nutrition.^{9 381 382} Furthermore, poverty is also associated with higher risks of physical abuse and neglect of children, with family violence events exacerbated by overcrowding and substance abuse.³⁸³⁻³⁸⁵ Poverty stress is the daily living reality for Pacific families in this study and these structural factors affect food habits in significant ways.

Results of this study showed that the main encroachment on food supply was lack of monetary resources, and on food preparation, it was lack of time (see Chapter 4, Food context, Figure 4.11, page 118). Consistent evidence shows that food insecurity, which by definition incorporates aspects of affordability and accessibility to appropriate health promoting foods, is significantly more common in Pacific populations in New Zealand compared to other ethnicities.^{9 138 234 238 243 386 387} Results of this study add to this evidence base with 43% (13 out of 30) of the households, as reported by parents, experiencing food security issues (see Chapter 4, Food supply, page 77). Fifty percent of these households were from low-income large-member households (see Table 4.4 on page 118). It is recommended that governments look directly to implement food price controls as the best direct obesity-prevention measures available. Evidence, both internationally and in the Pacific, shows that price is an important factor in determining the foods which consumers purchase.^{8 235 388 389} Since price is a particularly important consumption determinant among low-income groups, price controls have the potential to reduce health inequities in low income groups. Food price controls can involve either increasing the prices of foods which contribute to an unbalanced diet and or reducing the price of foods which would contribute to a more balanced nutritional intake.

The relationship between food insecurity and obesity seems paradoxical when obesity connotes excessive energy intake and food insecurity reflects an inadequate food supply. For most Westernised countries, New Zealand included, obesity prevalences are significantly higher in the most deprived population groups suggesting that food insecurity may determine the higher obesity levels in Pacific people in New Zealand.^{10 19 220 387} Evidence suggests that food insecurity is associated with poor food choices, with low income populations choosing cheaper energy-dense micronutrient-poor diets as an effective way to save money.^{226 227 234 241 390 391} Furthermore, there is some evidence supporting this behaviour with the cost of healthier food items being more expensive than non-healthy food options.²³¹
232 392

Additionally the consumption of energy dense, low-fibre and high-fat foods supersedes the consumption of health protective fruits and vegetables.^{225 229} New Zealand data suggest fruit and vegetable intake is mediated by neighbourhood deprivation and ethnicity, with Pacific people less likely to eat the recommended servings.^{10 127} This study found low levels of fruit and vegetable consumption was an observed difference between obese and healthy weight student households (see Table 4.11, page 177). Similar to previous studies, parents faced with financial constraints saw these particular food items as 'squeezable' or nonessential and household bills would often take spending priority.^{233 241}
243 393 It has also been suggested that satiety is just as influential on food choices as cost-affordability factors, with those on limited income more likely to purchase fatty meats and processed carbohydrates which "fill" but not "nourish", whereas fresh fruit and vegetables do not satiate and in addition can be relatively expensive.^{138 380}

Other studies suggest food insecurity events affects child-health well-being by affecting parental feeding practices.^{394 395} Chronic uncertainty in food availability has been found to be a major stressor for parents, leading them to make poorer food choices, and despite having sound food knowledge, becoming more non-compliant to healthy food and eating guidelines and exhibiting less desirable feeding habits, which ultimately influenced their children's health and consequent body weight. Less desirable feeding habits included using food as a compensatory positive experience to overcome negative feelings of living in adverse poverty stricken conditions. For example, Gundersen et al,³⁹⁵ found low-income chronically-stressed mothers tended to make "comfort foods" more available to children. This could be described as coping mechanism with low-income people using food as a "tranquilliser" to impoverishment. Elements of this phenomenon were found in the dialogue with parents who admitted to purchasing highly palatable takeaway food items for their children despite being on government welfare and experiencing chronic financial constraints (see Chapter 4, Food Habits, pp94-5). This may be parents' way of mitigating feelings of inadequacy for not providing certain living standards for their children and family, which is a similar finding to other studies on food choices of low-income people.^{214 243 396}

The use of food as a coping strategy for stress is further supported by Kumanyika who explains that being an ethnic minority exacerbates stressful states, which may explain differential obesity prevalences amongst majority and minority groups.

"parents, families and children in ethnic minority populations are likely to have higher than average levels of direct or indirect (i.e., by association or ethnic identification) exposure to environmental and psychological stress, e.g., associated with racial discrimination, violence, economic stress, concerns about economic security and personal safety, and perceived inability to improve one's life circumstances or those of one's children. Day to day stress may be overlaid onto chronic stress caused by socio-political history of oppression or social disruption or factors related to immigration which are retained in cultural memory... [these] are possible stressors for ethnic minorities which could explain certain coping strategies, including the use of highly palatable foods to reduce stress." ^{214 (p68)}

New studies have emerged which confirm that comfort foods do in fact lower metabolic levels of stress and may predispose people to increased weight and obesity levels.^{397 398} In relation to ethnic minorities who are overrepresented in the most impoverished socio-economic conditions, the effect of chronic maternal stress will over time predispose families from these circumstances to generational obesity, including possible gestational transmission of obesity.

One particular qualitative study in the Auckland region noted similar themes in the relation between poverty and its effects on particular food choices and health promoting behaviours.²⁴³ Despite being on government welfare, participants in this study chose to spend beyond their means on 'junk food' items, and yet made statements that eating healthier foods was too expensive. The authors noted that these low-income focus group participants were not concerned about the self-reported poor state of their family's nutrition and physical activity levels and furthermore, indicated that lowering the price of

healthy foods or attaining more food information to make their diets healthier would probably not be an effective motivator to better health behaviours. Participant motivation to change behaviours was low and the author's speculated that this was caused "by a chronic sense of hopelessness about their lives and lack of confidence and self-motivation across a number of areas but that is outside the parameters of this particular research."^{243 (p40)}

These findings have important implications for future obesity intervention efforts. This study suggests certain structural environmental factors related to poverty affects food habits of Pacific people and mass reach intervention and education programmes will likely to be ineffective for this group. Research has shown that peoples of low-income strata tend to be less aware of the relationship between dietary factors and disease, less likely to be concerned about their nutrient intake and furthermore less desiring to make behavioural changes despite being more at risk of obesity.^{399 400} Specific interventions that reach low-income impoverished groups will need to prioritise the elements of motivation, self-esteem, self-confidence, and life-skills training as well as making policy changes to structural barriers part of an effective programme. The development of interventions for low-income groups will require concerted efforts across a number of social change agencies and would not merely be about food or physical activity goals per se. Research has consistently shown that attaining fundamental health protective traits, such as educational qualifications which lead to employment and higher income levels, protects against obesity and this should be a priority goal for interventions.^{16 210 401 402}

Healthy food accessibility is also another key factor that cannot be underestimated as different socio-economic environments have dissimilar food item accessibility. For example, a recent study found that low socio-economic neighbourhoods like Mangere, the urban area of this study, has greater numbers of fast food outlets as well as greater distances to healthy food stores like supermarkets, compared to higher socio-economic suburbs.²³⁶ Furthermore, there were also food item differences available at these two different supermarket locations. A recent report suggested healthy food items, like those displaying the New Zealand Heart Foundation's Red Tick label as a guideline for healthy food, were significantly less available in supermarkets in the most deprived suburbs like Mangere compared to least deprived urban areas.³⁸⁷ Change needs to occur at the public health policy level to ensure equitable access to healthy food is attained for all communities, particularly in relation to children's nutrition which research has shown is critically important for physical, mental and social development.^{28 38} Children born into poverty without access to nutritious foods present with developmental delays which have a lasting effect on adult health, and are at a higher risk of illnesses leading to death.^{218 403} Future interventions should therefore always be mindful about imbedding the realities of the immediate environmental constraints on food accessibility and affordability as part of any effort to make long-lasting changes to nutritional behaviours.

Coming close to cost and affordability as a key environmental constraint on food habits, is the lack of sufficient time to prepare healthy foods. Parents of obese students tended to work longer hours through double shift arrangements and often over evening, early-morning hours and weekend days (see Table 4.14, page 184). Time constraints were also a big factor for households with two working parents with parents managing time by choosing food behaviours that were time-convenient. Longer hours away from home meant little time was available to give attention and effort towards healthy food preparation, and takeaway convenient meals became the default choice for time-constrained parents (see Chapter 4, Food preparation, pp. 78-9). Research has shown that long hours of parental employment, especially maternal employment are associated with an increased obesity risk for children.^{404 405} Time pressure, whether real or perceived, exerts further stress onto vulnerable households and can result in less time to walk children to school or supervise extracurricular sports, less time to monitor children's food intake, and stressed parents fostering "time guilt" and acceding to children's demands for energy-dense foods.^{406 407}

Furthermore, consumption of breakfast and lunch was severely impacted by time constraints. This study found obese students were more likely to skip breakfast and school lunch consumption compared to healthy weight students, and this pattern was matched with their parents' eating habits (see Table 4.11, page 177). Both students and parents who skipped meals implicated insufficient time as the key reason for having irregular meals and reported that they would often compensate for skipped meals by over-eating at the next meal occasion. When this type of eating pattern is repeated with some regularity over time, portion sizing of meals may increase in small but significant amounts increasing energy intakes. Recent data support this pattern of eating with Pacific adults consuming more total food energy per day compared to non-Pacific, and this was due to total food consumption with observed differences in serving sizes and frequency of consumption of certain cheaper energy-dense low-nutrient foods.¹²⁷

The comparable eating habits between parents and their children suggest that environmental factors may exert a greater influence not only on parental and children's eating habits but on the eating habits of all members of the household. Previous studies have found that maternal nutritional behaviours are closely aligned to the whole family's eating patterns, as mother's continue to have the role in the selection, supply, preparation and monitoring of food and eating habits within the homes.^{227 241 402} This study also finds that parents, especially mothers, continue to have a greater influence on children's nutritional status (see Chapter 4, Food supply and preparation, pp. 77-8). The consistent nature of the evidence showing close alignment between parental and children's food habits advances the argument further for childhood obesity interventions to involve parents in future endeavours. Much has been written about the consistent association found between parental obesity protective eating habits and its positive influence on children's total energy, fats and fruit and vegetable intakes that parental involvement can no longer be disregarded.^{24 25 402}

An important obesity-risk food habit was revealed in this study with Pacific students, regardless of weight status, significantly more likely to purchase breakfast and school lunch food items than other ethnicities (see Figure 4.2, page 85 & Figure 4.5, page 89). As has been discussed above, parents made money available to students to purchase school lunch food items to fit their management of time by choosing the convenience of not making home lunches and expecting adolescents as they got older to self-monitor their own school food intake. Valuing children's independence by giving them money to purchase their own lunch was related to household size and having greater numbers of dependent children. Parental time for monitoring children's eating habits is probably severely compromised when there are more children in the family to care for. In addition, having permissive parenting styles by giving into children's desires for purchased snack foods was another example of parents compensating for poverty stress.

Both obese and healthy weight students therefore had similar school lunch food items which were the most available foods at their school canteens or shops within the perimeter of their school. Further analysis of the OPIC study found, in some cases, healthy weight students consumed more energy-dense snack food items than obese students, as obese students were more likely to attempt weight loss strategies.¹¹⁹ Healthy weight students were able to explain that despite being knowledgeable about the health risks associated with eating energy-dense snack foods, as they had not yet personally experienced an adverse health event due to current food habits, they were very reluctant to change their current eating behaviours. Parents of healthy weight students were also unconcerned about providing purchased school lunch foods for their children as they were currently fit and active and had acceptable body weight, which parents interpreted as signs of good physical health. Studies in this area support the lack of obesity prevention action by parents, with parental concern for obesity only observed after excessive weight gain has already occurred in children, particularly amongst low socio-economic groups.^{396 408} This fits the patterns found in this study with obese students receiving much more parental support for healthy eating compared to healthy weight students (see Figure 4.10, page 112).

A key point for future interventionists to be mindful of, is that shifting structural barriers like poverty status and its associated mindset will be difficult to achieve in the short-term. It is therefore, highly unlikely for prohibitionist advice to parents, with regards to not making money available to students to purchase lunches, to succeed under these conditions. For example, parents cannot make healthy home-based lunches when employment hours encroach on their time and presence within their homes, and when there is simply not enough money to purchase healthy foods. It is likely therefore that students with ready access to working extended family members, will continue to have access to discretionary spending money, and changes in the school and community food environment will be the best strategy for preventing childhood obesity for this group. Both central and local government agencies have a role to play in setting public health policy in institutions under their influence and the

recent Healthy School Food policy requiring all public schools to report on the provision of quality school food that must meet current nutritional guidelines is a step in the right direction for this group in the community^{viii}.⁴⁰⁹ Furthermore, the continuing role of extended family members in influencing Pacific adolescent well-being suggests that future interventions for Pacific communities should involve extended family groups or undertake community development approaches to ensure there is sufficient reach for all members of a Pacific family unit.

Special occasions and the practice of toonai (Sunday lunch) shows cultural values are manifested in particular high value foods and the particular way of preparing, serving and distributing foods. These special occasions though are irregular and Pacific families compensate for toonai meals by making it their one meal of the day and sometimes for the whole weekend. Due to the counterbalance strategies employed by Pacific people who routinely prepare toonai meals, it is probable that it is not the practice of toonai or the over-eating at irregular special occasions that contribute to increased intake of energy that promotes obesity in Pacific families. Toonai has been practiced since before obesity rates become problematic.^{304 410 411} It is more likely that it is the intake of cheap energy dense foods on a regular daily basis that is driving the higher obesity in Pacific communities in the New Zealand environment.

Family and school environments were the key influential sources about healthy food and healthy eating, but food knowledge was not related to food and eating behaviours, as has been found in other studies.^{399 412} For example, it is one thing to know of healthy foods, it is another to know about its effect on physical health and furthermore how to apply this knowledge in practical ways. Most students and parents could recite what they learnt about foods or read about foods from school or other sources. One parent was able to remember “the triangle thing the kids brought back from school” as the food pyramid graphic giving guidelines for healthy eating. Both students and parents were able to rely on their memory to answer questions about healthy and unhealthy foods but few went further to apply this knowledge on a daily basis. Several studies indicate that food knowledge is a poor predictor of changing food and eating behaviours, and that food awareness is different to adopting and complying with healthy food guidelines and then making sustained changes over time.^{227 412 413} Furthermore, age, gender and social class differences have been found to mediate the uptake of food advice and knowledge.³⁹⁹

^{viii} At the time of writing this section of the thesis, a new political party was elected into New Zealand’s government and reversed the Health School Food policy which was set in 2007 by the previous government.

Only a few households actively practiced health prevention or health promoting strategies related to food habits, such as: having strict food rules in the home, of not purchasing sugary beverages, takeaway meals or particular snack foods, of preparing and eating only home-cooked meals, of monitoring children's eating of vegetables and of restricting television viewing time. Those that employed such strategies had regular affirmed knowledge of healthy food and nutrition and its relation to health (see Chapter 4, Influencers on parents' eating habits, pp. 117-9). For example, parents who worked in health related fields like nursing, elderly care, or worked in hospital kitchens, were very aware of the health promoting effects of particular foods and would be conscious of making particular food choices to promote the health of their families. Those managing chronic illnesses were also more aware of food and nutrition's effects on health status and often made nutritional changes after an adverse health event. This unfortunate learning event has been found in other studies and suggests that good health status is invisible and often taken for granted, and that few health prevention approaches are taken by most people until it is too late.^{241 396}

However, the evidence states greater parental educational level/status is associated with positive parental eating habits, which in turn greatly influences child eating behaviours.^{24 402 414} The specific mechanisms through which educational levels affect food behaviours is not well understood but it is probably related to a specific set of skills that involves time management, knowing how to seek information, to analyse information, having confidence in applying new knowledge and in trying new things.⁴⁰¹ Studies have shown those less educated tend to rely on past experience and have more conservative food choices and eating habits which were formed while growing up.^{142 399 400} This is not surprising as people can apply only what they know, and not having educational opportunities to learn not only new facts about food, but also key skills in managing time, in information exploration, in information examination, in prioritising, negotiating, delegating and budgeting, are all specific sets of key life-skills which those with higher educational attainment have both had the opportunity to learn and apply in food habits, which those with less formal educational opportunities are less likely to do.⁴⁰¹

This study found that there was a two-tier knowledge and understanding of food depending on place of birth and related to early life experience (see Chapter 4, Food knowledge, page 106). Island-raised parents had understanding of healthy and unhealthy foods that they experienced growing up, so therefore they had knowledge of cooking and preparation of traditional Island-based foods. Whereas, their children born and raised in the New Zealand environment, had a taste for foods readily available in their environment of birth. Most students experienced two food sources, often eating New Zealand based foods outside of the home and Island-based foods within the home, particularly for the main meal of the day. Most parents identified fatty or oily meats or traditional fried foods as unhealthy but had difficulty identifying foods they were not familiar with, particularly highly processed purchased food items like potato chips, biscuits, ice-cream, chocolates, pizza, pies or pastries as unhealthy foods. These are food items Island-raised parents would not have experienced, that is eaten or prepared, in

their Island homelands. Therefore they would not have knowledge of how to cook these items or have knowledge about the base ingredients that make up these products. This lack of knowing would often mean students were not always discouraged from purchasing these particular food items. Bakery type food items like donuts, pizza and pies were regularly bought by parents for their children's breakfast and lunches. Having experienced these foods from an early age, students come to have a taste for them and an alarming food transition seems to occur when New Zealand-raised young people were able to earn their own money, and chose these highly accessible takeaway food items as their main choice of meals.

This is a clear food knowledge gap which future interventionists should address. Pacific-raised parents need more than just knowledge in this area but practical experience in New Zealand based foods, particularly those made from sugar, cream, butter and cheese. Cooking classes which give parents the opportunity to recreate the food items their children eat on a daily basis may be effective in gaining understanding of the healthfulness of commonly available NZ-based food items. Food education strategies need to go beyond simple food awareness campaigns to offering practical working knowledge about how to grow, produce, purchase, cook and prepare healthy everyday easily accessible and affordable New-Zealand based foods. A caveat important to stress however, is that results of this study, which mirror others, show that cost and affordability are key determinants of current food habits and patterns, and further food education strategies need to be mindful of this.^{238 242}

⁴¹⁵ Good nutritional knowledge application is limited by food accessibility and by people having limited food purchasing power. Giving people more education without being mindful of actual food constraints, runs the risk of setting people up to fail, and according to Lanumata, "has the potential to result in victim blaming – of blaming people for failing to use their new knowledge and skills when their limited resources and the expense of healthy food make it very difficult, if not impossible, to succeed." ^{238 (p5)}

The few students who were able to apply knowledge of what they learnt about foods, by choosing not to eat particular food items, were those with regularly affirmed knowledge and practical experience of food. Healthy weight students were twice more likely to state the school environment and particular subject classes like catering, hospitality or health classes at school as their source of food knowledge compared to obese students. Students who enrolled in these subject classes seemed to have a deeper understanding of food and its health effects and had opportunities for their basic food knowledge to be expanded and affirmed regularly. Students with this type of educative opportunity seemed to apply their food knowledge more readily than those who did not have this opportunity. For example students reported changes in dietary patterns by resisting temptation to purchase fizzy drinks and drinking more water. Food educational opportunities that are both ongoing and regular with multiple opportunities for affirming and expanding on food and nutritional knowledge seemed to be much more effective than one-off food awareness campaigns.

It is likely that it is not one factor that increases the likelihood for obesity through particular food habits but the combined effect of compounding determinants that increases the risk of childhood obesity. Children raised in highly obesogenic environments with insufficient household monetary resources to source and supply healthy food, with little parental time available to prepare healthy food, and lack of parental knowledge about non-traditional or New Zealand-based foods, will have a greater compounding effect of an unhealthy nutritional environment that will only serve to promote and increase obesity levels compared to those who have all the combined resources of time, money, nutritional knowledge and easy access to health promoting foods.

Summary

The results of this study found that social circumstances determined food behaviours more than cultural beliefs and values about food. This analysis has important implications for obesity interventionists as framing the determinants of healthy eating between individual cultural and social structural factors will determine the appropriate interventions. Results of this study illuminate the complexity of behavioural determinants and suggest that impoverished circumstances may exert a particular dynamic which has not been fully considered by past research. A key implication for interventionists is that, if food habits are influenced more by structural factors rather than cultural, then interventions that address structural barriers should prove more effective. If cost of food is the main barrier to healthful eating, then this needs to be addressed as a priority. A growing body of evidence has already implicated cost and affordability as the key influential factors to healthy eating, yet despite this, very little political change has moved in the right direction. Instead, further research is garnered to test whether cost factors were actual or misconceived.^{227 238 241 243 386 387} Interventionists need to be mindful that enablers of behaviour can be both real or perceived¹⁴² and interventions can move forward by addressing these as such. Results of this study found cost factors were related to household size and income level. Food pricing control measures and supplementary grants for food purchases need to be made available for such families to mitigate food insecurity. However, for some families, cost was perceived as the main barrier but parents still purchased high-cost food items like takeaways. Providing these families with food shopping and food preparation experiences, which gives them an example of how cost factors can be minimised, will probably prove more effective. However, underlying the reports of perceived cost as a barrier to healthy eating are low motivations to make behavioural changes. This is likely to stem from poverty stress which can only be addressed by structural environmental changes in intervention efforts.

Physical Activity

The results of this study have shown that Pacific adolescents classified within the healthy weight range are significantly more active than obese Pacific adolescents and therefore physical activity seems to be protective against obesity, as has been found in other international studies^{108 167 416} and New Zealand-based studies measuring youth activity and body size.^{153 417-419}

Analysis of the interview text which probed further into historical physical activity patterns showed that Pacific students had always been active at preadolescent ages and valued activity, particularly the intrinsic effects of physical activity. A noteworthy pattern emerged with obese Pacific adolescents reporting that the timing for drop-out or inactivity coincided with entry into high school or senior school levels.

In the New Zealand context, students enter the high school environment from smaller junior primary and or intermediate schools. High school environments generally support sporting school teams depending on available physical (facilities, equipment) and personnel (coaches, volunteers) resources. In the context of decreasing school funding and available resources, including decreasing volunteerism, schools generally have resources for supporting smaller numbers of teams. In this situation, a greater number of students vie for smaller opportunities to be part of sporting school teams. Students with exceptional sporting skills often get supported and students with average ability, but with an enjoyment of sports, do not.

Coinciding with this situation is the critical adolescent life-cycle stage, where the identity formation process is occurring with students using peer comparison and peer-acceptance to formulate self-identity. Students' explanations for recent inactivity shows that self-efficacy perception is the most important reason given for dropping out of physical activity participation, which matches the findings of previous studies.^{176 420} That is, not having the skills to be selected for school teams was the most cited reason for dropping out of structured sporting activities (See Table 4.7, page 131). When the school sporting environment is structured to support only talented students, in one or two junior netball teams or rugby teams or volleyball teams, and the teams are ranked in order of competency, students receive clear messages about the value of sports participation, not as an activity for general enjoyment and maximum participation, but they come to understand the sports high school structure as an environment purely for achievement. In this way, their new environment, no longer supports their current intrinsic motivations for physical activity and their drop-out is the result.

In addition to this, the school environment is clear about the value of physical activity in comparison to other school subjects. Physical education is no longer compulsory for high school students once they reach senior school levels (Year 11, age 15) and the prevailing message is that participation and achievement in physical activity is not as important as academic achievement in non-physical subjects. Students are encouraged to prioritise academic achievement at the expense of physical education. This cultural normative practice of New Zealand schools at the critical adolescent life-cycle stage, where health promoting practices and habits, which were supported in earnest in junior schools, are now contradicted in senior school level. This is problematic for formulating future positive adult health promoting behaviours.

Furthermore, this cultural schooling practice is disingenuous about the importance of participating in daily physical activity, and is instead teaching young people the habit of prioritising other life activities at the expense of others. Students perceive that academic achievement, which is related to work prospects and future career, can be achieved at the expense of daily health promoting activities. For some students, prioritising academic studies was an identified barrier to maintaining physical activity in the senior school levels. This is in clear contrast to current government policies for working adults that aim to achieve work-life-balance and yet no education in life balance is created or supported in the New Zealand schooling system.

Obesity interventionists should be mindful that the particular context of entry into a high school environment brings significant changes in an adolescent's life. Given that a general pattern of inactivity seems to begin at entry into high school or into senior school level (Year 11), obesity interventionists would do well to think about what has made students stop being active once they reached high school environments, and in what ways can high schools environments change to ensure maximum physical activity participation for all students at school?

Studies completed both internationally^{165 421} and in New Zealand⁴²² have been critical of the current structure of compulsory school physical education which limit physical activity opportunities for children and adolescents. Secondary school physical education programmes have in their traditional form been ineffective for ensuring life-long activity and particularly for maintaining the interest of girls.⁴²²⁻⁴²⁴ It is recommended that current physical activity and sports participation opportunities within schools be restructured to fit students' intrinsic motivations for physical activity. Adolescent interests and motivations for physical activity change as they mature and social, recreational and personal motives are as important as achievement motivation.⁴²⁵ Physical activity should be structured as a daily, compulsory curricular subject alongside other academic subjects throughout all Year levels at New Zealand secondary schools. Increased public funding is needed to provide resources, (both facilities and personnel) to promote habitual daily physical activity opportunities for all students in schools. For

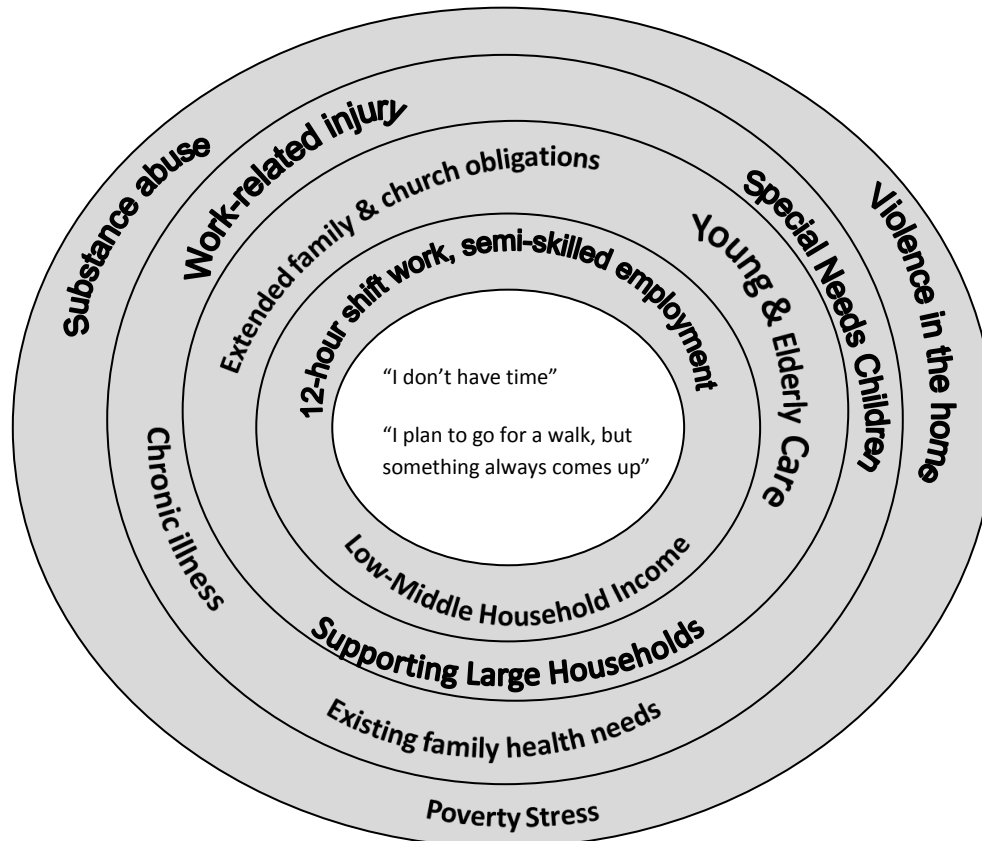
children and adolescents, evidence shows that the school environment still presents the best opportunity for increasing daily physical activity and addressing obesity prevention.^{153 426}

Interestingly, students' reasons for dropping-out of activity matched their perceived barriers to future activity (see Table 4.9, page 151). At the top of the list of barriers to future activity were structural barriers. To mitigate these barriers, interventionists should address the structural barriers of monetary cost and transport for neighbourhood safety, by subsidising sports fees and providing transport for after-school activities. The nature of neighbourhood safety would seem to differ across neighbourhood deciles and interventionists need to be mindful about the distinctiveness of social-environments and their effect on people's behaviours⁴²⁷; for example, the inhibiting nature of a social-environment of living in a low-decile Mangere area and how it can affect sports participation for Pacific adolescent girls. Other studies from low-income deprived neighbourhoods have shown the salience of neighbourhood safety affects physical activity participation.^{228 428-433} Results from a recent study showed that while most adolescents in South Auckland (81% males and 64% females) felt their neighbourhood was safe, when asked, how their parents felt about neighbourhood safety, only a third of students reported that their parent's felt their local neighbourhood was safe.¹²

This thesis has found that Pacific parents struggled to meet current guidelines for daily physical activity and the main barrier for this was lack of time (see Chapter 4, Perceived barriers for parental physical activity, pages 132-3). Numerous studies both worldwide^{228 434-438} and in New Zealand²⁴⁴ support time scarcity as a significant contributor to adult inactivity, including for Pacific adults.^{196 242 243} This study provides more evidence of this for Pacific people living in New Zealand and further highlights the barriers that are keeping them time constrained and decreasing their ability to realise their health potential.

Figure 5.1 is a graphic illustration summarising the typical social environment of Pacific parents interviewed for this study. Parents talked about long employment hours and managing shift work between two working parents as the normal working life arrangement. Seventy percent (70% or 21 out of 30) of the households live in extended family situations, with some interviewed students "adopted" into extended family arrangements (see Table 4.4, page 118). Supporting large families and young children, meant parents prioritised the activity of caring for the young and elderly before their own health needs. Fifty-six percent (56% or 17 out of 30) of the households interviewed talked also about the existence of managing chronic illness in their homes. A few parents talked about needing to meet extended family obligations. Parents also talked about the place of the church in their lives and meeting church obligations, with Sundays committed to attending to their spiritual health. A few parents were open about the existence of violence and substance abuse and stress in their homes.

Figure 5.1: Contextual factors affecting parental Physical activity



Employment time, especially shift-work arrangements or type of occupation, was the main encroachment on available time for daily physical activity for Pacific parents. These results mirror the findings of Ball et al,²²⁸ qualitative study which examined physical activity determinants for Australian women across different SES groups. Lack of time was a commonly mentioned barrier to being active, for all women regardless of socio-economic status; however, the time constraint contexts differed between low and high SES women. Low SES women mentioned more often the time constraints due to work commitments while high SES women had family commitments to manage.

The two contexts obviously balance different outcomes, with working life resulting in economic advantages while family commitments (e.g., childrearing, household duties) were less so in an economic sense. Women of low- and mid-SES perceived that lack of time was often associated with feeling too tired or lacking energy to be active, in the time that was available, “and this was particularly the case among women working in jobs with long hours or stressful conditions.”^{228 (p102)} The way low-SES mothers talked about working life stress, and that there were more mental pressures felt with regards to fulfilling work employment commitments that could take up enormous physical and mental energy to manage; which women from high SES situations may not experience. Therefore, high-SES women may have the necessary energy required to manage their limited time better than women from low SES positions. High SES women were more able to overcome time constraints by having more options like payment of childcare and by having consistent time management strategies and applying these skills to enable physical activity participation. As highlighted by Ball “even when they felt their life was hectic, women of high-SES invested considerable thought into planning how physical activity could fit into their day.”^{228 (p103)} Some parents interviewed in this study, also alluded to this requirement of needing to have sustained individual effort to manage limited time to ensure daily physical activity habits (See Chapter 4, Perceived barriers for parental physical activity, pages 132-3). Time management skills seems to be a key pre-requisite for engaging in and maintaining adult physical activity participation.

This study also found that there is a lack of familiarity with the concept of individualised structured health-promoting physical activity that is called exercise, which is a Westernised cultural concept (see chapter 4, Future activity – parents, pages 153-4). Most Island languages do not have a traditional word for the European word ‘exercise’. Pacific parents understood and defined exercise or physical activity to mean household work related activity. Interestingly, this is clearly different from Western definitions of exercise, with Ball’s²²⁸ qualitative study finding Australian women clearly delineating the difference between exercise activities and household chores. Pacific parents often struggled to replace the physical activity from housework chores which are now done largely by technological devices (i.e. washing machines). When this is no longer the environment, Pacific adults need to adapt to these changes in the environment by undertaking separate structured exercise activities. However, the new working/employment environment does not allow time for health promoting exercise to occur. Even if Pacific people take on the Westernised cultural definitions and expectations for individualised structured health-promoting physical activity exercises, these behaviour changes are still difficult to enact when the social class circumstances or socio-environment has not changed to allow these behaviours to occur.

Not having a tradition in daily exercising makes it harder for Pacific people to initiate separate physical activities, and thus, efforts to include such activities for Pacific communities may be ineffective if interventionists are not aware of this. Activities that are dynamic and vigorous but have purpose are more culturally appropriate and indeed may even be more sustainable. Sustainability can be enhanced when that activity is customary, habitual and scheduled. In the New Zealand environment, it is customary for adults to be employed for most days of the week. About 80% (25 out of 30) of the interviewee households for the qualitative study were employed households. Daily physical activity can be built into daily work schedules by making changes to active transport to and from workplaces, and workplaces made into active places or places that provide physical activity scheduled into employment activity, should be the new cultural norm. For this cohort of parents, only those with active occupations and who take active transportation to workplaces are meeting the current guidelines for adult physical activity. This can be supported by over-arching government policies that incentivise workplaces that support health promoting activities for employees.

Different members within the family that have different roles and occupy different environments during the day, (or night times for the sizeable numbers of Pacific adults in shift work arrangements) - e.g., the school for adolescents, workplaces for working parents, homes for mothers and fathers caring for young, old or sick family members - require different interventions for increasing physical activity. It is recommended that different strategies are needed for stay-at-home mothers that have young children to care for. For example, home-based exercise programmes may be more appropriate for this section of the community. Church-based sporting community competitions that are part of the regular church life for all its members and organised at multiple days of the week are other avenues that can be encouraged.

Results of this study found that Pacific adolescents and parents had positive beliefs about the health benefits of physical activity and there were no differences observed across student weight status. Pacific students have always been active and they value activity, particularly the intrinsic effects of physical activity. Students' and parents' knowledge about the health benefits for physical activity and the recommended dosage of activity required to gain health benefits was strong and students credited their schooling education for this knowledge.

This study also found strong support for the influence of Pacific parents and extended family members on the activity of adolescents (see Figure 4.18, page 145). This probably reflects traditional cultural family hierarchies, with respect and authority assigned by seniority. Adolescents raised in this traditional cultural milieu understand their place within the family and this is consistent with Island traditional social classification of children and young people, as non-decision makers in society, whose role is to learn and obey without question and to provide physical and economic assistance to their families where possible. According to Sua'ali'i, "To learn without question was advocated by Samoan

parenting ideologies on the presumption that the answers to young people's questions would become clear to them later in life." ^{439 (p180)} Pacific parents expected their children to be of a certain weight size as evidenced in their increased level of support for physical activity, when their children's body size becomes larger. Parents may find it hard to monitor all of their children's activities when time is limited at home. Further, their children's sporting activity, which was initiated in the primary school environment, had now seemed to decline in the high school environments. This result is clearly pointing towards the need for changes to school environments to further support adolescent physical activity needs.

Summary

The objectives of this section of the study was to explore the potential socio-cultural determinants of obesity, including economic and material wealth as well as social norms, values or expectations, attitudes and beliefs towards physical activity. Literature on physical activity participation generally agrees that factors influencing positive health promoting activity are shaped by a multitude of factors that can sit between the individual determined factors on one end and environmental factors at the other extreme end.^{223 440 441} This is the same as asking the question as to whether health promoting behaviours are mediated by behavioural/cultural explanations or material/structural explanations. Results from this study finds that the socio-environment, particularly the economic environment (i.e. lacking time through employment arrangements) has a greater influence on the health promoting behaviour of Pacific parents.

In addition, this study analysed results according to weight status, taking an appreciate inquiry approach, to look not only at problematic health behaviours but to reveal behaviours of currently healthy weight Pacific adolescents. Results showed that a key difference between healthy weight and obese Pacific adolescents was in the level of physical activity, with healthy weight adolescents participating in higher levels compared to obese adolescents (see Table 4.12, page 179). Physical activity protects against obesity for Pacific adolescents. Both groups had similar beliefs, attitudes, and values about physical activity. Pacific adolescents enjoyed physical activity and most have participated in physical activity as young children. A significant number of students stopped being involved in structured sports activities once they entered the high school environment. Obese adolescents desired more future physical activity opportunities.

Parental social capital and beliefs and values about physical activity, and its link to the health of children are generally positive and sound. There were no problematic cultural expectations with regards to physical activity acceptability or participation, for both Pacific adolescents and parents in New Zealand. Parents expected their children to be active, and when children become overweight, are even more active in their support for children to become more physically active.

There were however, still some gendered expectations, with boys being allowed to be more active and girls were expected to prioritise academic studies. Due to perceptions and real experiences of neighbourhood crime and safety, girls were required by some parents to have more parental supervision for their personal safety and this limited their opportunities in sports participation and or active transportation to school.

Results presented in this section, alluded to both individual/cultural and environmental/material or structural elements affecting the physical activity participation of Pacific adolescents and parents. A debate exists in the literature on the relative contribution of individual/cultural versus environmental/structural factors has on health promoting behaviours. The results of this study finds that social circumstances, but particularly social class effects which include economic and material wealth, preclude health promoting physical activity for Pacific parents, and structural systems within high school environments maybe inhibiting youth activity. Strong evidence is mounting for the need to make major policy changes to transform such “obesogenic” environments in order to curtail population obesity and for Pacific populations in New Zealand with the highest obesity prevalences, this endeavour is even more urgent.

Body Image

The following section discusses key body image findings beginning with body image results of Pacific students. This is followed by a discussion of the results for Pacific parents. The discussion will explain the results by positioning body image as reflecting a “society’s cultural order embodying its value systems.”²⁹⁰ In comparison to previous studies, divergent cross-cultural body image results will be explained by juxtaposing Pacific versus Westernised societal structures and cultural values. The discussion will critique previous theories explaining Pacific body image and offers an alternative view. The section will end with limitations and implications of the results with regards to obesity prevention for Pacific communities in New Zealand.

A reminder of the study’s body image objectives is useful at this point to contextualise the following discussion points. The objective of this study was to explore the socio-cultural factors that may drive eating and physical activity behaviours, with the hypothesis that body image factors may influence these key health promoting behaviours. In particular, it wanted to examine whether problematic body image ideals existed in Pacific youth as an explanatory factor for the higher obesity prevalences found in the New Zealand environment. The key driver of this hypothesis is the belief (encapsulated in earlier studies of Pacific body image and as critiqued in the Literature Review chapter), that Pacific adults valued big body sizes which could potentially be a problematic body image ideal to have in obesogenic environments. The present study was to test whether such body image ideals previously found in Pacific adults also existed in Pacific adolescents.

Pacific students’ body image:

Students’ perceptions of overweight and underweight bodies confirmed that their knowledge about obesity and consequential adverse health effects is sound. However, students’ comments related body sizes in relation to their current functionality. That is, students wanted bodies that can be good within their current activities, like dance and sports. Students were aware that bodies that are too big or too small can result in health conditions like diabetes, heart attacks or early death, but the most important motive for a desirable adolescent body type was in relation to what their bodies could do for them now, which particularly for boys is about having bodies that are strong and skilful in sports. The boys’ ideal of a male physique and identity, as a 15 year old male being skilled in sports performance is more relevant than aiming for health-related body sizes. This sporting functionality has been found with other young males both in Westernised countries⁴⁴²⁻⁴⁴⁴ and recently in Polynesian samples in the South Pacific.^{282 285} Athleticism and its precursors of competitiveness, toughness, endurance, and physical superiority were the main predictors for the drive of muscularity among adolescent boys and men.^{285 294}

445

It would seem that body image ideals are context specific and it is expected that body image beliefs will probably change throughout the lifespan.⁴⁴⁶⁻⁴⁴⁸ The key implication for interventionists is to be aware of these context specific, age and gender-related differences in body image. Health-promoting motivations for behaviour particularly for youth have consistently been found to be low.^{449 450} This is probably reflective of limited life experience. Interventions that tap into age and gender specific motivations will probably be more effective, particularly for engaging and sustaining behaviour in interventions.

Results of this study also found that parental influence was most important on Pacific students' body image (see Figure 4.20, page 166). This practice is not surprising for Pacific families and children socialised in traditional Pacific culture, where power and respect is given according to seniority.⁴⁵¹⁻⁴⁵⁴ Children must defer to the wishes of parents or any adult member within the household who is senior in age. Likewise, parents were influenced by family members and were motivated to change behaviours to control their body sizes and weights. This relationship between Pacific parents and their children provides further support for family obesity interventions in Pacific households. Interventions should include all members of a household as Pacific families continue to live in extended family groups and traditional practices of communal childrearing and parenting responsibilities are salient.

Pacific parents body image:

Results on Pacific adult body image are summarised below:

- Pacific parents did not choose 'obesity-sized' body sizes as the ideal.
- Pacific women (all of the interviews bar one, were with the mother present) estimated ideal body sizes at clothing sizes of 14-16 as ideal not only for Pacific women, but also for other ethnic groups. These are 'average sized' bodies but definitely and well-understood by Pacific women, are ideals larger than Palagi women's desired body sizes.
- Parents valued functional bodies, for example, bodies that could bear children and achieve daily tasks like housework and childrearing were classed desirable.
- On the link between body size and ethnicity, some Pacific parents thought Pacific people had naturally bigger body sizes than non-Pacific but particularly Palagi populations, while other parents did not agree that this was a natural phenomenon.

The following section will explain that the existence of traditional but relevant Pacific social structures and Pacific cultural values can be applied to explain the summarised key points above. A useful starting point to provide some answers to the questions above are to apply current scientific understanding of the body as “part of a society’s cultural order” embodying the value systems of each society.²⁹⁰ The author contends that as has been found with other non-Western groups, particularly minority groups in Westernised countries, body image concepts or body image as an abstraction is not well understood,⁴⁵⁵ nor does it have traditional or contemporary relevance for Pacific groups. The few studies on African American,^{264 267 456} American-Hispanic,⁴⁵⁷⁻⁴⁵⁹ and other non-Western samples⁴⁶⁰⁻⁴⁶⁴ have shown only positive or neutral ideals about bodies, particularly in relation to beauty ideals. For these non-Western cultural groups, the body is a functional entity and as such, little regard is given to viewing the body in relation to other bodies and unexpectedly for Western researchers, its non-Western samples showed very little concern or preoccupation with their bodies.^{279 280 282 283 289} The author further contends that body image, which involves an individual making a subjective perception and evaluation of the physical attributes of his or her body, and how closely this fits to its cultural group’s ideal, is not a *modus operandum* of Pacific people as it does not fit within traditional but still relevant cultural structures and values.

Positing Pacific societal structures as an explanation on body image and Pacific peoples

Traditional leadership arrangements still relevant today are different to Western standards.^{295 465} For societies like Tonga and Samoa leadership was (and still is in some respects particularly in Tonga) tied to blood lines with strict adherence to arranged marriages between families of higher social order which was undertaken specifically to bolster the power of royalty familial lines. This is to say, that social class by birthright ensured high status in these societies, and it was highly unusual for lower order classes or commoners to attain a higher position merely through enhancing beauty ideals like for example, altering body sizes to ensure this. Consequently, to desire what cannot be attained, that is, social class mobility, which must be noted is different to Westernised standards of economic mobility,²⁹⁵ goes against the argument that lower order classes would desire the body sizes of higher order individuals. If we are to believe that the body is a reflection of a society’s social order, then Polynesian leaders or high status individuals, who have a ‘sacred’ mandate of leadership, were meant to have larger bodies and commoners were not. These traditional societal class order mean that leadership rights are highly respected and communal respect is given by servicing royal or high status families. To be given the best quality foods, and to free these individuals from daily laborious work, are examples of the work of common people in honour and recognition of the ‘sacred’ status of leading families.

Are these traditional societal structures still relevant today and practised in the New Zealand environment? The structure of Pacific Island churches maintains very much, these traditional social orders and high status leadership is vested absolutely in church Ministers or Pastors.⁴⁶⁶⁻⁴⁶⁸ According to Meleisea, for Samoans the divinely-inspired “sacred power of the old chiefs was transferred to the pastor who was given the chiefly form of address of ‘*Susuga*’...The pastor was termed ‘*o le feagaiga*’ because of his covenant with the village, and in recognition of the covenant between God and man.”^{295 (p69)} The structure of Pacific Island churches mirror traditional societal order, with the Minister as the head of the congregation and its members are ordered according to seniority by age and traditional rank, with roles specific for titled men (*matai*) and women (*faletua ma tausí*), unmarried men (*aumaga*) and women (*aualuma*), adolescents and children (*talavou*), as per relevant traditional social classifications^{ix 453 469-472}. National census data confirm the salience of the church in New Zealand-based Pacific populations, particularly for Tongan and Samoan groups (83% of Pacific people are affiliated with at least one religion).³²⁷ Students and parents interviewed for this study mirrored the statistics rates. Eighty-two percent of the study sample (52 out of 63) attended church regularly and church events and religious practices, such as daily family evening prayers still practised in Island homelands are still very much conducted by Pacific families in the New Zealand environment.

In relation to body image, outside observers may note that generally Pacific church Ministers and Pastors have larger bodies than members of its congregations. Some Pacific researchers have examined the role of the unique Pacific-derived churches and the leadership structures within it. According to Setefano⁴⁷³ the wealth and the status of church Ministers manifested through obvious signs of having high status symbols like expensive cars and houses and personal effects as well as having a well-endowed body, is looked upon by Samoans particularly as a testament of the wealth and well-being of the whole community. For it is the role of the church community to provide service to their ‘sacred’ leaders, who in turn looks after the spiritual well-being of members. In relation to body image, the expectation is for church leaders to have certain “chiefly” body types, which befits their divinely-ordained high status, symbolising the wealth and well-being of their whole community/congregation.

Hence, when previous studies report unexpected findings of Pacific adults not idealising larger ‘obesity-defined’ body types, it is very likely that their samples chose this because this was not the expected body ideal for lower order classes of people to have.^{279 281-285 287 289} Previous samples chose bodies that suited their status and their daily functions and most importantly, and in relation to the critique of current body image research, the common person’s idealised body size was of an average-sized body. In this particular study, when parents were asked who they would like to look like body-

^{ix} This is a Samoan example.

wise, they did not choose their ordained leaders or community members of high status as role models. They chose average-sized bodies and their own previous body sizes as their preferred model.

Pacific social roles and effects on gendered body image

Therefore, the question of “beauty” but for what purpose, seems relevant to ask at this point. Beauty ideals for Pacific people, which have also been found with other non-Western groups,^{214 293} have always been related to functionality. Particularly for women, this means bodies that can procreate, as fertility is an important part of cultural systems underpinned by kinship relations. Fattening practices described by Pollock,²⁹² whereby young Polynesian women were given the choicest foods and discouraged from laborious work, were part of addressing this gender based functionality with attempts to preserve the fecundity and successful pregnancy and lactation of women. A woman with body shapes that were “full-bodied”, “wide hips”, “strong legs” that could bear many children successfully were highly valued and deemed attractive and ideal. These cultural practices endured for thousands of years, ensured continuation of Polynesian societies; and are not that dissimilar to contemporary Western health advice for pregnant and lactating women to eat well without engaging in damaging dietary restriction or over-strenuous physical activity practices. For Pacific men, their body’s functionality was related to clearly defined gender roles within traditional Polynesian societies, as the warrior, the worker, the provider, the hunter-gatherer, the fisherman, the agriculturalist, the cook, amongst other things.²⁹⁵ Strong bodies, and bodies that were a by-product of completing this work, were muscular, tall, agile, and robust, and were therefore highly valued for men. Interestingly, cross-cultural literature on male body image finds this body type is valued and idealised amongst both Western and non-Western men and boys, with the sporting context a key environment for displaying these elements of masculinity.^{285 294} This study supports functionality as the idealised Pacific body, mainly for mothers/women who were numerically strong in this study’s sample size. The women articulated that “functional” bodies that could meet the demands of their role and identity as a Samoan or Tongan or Cook Island woman in this cultural context was salient.

Positing Pacific cultural values as an explanation on body image and Pacific peoples

Western researchers undertaking comparative research in this field often find it surprising that Pacific people have a general lack of concern about body sizes compared to Western samples; but these studies go further to state that their Pacific samples were able to clearly articulate a preference for functional bodies.^{283 289 474 475} Even recent studies on Pacific adolescent samples, for both boys and girls note the salience of functionality as a key marker of the idealised body type.^{285 294 476} For example, Williams et al.’s study comparing Australian girls to Indigenous Fijian girls from Fiji found, that for

Australian girls “the values attached to an ideal female body were associated with increased aesthetic appeal. In contrast, Fijian girls were more focused on the body’s functional qualities such as an increased ability to work.”^{287 (p279)} Ricciardelli et al.’s²⁸⁵ study found this was also the case for Indigenous Fijian and Tongan boys. It would seem obvious that the desire for ‘average-sized’ bodies that are able to do physical work is a reflection of the realities of living in an Island environment. Traditional subsistence living arrangements in Tonga, Samoa and the Cook Islands, are still the norm for a large proportion of the population.^{410 469 477-479} The cultivation of land, fishing, farming, agricultural labour, building and other activities are part of the daily life reality for Pacific people. In relation to traditional social structures, young people have particular roles in traditional Pacific societies and they are expected as part of an interdependent community to support family well-being, by fulfilling daily physical work.^{452 453 469 470} While this explains the desire for these body types in an Island environment, what explains the desire for functional bodies in Pacific people living in the New Zealand environment?

Pacific mothers in this study, who are mainly Island born migrants, confirmed the salience of functionality in their estimation of an ideal body. As explained above, this is due to the traditional gendered identity of a Pacific woman as progenitor and their traditional role within the family. However this role, coupled with the lack of preoccupation for body size, may reveal that the quest for functionality is due to Pacific people valuing body sizes that can fit within their own definitions and worldviews of “health”. Pacific people generally have a holistic view of health that is different from Western biomedical definitions which generally emphasize physical health over other dimensions.^{256 480-482} For Pacific people, the mind and body are not separate entities and spiritual elements are important. Pacific worldviews and understandings of key concepts of “health”, “illness” and “sickness” have been described by Pacific researchers as being at diametrically opposite ends of Western understandings.^{258 480-483} The results of this study found that some Pacific parents were not convinced that body size alone was a sufficient marker of health status. Their explanation for this belief is that a healthy body is a body that can function and complete all of the obligations required of it for its extended family/community but also, that it must contain important markers of spirituality, which are positive emotional states like “happiness” and lack of mental stresses like “worries”. Samoan, Tongan and Cook Islanders define health as being well in body, mind and soul and these three parts as a whole are interpreted as being healthy.^{258 483} So according to the Pacific women’s understanding of health, the ideal healthy body size is the body that can function in this manner and therefore ‘average-sized’ bodies of clothing sizes 14-16 is a reasonable estimation of the healthy body size ideal for them.

A key part to understanding definitions of health for Polynesian societies is to understand the foundations of Samoan, Tongan and Cook Island culture. Hecht, et al., provides a useful explanation of *faaSamoa*^x:

Samoan social relationships are grounded in the idioms of kinship. But the culture focuses on the political form and content of relationships, on concepts such as *fa'aaloalo* (respect), *fa'alupega* (proper address, order of precedence) and *feagaiga* (social contract).^{471 (p42)}

Tamasese, Peteru and Waldegrave³⁶⁶ go further to state that in the Samoan worldview there is no concept of self and Samoan identity will eventually return to the connections between people. This could be generalised as the manifestations of interdependent communities. And all activities related to well-being are fostered in the group and one's relationship with others within that group, so that individual pursuits and undertakings such as making individual subjective judgements on one's body in relation to others just would not occur under these conditions.⁴⁸⁵ Thus explaining why researchers may find, Polynesian samples general disdain and lack of preoccupation with their bodies.

The spirituality elements can be explained because "the understanding of health for Samoan and Cook Islanders is largely related to family, both living and dead."^{258 (p17)} For example, Meleisea explains that pre-Christian "religious beliefs were an important factor in social control. For example, illness was often explained as a punishment by ancestral gods for behaviour which spoilt the honour of the family."^{295 (p37)} Illness and sickness are therefore not perceived as a "failure of the body" but a "sickness of the spirit". Therefore a body that is big but can function within the family, its activities ensuring the well-being of the members of that family, is healthy; but related to this also, is that a body cannot be ill or sick due to large size, if its happy spiritually.

This section therefore suggests that cultural values, encapsulated in Pacific peoples view of "health", mediates body image ideals. Pacific adults want bodies that fit their definition of health which is related to the well-being of the family and important traditional spiritual elements. Health as defined by Pacific people mirror WHO definition of health as "a state of social, mental, physical and spiritual well-being not just the absence of disease and infirmity."^{486 487} Finau confirms that for Pacific people this is "a state akin to satisfaction and happiness."^{481 (p267)} The balanced combination of the health elements mind, body and soul/spirit are important markers of health status for Pacific people and measuring health by body size alone is therefore viewed as an insufficient indicator of '*Pacific-defined*' health status.

^x *faaSamoa* means Samoan customs or way of life 484. Allardice RW. *A simplified dictionary of modern Samoa*. Auckland: Polynesian Press, 1985.

Juxtaposing Western cultural explanations of body image

A brief synopsis of literature with explanations of how Western social structures and cultural values affect body image differently, and why these gendered differences are observed, seems useful at this point. If the body conveys messages about a society's social order and the values systems that are distinctive about that society, then what does the desire for small body sizes or relative thinness indicate about Western society? Researchers have noted that the "thin and slim" ideal was not always the desired body in Western societies and is a recent phenomenon brought on by the turn of favourable economic environments which have brought relative prosperity to all members of society with food security possible for the masses.^{293 312 488} According to Fallon in the early twentieth century, when resources were scarce, ample weight was associated with prosperity and "upper aristocratic women were fat and well fed and plumpness was admired."^{488 (p95)} As the environment grew abundant, upper-class women came to renounce the "common" shape and desired thinness as "a way to conspicuously distinguish the upper classes from the lower classes."^{488 (p95)} Contrary to Pacific traditional ideals, the slimming physical body thus came to represent class, power and wealth.

According to Ritenbaugh²⁹⁷ and others,^{290 489 490} the support for the slim ideal came from historical religious-moral worldviews, particularly Puritanism which in the new environment of uncontrollable abundance came to have inhibited attitudes to sex and food and saw fat and permissive bodies as a moral failing of the mind controlling the body. As Western society went through the industrial revolution, capitalist ideologies reviewed the relationship between the body and the mind and "came to consider the mind to have greater significance than the flesh."^{290 (pxii)} Turner argues that the separation of the mind from the body was further supported by secular institutions like the medical profession who took on the "theology of the flesh through a moralistic medicine, and [sic] established itself as the science of the efficient body."^{491 (p3)} Ritenbaugh further explains the implication of this in the Western cultural construction of obesity as a disease:

The Western separation of mind (within the purview of religion) from body (within the purview of science), has led to a view of the individual as not responsible for his/her illness. The aetiology of obesity is described neutrally in biomedicine as a positive imbalance between energy ingested and energy expended. More simply, it is the result of overeating and/or under-exercising. These terms are the biomedical gloss for the moral failings of gluttony and sloth. Important themes in American society are individual control and fear of non-control – obesity is a visual representation of non-control.^{297 (p352)}

de Garine & Pollock support Ritenbaugh's analysis and further explain that the English word "obesity" which has no equivalent in other non-Western cultures,^{297 312 492 493} "has come to have strong negative overtones through the development of philosophical tenets that support the idea that the flesh must be controlled by the spirit, so the regulation of diet is a means of demonstrating control by the mind over the body. Where such control is not exercised, the person is labelled obese or out of control."^{290 (pxiv)} In reference to understanding the body as part of a society's cultural order, embodying the value systems

of a society, Chang and Christakis⁴⁹⁴ state that this focus by western societies on control of the body as a demonstration of the superiority of the intellect was concordant with capitalist ideology central to twentieth-century Western societies. This ideology was important in egalitarian “classless” democratic societies where expectations for social mobility are tied to economic mobility, which can be realised through the might of consumer capitalist ideals.

There are however, gendered differences in body image ideals, such that the desire for thinness sits unequally for Western women, more than for Western men, perhaps reflecting the gendered imbalances in the social and economic mobility between men and women. Western males desired moderate mesomorphic bodies as their ideal, and furthermore, this ideal seems to be common for both Western and non-Western adolescent boys and men.^{282 495-498} However, Western women are generally more concerned about their bodies, tending to overestimate their body sizes and show greater dissatisfaction perceiving greater dissonance to ideals than men.^{282 495-498} Fallon & Rozin⁴⁹⁶ stated that for Western women, their self-concepts are correlated with perceptions of their own attractiveness whereas men’s self-concepts relate more to physical fitness and effectiveness. A possible theory is that Western women’s social class mobility is still relatively limited in comparison to men and a possible avenue for class progression, made possible in “egalitarian” democratic societies is through marriage to more wealthy men. This could reasonably be described as the “Cinderella” syndrome, with women accepting that attaining and maintaining beauty ideals, which include thin bodies, can ensure economic well-being and social class mobility through good marriage prospects. Allan’s et al.’s study on body image values of white American women provided a quote supporting this point:

Quote from a Caucasian women; “We live in a society where people are first attracted to each other by mere physical appearance and this means thinness. If you don’t have that, your choices and options are limited when it comes to men. You innately know, as a woman, as your mother always told you, the best way to get a man and keep him is to be thin.”^{499 (p330)}

The constitution of mass media and its pervasiveness, its ability to reach all women, men and children of divergent classes has been credited for perpetuating this gendered “Cinderella” syndrome and standardising the thin body beauty ideals.⁵⁰⁰⁻⁵⁰² Powerful groups and businesses who control the media, market their own ideals of femininity and masculinity, commodifying ideals of beauty as youth and thinness, and silencing what is not; that is, the old, the coloured, the disabled and the bigger-bodied human diversity reality. Higher prevalence of negative consequences like disordered eating and physical activity practices and mental stresses like anxiety, depression and low self-esteem, leading to illnesses like anorexia nervosa and bulimia, are therefore observed more often in Western women and girls than their male counterparts.⁵⁰³

Therefore, if cultural ideals of body weight and size provide some indications as to the values and history of a particular culture, the desire for thinness and relative smaller body sizes suggest that modern Western capitalist environments valued intellect over physicality, both as a function of attaining economic well-being as well a cultural reflex to control over-abundance. It reflects historical religious beliefs which have been affirmed by traditional Western medical practices of dichotomising the body from the soul, spirit or mind, with the body becoming an entity for control. It reflects the unbalanced power of women with social mobility possible through achieving standards of “attractiveness” and ensuring marriage of men who are wealthy, made possible by egalitarian democratic social structures. It reflects the commodification of the body by powerful media and market forces, and their entrenchment of the “Cinderella” syndrome for women, which results in problematic body image ideals more for women rather than for men. Table 5.1 summarises the different hypothesised explanatory factors between Pacific and Western body image.

Table 5.1: Summary of the different hypothesised explanatory factors between Pacific and Western body image

Pacific traditional social structures & practices	Western traditional social structures & practices
Hierarchical Interdependent communities	Egalitarian / democratic, - allows greater social mobility - Individual independence valued
Health as holistic	Biomedical physical health is more prominent
Communal subsistence - reliance on functional bodies	Capitalism - allows greater social mobility
Lack of body image concerns	Body image concerns females more
	Pushed by mass media, capitalists’ commodification of the body, and gendered social mobility

A critique on Westernisation theory and body image in Pacific people

If Pacific people had never desired 'obesity-sized' body sizes for themselves, then that would explain why they chose moderate sizes as ideal in previous studies.^{279 281-285 287 289} If this is the case, then increased Westernisation or acculturation as an explanatory factor which has been found to be contradictory throughout the literature is baseless. Results from this study found half of the parent group (15 out of 30) believed Pacific people have naturally bigger sized bodies and therefore expected Pacific people to be larger-sized than other ethnic groups. However, equal numbers of Pacific parents (15 out of 30) did not support these beliefs. Literature in this field state that the most marked differences in body image beliefs between ethnic groups is related to the economic status of environments, with developed mainly Western countries valuing smaller body sizes while developing poorer countries valuing bigger body sizes.^{293 312 504} If this were the case, then an expected result from this study would find recently migrated parents would believe and desire bigger body standards compared to those parents who have resided in New Zealand for longer periods of time. The results of this study did not support this acculturation affect, although this conclusion is limited by its small sample size ($n=35$).

A fundamental problem occurs when mismatched cultural assumptions underlying study objectives would as a consequence produce explanations that cannot account for study effects entirely. A critical viewpoint is that the concept of "Westernisation" has been assumed in the literature without clear definitions. According to Baker et al. the term "Western" is invalid in the social sciences and the term "Modern" is used to describe complex social characteristics, as described below:

A society is considered modern if it has a cash economy, a formal education system, is secular in governance and approach to problems, and contains urban units. ...traditional populations, connotes some common attributes such as residence in relatively small kinship groups or villages, subsistence food production, and a minimum of participation in a cash economy or a nation state. It also implies strong continuity in the values and social structures of the group.^{505 (p7)}

Many of the effects between ethnic groups have been explained by the "modernity" and "traditional" dichotomy. The conflicting results from the current literature are probably due to oversimplifying contemporary Island environments which have long-established both modern town areas and traditional communities in the rural areas.

Another key limitation of the Westernisation theory is that explanations for its own modern society's body image ideals for thinner and smaller body sizes are due to over-abundant food environments. Researchers state that 'plump' bodies had also been valued for Western women up until key environmental changes which saw food scarcity become a non-issue for the majority.^{293 312 488} Since the time of industrialisation, a key marker of modernity, when food became more accessible, Western

populations came to desire thinner body sizes as a reflex survivalist mechanism against super-abundance. Previous studies that have explained Pacific populations desire for smaller body sizes as the influence of Westernisation, denotes that this reflex survivalist mechanism does not occur for them. It may be that, as has been found by Jones's²⁸³ study on Samoan adults across rural and urban Samoa, the desire for smaller body sizes by Pacific people was also due to the uptake of a survivalist mechanism by Pacific people who found abundant food in the more modern town areas, while desire for 'plump' body sizes was still relevant for rural communities. It is probable that the case for Westernisation has been over-stated and it may be plausible instead to view that the survivalist mechanisms that can happen in one group of people can also happen in another. Humans have undergone various cultural modifications over thousands of years to adapt to the widely diversified and dynamic environments in which they found themselves. The ability to survive these environments is to evolve and enact new culturally driven behaviours and therefore it can reasonably be expected that no one group will have a franchise on making cultural changes to suit their physical environment and others will not. Emerging cross-cultural studies in this field from non-Western viewpoints support the limitation of "Westernisation" as the explanatory factor in cross-cultural body image ideals.^{506 507}

Furthermore, what may be misleading about positing the Westernisation argument to explain body image in Pacific people and adolescents, is that it assumes Pacific people desire to have body sizes and shapes like their Palagi counterparts. The findings of this study, which corroborates the findings of others, is that Pacific people stated their own body size ideals and then go further to explain their awareness of this being different to their understanding of what Palagi ideals may be.^{284 287 289 508} When asked to identify ideal body role models, Pacific adolescents and parents did not identify Palagi body role models as would be expected if that meant taking on Westernised body image ideals. In valuing their own ethnicity, Pacific students and parents desired to have a body size that reflected their ethnicity and demarcated them from Palagi. They did not want to be of Palagi body sizes necessarily but sought role models of women or men of their own ethnicity or coloured non-Western role models as their body type ideals. Girls chose Aaradhana, a popular New-Zealand based musician of mixed Samoan-Maori-Indian ethnicities and African-American and Hispanic-American celebrities like Beyonce, Tyra Banks and Jennifer Lopez. Pacific boys chose Pacific All Blacks like Tana Umaga and Ma'a Nonu as their ideal body role models and parents chose a smaller version of themselves. Williams et al.'s²⁸⁷ study of Fijian girls showed Fijian girls chose similar role models and particularly liked Hispanic-American Jennifer Lopez for her curvaceous body shape and of having large hips. Adolescents in this study further explained the importance of wanting to look like other Tongans and or other Samoans so as to identify with their own ethnicity (see Chapter 4, Body Ideals, page 164). This pattern for choosing ethnic-based body size role models is similar to the patterns emerging from cross cultural studies in the United States for African-American women.^{264 456 499 509} This is an interesting finding and provides support that ethnicity is a key mediating factor for body image ideals and acculturation or its synonym "Westernisation" have probably been overstated as key effects.

The conflicting link between ethnicity and body size could be due to half of the parent group merely reflecting back the current New Zealand-based environmental norm, which is that body size differs substantially between Pacific and Palagi groups and this is deemed the 'expected' size. Whilst for the other half of parents, it is more likely, that body size ideals are influenced by lifelong weight status, and those adults who were not of a bigger body size prior to present time, do not accept natural ethnic differences in size. Given that most parents were migrants to New Zealand, it would seem that they may have arrived in smaller body sizes which grew in the New Zealand environment, as they aged and as they went through key life stages like marriage and childbirth and entering the workforce. It was clear from parental perceptions on overweight and underweight bodies, that parents did not desire overweight bodies because of detrimental health effects, highlighting again that knowledge on the health effects of obesity is sound and is not the key factor in promoting obesity in Pacific adult groups. At the most, parents desired healthy weight sizes of moderate proportions but were well aware that this ideal size differs markedly from what non-Pacific but particularly Western or Palagi ideals of suitable body weight and size.

“Is the Pacific ‘ideal’ body size the ‘healthy’ body size to attain?”

The implication of this finding, is to ask whether the Pacific parental body size ideal is a healthy body size for Pacific adults to attain? It would seem that students and parents are already choosing healthy body sizes for them which are different to biomedical BMI-defined body sizes. The results of this study mirror's Craig et al.'s ^{53 508} findings which found that Tongan men and women preferred a body size slightly larger compared to their white Australian counterparts but these preferred sizes, if modified to reflect BMI equivalents to percent body fat would show that the Tongan body preferences was both reasonable and realistic.

This question takes us back to reflect upon the appropriateness of using standardised BMI cut-off points as a tool to measure body size and its relation to health across different ethnic groups. The relationship between BMI and health indicators is still unclear. Current studies on health related indicators, for example on blood pressure, cholesterol, mortality and morbidity and its relation to obesity or BMI for Pacific populations have shown conflicting results.^{90 510-518} Generally for the same BMI levels Pacific adults do not show equivalent adverse health profiles compared to Western populations. Sluyter's ⁵¹⁹ study on Pacific adolescent samples and others on Pacific adult samples in New Zealand, show BMI measurements overestimate adiposity levels.^{49 55 58-62 520} BMI has been criticised by scientists for its non-specificity across ethnic groups ^{54 57} and it is probable that weight status classifications using international criteria, used even within the survey this study employed, may overestimate obesity prevalence for Pacific adolescents. Studies on physical fitness and body size have shown that having moderately overweight bodies does not negatively affect physical and cardiovascular fitness.^{188 521 522} These studies need to be replicated for Pacific groups and further

research is warranted to test whether Pacific adolescent and parental body size ideals are in fact healthy body sizes to attain.

It is not clear whether body image research makes any meaningful contribution to obesity prevention for Pacific people, given the cultural-bounded nature of the concept 'body image' which sits at opposite ends of societal worldviews and value-systems. The author challenges the basis of cross-cultural research in this area which began with problematic framing of the concepts "big" to equate to "obesity" as the foundation for Pacific people's body image. The general thrust of cross-cultural research has been to describe differences between groups so as to test this speculative hypothesis. The motivation was to create more body awareness in order to mitigate the effects of "Westernisation" or "acculturation" which bring problematic eating disorders. This seems like a highly a flawed argument when there is unprecedented persistent diminution of the ideal body concurrent with the relentless enlargement of the actual body. Craig ²⁹³ calls this the "ubiquitous presentation of the contrast" in contemporary Western environments, with the slim ideal images prominently displayed on magazines, in movies and on television, billboards, and on the side of buses, while obesity is obvious all around. Westerners idealise smaller body sizes and body image concerns have increased, but this has not decreased the current levels of population obesity prevalences.²⁶⁹

Summary

Culture plays an important role in how health is viewed and defined by an individual and therefore, the concept of obesity needs to be placed in a socio-cultural context. Health is more holistic and this has relevant functional elements for Pacific people. These differences pose substantial threats to communication and understanding between interventionists (or healthcare workers generally) and Pacific communities. For interventions to be acceptable and useful for Pacific people, they must be responsive to the beliefs and desires of these communities. The body image results of this study found Pacific adolescents and parents did not desire obesity-sized bodies but desired a range of average-sized bodies that met their Pacific-defined view of health. Further research is needed to test whether the body image ideals Pacific adults strive for are in fact healthy body sizes to attain (similar to Craig's ⁵⁰⁸ study for Tongan samples). Current tools for measuring body composition using weight continue to obscure the relationship between health and body size for Pacific people. Evidence is mounting on the need for ethnic-specific healthy weight ranges that can be correlated with some confidence to mortality and morbidity.

Furthermore, the author predicts that the incongruent cultural worldviews that exists between Pacific and non-Pacific will not elicit much future body image research from etic viewpoints. Ritenbaugh states that Western researchers have a ethnocentric bias and generally “experience our own culturally derived diseases as real and have only closely questioned disease categories in other cultures which we cannot intuitively understand.”^{297 (p348)} This could similarly be applied to Pacific researchers, who, if they cannot find cultural relevance in the concept of “body image” will not pursue its further exploration through their own ethnocentric biases.

Differences between obese and healthy weight students

Results of the analysis by weight status revealed some expected results in the direction of obesity protective factors. Behaviours undertaken most often by healthy weight students were having a regular intake of vegetables as part of the evening meal, regular patterns of breakfast and lunch meals and being physically active. Interestingly some obesity-promoting behaviours were shared between healthy weight and obese students including both purchasing breakfast and lunch food items which were generally high in fat and sugars, and energy-dense snack foods and takeaways. Both sets of students had ready access to discretionary money to purchase breakfast and lunch food items, given by both parents and other extended family members.

The access and involvement of extended family members in adolescent life is characteristic of communal living which is customary to Pacific families. Despite years of established settlement in the New Zealand environment, Pacific people continue to hold strong traditional family values and preferences for extended family living.^{327 523} All adults within an extended family group are expected to be responsible for the welfare of younger members and having greater numbers of working adults in the household can be advantageous for sharing resources.⁵²⁴ This cultural practice seems salient for both obese and healthy weight student households, with both sets of students confirming the custodial role of older family members.

This is a key implication to note for future interventions with Pacific populations. Understanding household and family configurations should lead to accepting that wider extended family involvement is preferable to nuclear parental engagement, as all older adults' attendant in Pacific homes, as this study has found, continue to have influence on adolescent and childhood lifestyle habits. In addition, educating parents without cultivating changes of behaviour of other adults in the home can seriously limit any positive intervention influence by inconspicuous sabotage. In this regard, family interventions using Pacific definition of wider extended family groups is the recommended standard.²⁴⁹

While students were identical in the purchasing and consumption of breakfast and lunch food items, there were differences in the typical evening meals consumed and differences in the pattern of meal consumption, with healthy weight students less likely to skip breakfast and lunch. This made them less likely to eat more at the next meal event, while obese students reported eating more food to compensate for missed meals. One of the key limitations of this study is that it did not assess absolute food intake and therefore cannot substantiate if food energy intake differences occurred between healthy weight and obese students. However, the objective of the study was to analyse particular food and eating patterns which have been confirmed by existing literature to protect against obesity.^{120 122 123}

^{520 525 526} In this respect, with regards to the assessment of energy intake and expenditure and their

effect on adolescent body weight, it cannot be ascertained with absolute clarity whether it is unfavourable levels of energy intake or energy expenditure that promotes obesity in Pacific adolescent. Although, given both sets of students in this study exhibited similar patterns of food behaviours for two key meals of the school day, consuming the same energy-dense foods regularly for breakfast and lunch, one could surmise that it is possibly energy expenditure which seems to be the key obesity protective difference between healthy weight and obese Pacific adolescents. Habitual levels of physical activity were clearly distinct between the two groups, while there seemed to be convergence on what students ate, that is the types of foods they consumed, particularly outside their homes. Access to unhealthy food items was reported by students to be much more accessible than healthy food items. This study found students purchased what was readily available within their environment and affirms that changes in adolescent food environments is a necessary step to protecting Pacific students from obesity risk.^{123 128 527}

Current literature acknowledges that childhood obesity is a multi-system disease requiring multi-disciplinary tactics and an overarching comprehensive intervention approach.^{66 142 222} This has generally led to a muting of the debate on whether it is best to prioritise food interventions over physical activity exemplars or vice versa. Likewise this study found two potentially competing results with both sets of students engaging in obesity-promoting behaviours by purchasing breakfast and lunch food items, yet increased physical activity levels was clearly the obesity-protective factor between healthy weight and obese students. However, the life-course analysis of the qualitative data revealed that all students engaged in physical activity prior to high school enrolment and it is probably physical activity drop-out that promoted current adolescent obesity status; while food patterns and habits mediated by the surrounding environment and family constraints, like parental employment hours have probably been more stable over time. The consumption of energy-dense snack foods seems to be popular at the adolescent life stage but some adolescents are able to compensate for higher energy intakes more than others, consequently affecting their body weight.⁵²⁸ This study may also have found that energy intakes of healthy weight and obese adolescents were similar but the increased physical activity levels of healthy weight students was at exacting rigour, intensity and duration to compensate for increased food energy levels. The play-off in the energy balance equation, that is between energy intake versus energy expenditure through enacting compensatory mechanisms, is an encouragement to future obesity interventionists to engage exercise and nutrition scientists to identify potential behavioural synergies between food and activity choices. Intervention reviews support the need to combine both elements as an effective means for addressing obesity risk in young people.^{340 343}

Studies also show that health beliefs may have an important influence on health behaviour and understanding the attributions population groups make to body weight change is important for any future obesity prevention effort.^{194 334 529} For example, an Australian study found gender and weight status mediated attributions people made on the causes of body weight change.⁵²⁹ That is, more women than men did not believe physical activity had a major influence on weight and cited more often other reasons such as pregnancy, psychosocial stress, ceasing smoking or effects of medication as being influential and overweight participants attributed their weight change more on physical inactivity rather than their diet.

This study found obese students attributed their weight gain also to physical inactivity and received more parental encouragement to engage in weight loss behaviours, and more importantly, desired significant increases in their current physical activity levels (see Table 4.12, page 179). The fact that obese students did not attribute their weight status to their dietary behaviours is probably correct, if they observed their healthy weight peers purchasing and consuming the same types of foods, and if purchasing food items has been part of their food habits for sometime but weight gain was not observed until recently. Likewise, mothers of this study attributed their body weight changes to similar reasons like childbirth. Pacific mothers desired weight loss but not necessarily by increasing exercise levels. This has important intervention implications since the promotion of dietary change or physical activity as a weight-reducing strategy is unlikely to be successful if people do not perceive it as an important cause of weight gain or to be potentially important for weight loss.

The results of this study recommend that for students, changes in the school environment are needed to better support student physical activity. For Pacific students especially, if current obesity and overweight prevalences exceed healthy weight status levels, which has been found in the greater OPIC study, of which this project is aligned, then prevention strategies may not necessarily be the only action priority. Many more overweight and obese Pacific students are engaging in weight loss attempts which are encouraged with earnest by their families, and providing these students support in their attempts, seems to be a much needed area to address.

For parents of this study, time constraint through long employment hours was the most important barrier to healthy living, and employment status is hardest to change for Pacific parents with inadequate educational and job skill levels. Mothers of this study desired weight loss, and similar to Jackson's⁵²⁹ study, did not rate physical activity as a key weight-loss strategy. Not desiring more physical activity could be due to Pacific mothers' culturally defining exercise as more housework duties or because they do not have historical habits of exercise. Likewise, if childbirth events are blamed for weight gain, supposing that these events involved an increase in food consumption, then dietary changes is probably the correct intervention direction to take for parents.

This study had no parent engaged in a separate exercise or active leisure pursuit. The five parents assessed as active met current activity guidelines through their employment work. For interventionists, this means changes to built-environments to increase incidental activity and decrease inactive pursuits like car-reliance or having active employment places or church community events, where most Pacific parents spend most of their daily time, are key points of action for increasing parental physical activity. Decreasing television usage may also be a potential area although it should come with recommendations for compensatory activities. Future interventionists need to be mindful that perceived causes and barriers are important motivational leverage points to use, but balancing the energy in and energy out equation can potentially reap further positive results.

The evidence presented in this thesis on adolescent and parental food habits affirms others which show that what is consumed, that is the type of foods eaten, and how food is consumed, in other words, the pattern of meal intake is key to obesity prevention.^{126-128 137 139 526} The main influence on the types of foods chosen to eat, is money. The main influence of how and when foods or meals are eaten is time. Both lifestyle factors have already been implicated in the literature in affecting health promoting behaviours, particularly in nutrition and physical activity.^{16 135 238 243 387} Analysis of household demographic variables across student weight status showed that parental time at home was the main difference between healthy weight and obese student households (see Table 4.14, page 184). Obese student parents had more employment time encroachment due to working shift type arrangements, which left them time poor in other areas.

The effect of this type of working arrangement is probably more complex than just spending more time at the work environment, rather than being present in the home environment. Parents stated tiredness, disrupted sleep patterns and irregular body rhythms led to feeling lethargic and lacking energy, which sometimes led to unsafe practices like reckless driving after long shifts (see Chapter 4, Perceived barriers for parental physical activity, pages 132-3). Studies have shown shift type work arrangements are also more physically demanding and more stressful working environments than other employment types, and that they affect personal, family health and social relationships in negative ways.^{192 407 435 530-532} For most parents with this type of working arrangement, home time was trying to find some rest time and choosing convenient options for home responsibilities became the default choice.

Interestingly, there has been very little advocacy for changes in employment arrangements and laws, despite the higher risks associated with long periods of sustained work, both for the worker and in the health-related fields for example, for patients receiving care from over-tired workers.⁵³³ The way in which work responsibilities have slowly encroached into other spheres of life, and its acceptance by dominant Western society, is probably driven by a Protestant work ethic which as described by Weber, saw a broad cultural trend toward a growing portion of the population internalising and valuing diligence which in turn fostered a growth in capitalist political economy.⁵³⁴ This has impacted on

modern societies' trends towards materialism and a cultural accedence that employment status and the accumulation of material wealth is a reflection of personal success, good character, and assiduity.⁴⁰⁶ It is therefore an accepted cultural practice, that to attain money, one must put in the employment time required at the expense of all other responsibilities.⁵³⁵

Quality of life surveys show that, people are currently working longer hours and have accumulated more wealth than past generations'; however present generations do not rate their quality of life higher despite being comparatively wealthier. Instead, current generations desire more leisure time.^{211 212 427}
⁵³⁶ This has led some researchers to implicate modern society's lack of time through employment as a key driver to Western societies' current obesity rates.^{102 198} Some middle-class people are managing this well by downsizing employment time and choosing less monetary gain in exchange for more quality time, and higher income classes are able to buy more time by buying in home-based cleaning or childcare services, for example to manage available time.⁴⁰⁶ However, lower-income families, who already struggle to live on smaller incomes and bear the brunt of disparate health status, do not have that choice. Structural changes need to occur for appropriate safe work arrangements for all workers and sustained working periods should be reviewed.

Another key difference between healthy weight and obese households was not in parental educational levels but in a particular school health education for students and health experience for parents. Healthy weight students tended to have a deeper knowledge of food and nutrition derived from taking health, catering and hospitality courses at school while their parents tended to work in health employment fields or had experienced an adverse health event themselves or through a family member. These results support other studies which found there was an intervening effect of educational status, level or experience on obesity risk.^{210 220 402 537 538} For this study, the effects of greater educational and health experiences led students to attempt more healthy eating habits like choosing to drink water rather than purchasing sugary beverages (see chapter 4, Food and eating influencers, pages 106-7). Their parents likewise, chose not to purchase sugary drinks for home-based consumption or prepared vegetables more often for dinner meals than obese parents.

A key implication for interventionists is that a particular type of applied food knowledge seems to be much more effective than food awareness alone. Results of this study match a greater number of others which have shown consistently that food awareness does not necessarily translate to healthy food behaviours.^{227 229 243 399 412} For Pacific households, it is imperative that interventionists are aware that Island-raised parents may have a particular food knowledge that is different to New Zealand raised parents and students; and that there is a clear gap in food knowledge as related to particular New Zealand based food types which could be addressed immediately.

The results from the body image data showed all students and parents idealised smaller body sizes, and after taking into consideration the earlier points made about the limitations of using current BMI standards for measuring obesity risk in Pacific populations, these body ideals are most likely to be within the healthy range for Pacific populations. The main differences between students was that obese female students preferred slightly bigger body sizes than healthy weight students, (see Table 4.13, page 181) although as stated previously, it is probable that clothing size 14 for Pacific female adolescents is an entirely appropriate healthy body size to attain. In addition, the divergent beliefs between students, with obese students regarding Pacific populations as having bigger body sizes than Palagi groups, could be students merely describing their current New Zealand environment with obvious differences in body sizes and obesity levels between these two particular ethnic groups. There are however no intervention implications to note with regards to body image, as obese Pacific students and their parents showed acute awareness of their overweight status, perceived overweight bodies negatively, desired smaller body weights and sizes and undertook weight loss attempts more often than healthy weight students.

This study has found that lack of parental time at home and not having enough money are structural factors preventing health appropriate nutritional and physical activity behaviours, leading to obesity risk for Pacific adolescents and their families. Greater changes at the societal structural levels are required to address the two risk factors which research has shown are key to preventing obesity risk.^{142 387 539} Societal-level intervention requires political will and is a long-term solution to addressing population weight gain. A number of leading international obesity prevention reviews implicates a complex web of “upstream” societal structural factors which impinge on individual food intake and energy expenditure and directly challenges the notion of individual ‘free will’ regarding food choice and energy expenditure.^{13 66 198 222} For Pacific populations who are already burdened with high obesity levels and continue to live in social situations and environments promoting greater obesity risk, the call for political action is more urgent.

Emergent food studies which show changes in environmental food supply, and food policies that subsidise healthy foods like fruits, vegetables and milk products, are examples of positive societal structural changes that directly address not only obesity risk, but other chronic diseases like diabetes which lead to disparate health outcomes between groups.^{540 541} Changes in the school food environment are particularly important for Pacific adolescents as they are more likely than other ethnic groups to purchase school lunch food.^{139 542} Structural changes are needed also both in the school and employment environment to allow greater physical activity opportunities for both students and parents. The integration of physical activity into daily life is probably more sustainable than just increasing leisure time exercise, but again this will require societal structural changes from other sectors like city planning, transportation and changes to built environments. These changes cannot be sustained without political support, inter-sectoral collaboration and community participation.⁴⁰⁹

Summary

Results of this study found that healthy weight students exhibited obesity-protective behaviours such as habitual physical activity participation, regular breakfast, lunch and vegetable consumption, while obese students modelled obesity-promoting behaviours like inactivity and lack of vegetables for dinner meals. Both students purchased breakfast and lunch food items but the physical activity levels of healthy weight students seemed to compensate for weight gain. Obese students and parents desired weight loss, and environmental and societal interventions are required to promote and support their desired behavioural change. Recommended strategies for addressing obesity risk for Pacific adolescents and their families include structural societal changes in a number of institutions and in government policy, as well as future intervention efforts having an understanding of Pacific social structures and cultural knowledge especially in relation to health beliefs and ideals.

Study limitations and strengths

A number of study limitations must be noted. This is a cross-sectional observational study relying on self-reported data for behaviours related to obesity. Previous studies have noted the limitations in using self-reported accounts of nutritional intake, eating and physical activity behaviours.^{114 117 543} Under-estimation of nutritional intake and over-estimation of physical exertion have been found as there is strong social desirability to portray health-promoting behaviours. Without reliable objective methodologies to measure nutritional intake and physical expenditure, studies in this area are limited to using self-reported data and this limitation should be noted by readers.

In addition, the statistical analyses presented in this thesis are cross-sectional in design. The main aims of survey analyses are to determine if there are associations between the variables of interest. However, correlations do not prove causation or measure the direction or the strength of the associations.⁵⁴⁴ Another major limitation is the issue of confounding in cross-sectional research. That is, while an association can be found between two variables it does not exclude the possibility of a third factor being associated with both variables.³⁷¹

Data from the survey questionnaire were selected for this thesis not to test existing theories or hypotheses but to provide scope and breadth to the study. It had a 'complimentary purpose', to find different facets of the unexplored phenomenon that may emerge and a 'triangulation purpose', that is, to allow convergence of results with the qualitative method for the purpose of building theory³⁵². Therefore, statistical analyses should be interpreted conservatively and looked upon as general patterns of association.

In addition, the OPIC survey sample was unique in its demographic characteristics (89% of the sample was of non-European ethnicity). Furthermore, participants in this study were located in the South Auckland region. Therefore findings are limited in their generalisation to the New Zealand general population or other countries and populations with high risk of obesity. The student response rate for the survey was 54% and results may be biased without the inclusion of non-respondents.

The issue of bias through non-respondents was also observed in the qualitative phase of the study. From total sample size of 1518 Pacific students who met the inclusion criteria, 120 were randomly selected from the OPIC database and then invited to take part in the study. Approximately 40 students self-selected to participate in the study (33 student interviews were completed). Non-participants and their reasons for not taking part in the study were not identified as part of the research process; therefore unidentified factors may have been missed. By observation, the most morbidly obese students who were invited to participate did not come forward to take part in the study. In addition, only 30 households were interviewed and used for comparative purposes (i.e. 15 obese versus 15 healthy weight student and parent pairs). The small number limits the generalisations of the findings.

The interview sample was pan-Pacific to mirror the current ethnicity trends for Pacific youth in New Zealand, who generally are products of mixed-marriages and increasingly identify with all of their multiple ethnicities.³²⁷ This does not occur however for their parents who generally identify with one ethnicity. This was a particular challenge for the researcher, who being of Samoan ethnicity, was limited in cultural competence to the Samoan group but lacked it for the Tongan and Cook-Island groups. In a few cases, Tongan parents would have preferred interviews to be conducted in both Tongan and English languages, but they were constrained to English due to researcher's lack of capacity. In future, the use of Tongan interviewers and research analysts would be the preferred methodology.

Interview recruitment was based on Pacific ethnicity samples available through the OPIC study. Ninety-one percent of the Pacific sample was Samoan (46%) Tongan (23%) and Cook Island (22%) students. The recruitment of interviewees was therefore biased towards Samoan students and families due to their greater participation numbers. However, the OPIC ethnicity question was a forced one-choice option which does not capture the complex and fluid nature of ethnic identification, furthermore limiting interview recruitment. In any case, future studies across a number of ethnic groups should employ the principle of equal explanatory power and equal numbers of Samoan, Tongan and Cook Island participants would have strengthened the findings equally across all participating ethnic groups.

Household income data were limited to the parents' and their spouse/partner's income. This was estimated by one adult household member (the parent interviewee) and was not necessarily estimated by the actual earner, nor did it capture non-parental income or incomes of other adults present in the homes. Given the salience of extended family living arrangements for Pacific families, total household income data may have been grossly underestimated. In addition, total household income was not equivalised to household size, which is a better measure of sufficiency and poverty status.

The uniqueness of the OPIC study in terms of studying correlates of obesity in an adolescent population group from a low-socio-economic area of New Zealand is also a strength of the study. The study sample was predominantly of Pacific ethnicities (59%) and this large sample size ($n=2490$) helps to strengthen the interpretations for Pacific ethnic groups. To the author's knowledge, the OPIC study is one of only two epidemiological studies in the New Zealand environment with such a unique sample profile.⁵⁴⁵

The literature on the role of socio-cultural factors on obesity-risk is emerging. This thesis makes a contribution to the field by investigating the impact of socio-cultural factors on obesity aetiology in Pacific families in New Zealand. Pacific population groups in New Zealand have the highest prevalence of obesity in the world and there is an urgent need to address health disparities in this area. The exploratory nature of the study which took a social ecological approach, capturing both

individual and socio-environmental influences on behaviour, strengthens the development of multi-systems/multi-level preventive and management actions to address population levels of obesity for Pacific populations in the New Zealand context.

The strengths of this study include its contribution to expanding existing theories on obesity aetiology. In relation to Ball and Crawford's ¹⁵ conceptual model of pathways linking selected socio-cultural factors with obesity (Figure 2.3, page 27), the results of this study finds values and beliefs about health, which may differ across ethnic groups, seems to influence obesity-related behaviours. Peoples' views about what it means to be healthy seem to be an intermediary between the proposed socio-cultural factors and pathways proposed in the model (see Appendix G for proposed model). This study proposes variant views of health across ethnic groups may be a mediating factor on the pathways leading to individual behaviours.

One of the strengths of this study is that it provides a perspective on Pacific health by a Pacific member (a Samoan) who identifies strongly with the Pacific (Samoan) community in New Zealand. Pacific health researchers have recommended the use of Pacific research by Pacific people as a vital developmental tool for healthcare improvements, particularly the use of health research as a tool for social justice.^{319 320 546} As a major ethnic minority group in New Zealand, Pacific peoples are overrepresented at the lower end of the socioeconomic spectrum which is linked to their poorer health status compared to the general population. This places Pacific health researchers in a unique social context and opportunity to develop research that addresses inequalities. Pacific-centric analyses are the preferred approach for developing culturally-relevant information which is fundamental to developing meaningful social action to address disparate health states.^{363 546} A strength of this thesis, it that it takes an ethno-centric (Pacific/Samoan) approach, weaving the culture of the participants and the researcher into the methodological framework and text.⁵⁴⁷ In this way we "can comprehend something in as many new ways as possible, to construct the composite that finally, more comprehensively allows us to understand an issue, phenomenon or culture from perspectives of not just the researcher but the researched."^{548 (p279)}

Health information is essential for health services development and management. One of the aims of this study was to capture information on healthy states rather than just on disease-risk conditions. That is, to elucidate the behaviours of healthy weight Pacific students as well as obese Pacific students. This is a novel approach and strengthens the development of preventative actions.

Chapter 6

CONCLUSIONS & RECOMMENDATIONS

This chapter outlines the main findings of the study and provide specific recommendations for future obesity prevention programmes for Pacific populations in New Zealand. In addition, recommendations for future studies are suggested.

Summary of main findings

In the New Zealand environment, Pacific population groups bear the burden of disparate disease states particularly in non-communicable conditions like diabetes and obesity. Current surveillance methodology have been able to confirm that Pacific children, adolescents and adults have the highest prevalence of obesity over other ethnic groups in New Zealand but few have investigated the determinants of obesity for these groups. Having an understanding of the factors that influence eating and physical activity behaviours is important for developing public health strategies to address health-risk conditions such as obesity. This study addressed a key gap in the literature by exploring the socio-cultural factors that may promote obesity in Pacific adolescents and their parents and furthermore focused on a solution-based paradigm to explore the causes of non-obese states (or being of healthy weight) in Pacific adolescents.

This study confirmed the salience of economic conditions on food and eating behaviours of Pacific adolescents and their families. Parent, particularly mothers, were identified as the most influential personnel on adolescent food habits. Pacific parents confirmed that the most influential factors on adolescent and family food habits were cost and affordability. To save money Pacific parents chose cheaper foods which were often the unhealthiest (high in fat) and chose foods that could satiate rather than for its healthfulness state. Experiencing chronic food stress, and being of an impoverished state, affected parental food choices and feeding practices, with 'comfort foods' or foods that were desirable to adolescents often used as a coping strategy for stress.

Another key factor on adolescent food habits is parental time constraints on the supply and preparation of healthy foods, which is consistent with previous studies on the food habits of low-income population groups. Time pressure due to parental employment types, particularly shift work arrangements, was a key difference between obese and non-obese Pacific adolescents. Households with an obese adolescent did not have an adult present at home to monitor children's food behaviours or prepare foods, particularly healthy school foods for children. A higher intake of convenient takeaway food

meals, skipping meals, (mainly breakfast) and making money available for purchased school lunches were the default choices of time-constrained parents.

Pacific adolescents, regardless of weight status, and their parents had sound healthy food knowledge. However, only a few Pacific families applied this knowledge or actively practiced health promoting food habits. Those who applied this knowledge tended to be parents who had higher education levels, or worked in health-related fields or those who had experienced health-adverse events within their household. Health promoting food habits included applying food rules in the home, monitoring children's food intake and making effort to prepare healthy home-cooked meals.

Pacific adolescents often ate New Zealand based foods outside of their home environment and Pacific based meals inside it. A food and nutrition knowledge-gap was identified with Pacific-raised parents reporting unfamiliarity with the healthfulness of particular New Zealand-based foods which their children consumed almost daily. Adolescents who received broader educational opportunities in food and nutrition seemed to apply their knowledge more readily than adolescents who did not take catering, hospitality or health classes at school.

Traditional Pacific values are still evident in the way food is prepared, served and distributed in special occasions and the practice of toonai (Sunday lunch) for Pacific communities in New Zealand. This study found that Pacific families continue to compensate for toonai (Sunday lunch) meals on Sundays (e.g. by eating less meals on Sunday and or Saturday), and it is very likely, that it is not the practice of toonai (Sunday lunch) or the over-eating at irregular special occasions that contributes to the increased intake of energy that promotes obesity in Pacific communities. The intake of cheap energy dense foods on a regular daily basis is likely to be the major contributory factor in the increased risk of obesity in Pacific communities.

Pacific parents encouraged adolescent independence and older children were expected to be responsible for organising and monitoring their own daily school food intake. This was related also to household size, with older children from larger families receiving less parental supervision on food habits than younger children. Money was made available, or older adolescents were able to source money, from extended family members to purchase school food items on a daily basis. Adolescents purchased food items that were tasty, affordable and easily accessible within their immediate environment, i.e., the school canteen or shops outside the perimeter of the school. Health-related motivations rarely featured in adolescent food purchasing behaviours.

Results of this study found healthy weight Pacific adolescents were significantly more active than obese Pacific adolescents. This is in line with the conclusions of other studies providing further evidence to support the protective effects of daily physical activity against obesity-risk.^{164 340} Pacific adolescent motivation for activity, and rationalisations for drop-out of sporting activity, were consistent with studies of youth physical activity worldwide. Self-efficacy, the need for social support, and structural barriers of lacking money or transport due to safety reasons, were the main reasons for dropping out of physical activity and were also the perceived barriers for future activity.

All students, regardless of weight status, and their parents valued physical activity for its health protective affects and parents encouraged their children to participate in physical activity from a young age. Most Pacific adolescents were actively engaged in sports activities right up until entry into high school or senior school levels. This study suggests the structure of the current high school sporting environment, which values sporting achievement over physical activity enjoyment, contradicts the physical activity motivation of adolescents inhibiting their participation. The non-compulsory nature of school physical education into senior school levels further decreases the opportunity for adolescent physical activity, devaluing the importance of participating in daily physical activity for increasing health benefits.

Very few Pacific parents met current guidelines for health beneficial daily physical activity. Time constraint due to employment responsibilities was the most influential factor in adult physical activity. In addition, managing large extended households, with younger children and elderly members, and the existence of chronic illnesses in Pacific households, were also time-intensive environmental obstacles to participating in daily physical activity.

Time is the key barrier for Pacific parents to be active. The current socio-environment does not allow Pacific parents the time to be active, and physical activity rates vary according to seasons with a decline of adult physical activity especially in winter seasons. Lack of time from managing large households, and households with members in ill health, are the environmental norm for Pacific adults. Time taken to fulfil community obligations as being part of church members is salient. Work time encroaches on leisure time and many parents find it hard to manage a work-life balance. Lack of time for parents to be active is salient given the work occupation strata that Pacific adults fulfil. Changes need to occur at employment environments to support further parental physical activity.

While Pacific parents had high expectations for their children's physical activity participation, they desired this less for themselves. This may be related to differential cultural definition of physical activity, with most parents defining "exercise" to mean household-based work or purpose-led activity. Most Pacific parents were generally unfamiliar with "exercise" as defined in the Western construct as a structured individualised health-promoting physical activity. Nevertheless, increasing the

understanding of Pacific people in the Westernised cultural concept of “exercise” is unlikely to affect behavioural changes as the key constraint to current activity is lack of time due to employment and household responsibilities.

Students’ body image ideals were mediated by gender and functionality. Girls reported smaller body sizes to fit within clothing sizes 12-14 as their ideal, while boys generally desired to gain weight to attain male physiques that were competent in sporting activities. Pacific mothers reported body image ideals at clothing sizes 14-16 was ideal for them. Parents valued functional bodies, rather than bodies for aesthetic reasons. For example, bodies that could achieve daily tasks like housework, childrearing and meeting the needs of the family were classed most desirable by Pacific mothers.

Students’ ideas about the cultural norms for ideal body sizes were mostly influenced by media portrayals of Pacific or non-White celebrities and New Zealand male sporting personalities. Pacific mothers were less influenced by external or media personalities but desired their own pre-marriage and pre-childbirth body sizes as their most influential standard. Pacific adolescents and parents rated each other as the most influential person in the encouragement to body size change.

Most students and parents did not believe certain ethnicities or cultural groups were expected to have different body sizes, shapes and body weights. All students and parents perceived overweight and underweight bodies to be undesirable for adverse health consequences, suggesting they understand the link between obesity and health.

Obese students were very active in attempting to change body weight and size, and were strongly encouraged by parents to fit cultural norms for body size. Increasing physical activity was the main strategy employed by students to manage and control body weight. Parents reported using both food restriction methods and increasing daily physical activity as strategies most commonly used to control body weight. Parents rated social support, for example, exercising or dieting together with others, as a key factor in successful weight loss experiences.

The comparison of the responses of healthy weight students to obese students found the differences between the two sat more on the behavioural end of the continuum rather in the social-cultural environs. That is, there were very little differences in beliefs, values and attitudes to food and eating, physical activity or body image ideals between healthy weight and obese students. Likewise for their parents, all parents showed good knowledge about healthy foods, about the health benefits of daily physical activity and desired smaller body sizes for themselves and their children. Students and parents understood the link between food and particular eating habits, physical inactivity and body size to obesity-risk. Most desired more healthful eating habits, an increase in physical activity and changes to current body size.

The key differences between healthy weight and obese students were found in greater regular physical activity participation, regular consumption of vegetable foods and regular patterns of meal consumption observed in healthy weight students. In contrast, obese students were inactive, did not consume vegetables daily and skipped meals like breakfast and lunch more often than healthy weight students. Obese students were also most dissatisfied with their body weight, received more parental encouragement to lose weight and engaged in weight control behaviours more than healthy weight students. Healthy weight students and parents seemed to have more health-related knowledge and experience than obese students and parents.

Analysis of student responses by household demographic variables showed the key difference was in parental presence at home, with healthy weight student households more likely to have a full-time or part-time parent at home, while obese student households had parents that were more likely to be working in shift type working arrangements, which encroached on parents' ability to be at home. In terms of social support, Pacific adolescents rated parents and other extended family members as the most influential social support group for the encouragement to healthy eating, for physical activity participation and for body image ideals. Obese students received significantly stronger parental encouragement to eat healthily, to increase physical activity and to lose weight than healthy weight students. These results suggest the home environment and the family unit (Pacific defined) is the most influential for promoting health behaviours of Pacific adolescents, which provides further support for family-based intervention strategies to address childhood and adolescent obesity.^{344 402}

Implications and recommendations

1. Develop food pricing control policies

The results of this study found that socio-economic structural circumstances determined food behaviours more than cultural beliefs and values about food. This analysis has important implications for obesity interventionists, as framing the determinants of healthy eating between individual cultural and social structural factors will determine the appropriate interventions. A key implication for interventionists is that if food habits are influenced more by structural factors rather than cultural, then interventions that address structural barriers should prove more effective. This study supports the evidence from other studies which found that cost and affordability of food was found to be the main barrier to healthful eating and this should therefore be addressed as the intervention priority.^{238 243 386}

³⁸⁷ Food price is a particularly important consumption determinant among low-income groups and therefore has the greatest potential to reducing health inequities in low income groups. Food price controls can involve either increasing the prices of foods which contribute to an unbalanced diet and or reducing the price of foods which would contribute to a more balanced nutritional intake. Supplementary grants for food purchases needs to be made available for such families to mitigate food insecurity. Food policies that directly impact on the cost of healthy food, for example, removing Goods and Services Tax (GST) on healthy foods will address perceptions of expense and affordability particularly important for low-income population groups.

2. Target obesity interventions for low-income Pacific groups by specifically addressing holistic life-skills training, rather than limiting interventions to changes to health behaviours.

This study also found that living in impoverished conditions may exert a particular dynamic on individual behaviour which to date, has not been exposed by previous investigations. For example, some families related food cost as the main barrier to healthful eating but parents still purchased high-cost food items like takeaways for their families and children. Furthermore, underlying the reports of perceived cost as a barrier to healthy eating were low motivations to make behavioural changes. This study suggests certain structural environmental factors related to poverty affects food habits of Pacific people and mass reach intervention and education programmes will likely to be ineffective for this group. Specific interventions that reach low-income impoverished groups will need to prioritise the elements of motivation, self-esteem, self-confidence, and life-skills training as well as making policy changes to structural barriers part of an effective programme. The development of interventions for low-income groups will require concerted efforts across a number of social change agencies and would not merely be about food or physical activity goals per se. Attaining fundamental health protective traits, like educational qualifications leading to employment and higher income levels, which

research has consistently shown protects against obesity risk, should be the intervention priority goals.^{16 210}

3. Revise sustained employment hour policies

Time constraint was also a key barrier to healthful eating and the engagement of Pacific adults in health-promoting physical activity, which is supported by other studies. Analysis of household demographic variables across student weight status showed obese student parents had more employment time encroachment due to working shift type work arrangements leaving them time poor and absent from home. There is a case for making policy changes to continuous work time arrangements particularly in occupations requiring personnel to work longer than ten hours. For Pacific families overrepresented in low-skilled, low-income shift work occupations, these employment law changes are more pertinent. This is important for both the safety of workers and the public receiving services from such work agreements. This will also require a general New Zealand cultural paradigm shift in the value of work and employment status to overall health and family well-being. Government policies that support the well-being of families, by ensuring better work-life balance, should be prioritised.

4. Develop public policies to incentivise health promotional activities in workplaces and target different physical activity strategies depending on the environment most frequented by Pacific adults during the week.

This study found parents with active occupations, or who take active transportation to workplaces, are meeting the current guidelines for adult physical activity. To increase the sustainability of daily physical activity, it should be tied to customary activities like employment. Workplaces are a good environment opportunity for encouraging adult physical activity and should be supported by overarching government policies that incentivise workplaces to support health promoting activities for employees. For non-working adult members of the family, (for e.g. stay-home parents at home), different strategies are needed to increase daily physical activity (for e.g. home-based exercise programmes). The relevance of religion in the lives of Pacific communities in New Zealand, also offers the church as a possible environment to target as an institution for promoting physical activity (i.e., probably most relevant for elderly Pacific members).

5. Re-establish the Healthy School Food policy^{xi 549}

Related to time constraints, parental feeding practices to compensate for poverty, the cultural role of extended family members in adolescent minding, and parents valuing older adolescents' autonomy, is the ability of Pacific adolescents to access discretionary money for purchasing daily school food. Access to unhealthy food items was reported by students to be much more accessible than healthy food items. This study found students purchased what was readily available within their environment and affirms that changes in adolescent food environments is a necessary step to protecting Pacific adolescents from obesity risk.^{122 128 527} Both central and local government agencies have a role to play in setting public health policy in institutions under its influence and the recent Healthy School Food policy requiring all public schools to meet current nutritional guidelines for school food is a step in the right direction for Pacific youth.⁴⁰⁹

6. Increase public funding to re-structure compulsory physical education and/or health curricular in secondary schools

Habitual levels of physical activity were clearly distinct between healthy weight and obese Pacific students. The current high school sporting environments does well to support students with exceptional sporting skills. However, those with average ability but an enjoyment of sports and active leisure are often left out of school sporting opportunities. Structural changes need to occur within the schools environment to maintain the interest of Pacific young people in sporting activities. This is likely to require further government funding support for both facilities, equipment and given the decline of community volunteerism, sports and physical education personnel. The continuation of compulsory physical education or other health-related class is recommended through all secondary schooling years, as a testament to the value society places on the balance of physical health and well-being to other life domains taught within the education system. This would align with current government policies for working adults that aim to achieve work-life-balance, with life-balance education beginning from within the secondary school system.

7. Establish public subsidy for school sports fees and transportation to address neighbourhood safety concerns

Students' reasons for drop-out in activity matched their perceived barriers for future activity. To mitigate the structural barriers, interventionists can address monetary cost and transport for safety, by subsidising sports fees and providing transport for after-school activities. This study found

^{xi} At the time of writing this section of the thesis, a new political party was elected into New Zealand's government and reversed the Health School Food policy which was set in 2007 by the previous government.

neighbourhood safety was a critical inhibiting factor for Pacific girls' sporting activities. Safe transportation between home, school and sports venues was particularly important for Pacific parents who wanted greater parental or adult supervision of their girls' activities. These findings are supported by other studies which also found the salience of neighbourhood safety affects on physical activity participation of low-income communities.^{244 428 430 431 538}

8. Provide on-going specialist school-based food and nutrition education compulsory throughout the secondary school years for adolescents and for Pacific communities generally.

A more applied education experience was found to be another key difference between healthy weight and obese students, with healthy weight students who took specialist classes like catering and hospitality showing deeper knowledge of food and nutrition compared to obese students who were not enrolled in these specialist subject classes. Likewise, for parents those working within health-related fields or were managing chronic illnesses made conscious food and nutrition choices and applied their knowledge even within their environmental constraints. This result supports other studies which found there was an intervening effect of educational status, level or experience on obesity risk.^{210 220 402 538 550}

These results suggest that educational efforts like one-off food awareness campaigns does not necessarily translate to healthy food behaviours and it is the practical application within a group's perceived environmental constraints that should be the food educative approach that future interventions must now adopt.^{227 229 243 399 412} Further food education efforts needs to move beyond awareness to application of food knowledge, for example, like purchasing on a budget, making meals for large families, cooking low-fat options and increasing confidence in cooking and trying new recipes. Regular affirmation of food knowledge is recommended with continual school-based food and nutrition education compulsory throughout the school years and Pacific community adult based classes also recommended. For Pacific households, it is imperative that interventionists also understand that Island-raised parents may have particular food knowledge that will be different to New Zealand raised parents and students. This study found a clear gap in food knowledge as related to particular New Zealand based food types which could be addressed immediately by food education efforts for Pacific parents.

9. Use Pacific-defined family units (i.e. extended family units or household units) for future obesity interventions targeting Pacific families (not just nuclear parent-child arrangements).

This study also found parental influence and the home environment was rated highest by Pacific adolescents as having the greatest influence on their food and eating, physical activity, and body image status. Adolescent and parental eating habits were comparable further suggesting that environmental factors may influence the eating habits of the whole household. The consistent nature of the evidence showing close alignment between parental and children's food habits advances the argument further for childhood obesity interventions to involve parents in future endeavours.^{227 241 402}

This study found that the continuing role of extended family members in influencing Pacific adolescent well-being suggests that future interventions for Pacific communities should involve extended family groups or undertake community development approaches to ensure there is sufficient reach for all members of a Pacific family unit. Educating parents without cultivating changes of behaviour of other adults in the home can seriously limit any positive intervention influence by inconspicuous sabotage. In this regard, family interventions using Pacific definition of wider extended family groups is the recommended standard.²⁴⁹

10. Use participants' beliefs about causes of weight gain and barriers to weight loss to design obesity prevention or treatment efforts. These are likely to be different according to gender, age and ethnicity.

This study found obese Pacific students and their parents showed acute awareness of their overweight status, perceived overweight bodies negatively, desired smaller body weights and sizes and were undertaking weight loss attempts more often than healthy weight students. In addition, strategies for weight loss differed by age and gender. Adolescents preferred increasing their physical activity while their mothers preferred social supported dieting and physical activity endeavours. Interventionists should note that motivation is a key part of intervention design and beliefs about causes of weight gain and barriers to weight loss may be important motivational leverage points to use for future obesity prevention or treatment efforts.^{334 345 529} This study found (and supported by studies of other youth) that health benefits were insufficient motivators for Pacific adolescents.^{449 450 551} Bodies that could function in the sports arena were most desired by Pacific adolescents. Interventions that deal with the communities' societal-issues and priorities like safety, economic well-being or cultural maintenance, may override any health motivations and should be addressed first and ideally in conjunction with weight-related health goals.^{40 552}

11. Use Pacific definitions of health to design future obesity prevention or treatment strategies

Results from the body image section of this thesis found that culture plays an important role in how health is viewed and defined by an individual and therefore, the concept of obesity needs to be placed in a socio-cultural context. Health is more holistic and as has relevant functional elements for Pacific people.^{256 258 481} These differences pose substantial threats to communication and understanding between non-Pacific interventionists (or healthcare workers generally) and Pacific communities. For example, weight loss may not be desired to meet medically-defined measurements of obesity, which through the Western construct is an assessment of health status, but a Pacific mother may desire weight-loss to enable her to function within her family, which is her cultural definition of good health. For interventions to be acceptable and useful for Pacific people they must be responsive to the beliefs and desires of these communities and a basic understanding of the culturally distinct ways Pacific people view "health" is a key recommendation for any future effort in this area.

12. Prioritise obesity treatment efforts (rather than prevention) for Pacific adolescents and communities

Current prevalence statistics shows two-thirds of Pacific adolescents are overweight or obese, and two-thirds of Pacific adults are obese.^{9 10} Obese Pacific adolescents were engaging in weight loss attempts which were encouraged with earnest by their families, and providing these adolescents support in their attempts, seems to be a much needed area to address. This study suggests that it may be time to move forward from prevention schemes to implementing treatment strategies and programmes as overweight and obesity now affects the majority of Pacific adolescents, families and communities in the New Zealand environment. In addition, treatment studies may be beneficial for testing causative relationships and the relative contribution between energy intake and expenditure with obesity risk.

Recommendations for future research

1. Establish New Zealand norms for BMI with details for specific age and ethnic groups

Given the high level of disease prevalence by ethnicity in the New Zealand environment, and the unique growing ethnic composition of its population, New Zealand needs its own population-specific national reference growth data for body mass index rather than relying on North American population standards to measure and monitor its population trends of obesity. This study found New Zealand-based Pacific adolescents and their parents rated average-sized bodies as ideal, but there is currently insufficient evidence for accurately assessing these ideals to healthy weight ranges that can be specific to Pacific ethnicity, nor can these ideal BMIs be correlated with any confidence to mortality and morbidity. Having ethnic-specific BMI charts for those who show the most obesity-risk, particularly Maori and Pacific children and adolescents, would also greatly enhance the assessment and monitoring of obesity in these groups.

2. Establish best-practice guidelines for national surveys to use the principle of 'equal explanatory power' in sampling population groups.

Also related to the high prevalence of key lifestyle diseases and conditions by ethnicity is the need for quality research data on Pacific groups and their health status in New Zealand. Previous research efforts have not addressed this in their sampling techniques and having limited Pacific sample sizes can affect explanatory power and overall representativeness of research findings to Pacific population groups. National surveys are recommended to take on board the principle of 'equal explanatory power' by sampling equal numbers of New Zealand's key ethnic groups to be represented in surveys.³³⁰ This will allow analyses and interpretations for all groups to be at the same breadth, depth and quality which are essential for studies that look to make cross-cultural analyses.

3. Investigate both nutritional and physical activity behaviours concurrently in future obesity-risk studies

It would seem growing portions of the general population are undertaking weight control behaviours more regularly.¹⁰⁷ Weight loss attempts may confound cross-sectional studies looking at the interaction between BMI and nutritional behaviours and it has been recommended that study participants reporting weight control behaviours be excluded from future cross-sectional study analyses.¹¹⁹ Self-reported data on food intake and physical activity cannot measure accurately these behaviours when there are strong social desirability effects in social environments.^{115 117 543 553} This presents real challenges for researchers in the field and highlights the need for more innovative methods and particularly more objective ways of measuring nutritional intake and behaviours. Exercise scientists have been progressive in this area through testing activity in the field using new objective

measurement tools (for e.g. pedometers that count daily steps). The likely interaction between the two components of the energy balance equation (energy intake, food vs. energy expenditure, physical activity) suggests both elements should be investigated concurrently in future obesity-risk studies.

4. Establish best-practice guidelines for cross-cultural comparative studies, which at a minimum should investigate factors pertinent for both Pacific and non-Pacific groups concurrently in the same study.

Cross-cultural research seems popular particularly for multi-cultural Western societies like New Zealand. Unfortunately most cross-cultural studies that do not begin with Pacific worldviews can be limited in using deficit analyses by comparison of 'other' cultural behaviours to assumed 'normative' cultural practices. It is recommended that cross-cultural studies in this field take on the anthropological basis for research and begin to appreciate that "cross-cultural comparison allows us to see our own (Westernised) society's health problems and cultural beliefs about health in a new way."³¹² Studies that go beyond the limited framing and blaming or deficit analyses and instead do complete cross-cultural analyses by juxtaposing both sides of the cultural divide, will be more beneficial for diverse multi-cultural communities, who cohabitate in the same environments. For example, academic studies into the socio-cultural factors that may promote or prevent obesity for New Zealand's general population are just as relevant and could be completed alongside studies for socio-cultural factors for obesity risk in Pacific populations. This addresses the assumption that only one cultural group holds the solution for particular health conditions. Equalised comparative studies has the potential for all participating groups to learn from each other which could enhance the resolutions for all groups, particularly to shared health problems like increasing obesity which currently affects all of New Zealand's ethnic groups.

5. Collect more wide-ranging indicators and in-depth data to measure SES levels of study participants.

Current evidence suggests that different indicators of SES, that is occupation, education and income, are differentially associated with weight gain indicating that different social conditions may play a role between SES and obesity.²¹⁰ In the New Zealand context, SES confounds Pacific ethnicity patterns as there are strong relationships between the two and research in this area needs to do more to collect all variant definitions of SES to fully understand the health protective effects of SES components. This is particularly important for developing targeted interventions and reducing obesity risk particularly amongst the most disadvantaged communities.¹⁶

6. For complex multi-system health conditions like obesity, use mixed-methodology research approaches

Given the limitation with current self-reporting measures of nutritional and physical activity behaviours, experts in the field are becoming more vocal about using new methodology to explore obesity aetiology particularly across sub-populations.^{40 199 222 226 331} Quantitative studies that seek to describe nutritional or physical activity behaviours are limited in their explanatory power on factors that may mediate human behaviour. Social scientists urge the use of multi-disciplinary approaches to understanding human behaviours, particularly the use of qualitative studies which imbeds the social-context on human behavioural habits and patterns.^{15 290 333} The advantages of using mixed-methodology approaches as used in this study is recommended for any future investigations into complex multi-system health conditions like obesity.

7. Use of a solution-oriented research paradigm to identify the causes of improved health states (i.e. being of healthy weight) rather than causes of disease-states (i.e. being obese).

Last, an alternative and complementary research strategy for future research in this area is the use of a solution-oriented research paradigm to identify the causes of improved health states rather than the traditional reductionist approaches that seek to understand etiologic mechanisms to disease.⁴⁰ For example, research into how Pacific families have remained “resilient” to weight gain and obesity in impoverished environments with improved physical health status, may assist in the development of strategies aimed at preventing weight gain in others and are hereby encouraged. This will also be of benefit for case-study role modelling as part of social marketing campaigns for Pacific communities in New Zealand.

Concluding remark

It is very likely that the recommendations suggested here have been presented before while political and policy response has been slow. Some authors explain this is due to inconsistent dominant cultural values such as 'free will' and 'individual right' which run counter to public health goals like 'health equity for all'.^{319 554} This has led subsequent governments to promote contradictory messages like "lose weight but enjoy the market-based offerings that encourage weight gain."^{198 (p8)} Policy makers are therefore encouraged to assess outcome impacts carefully as proposed policy change will no doubt impact on commercial interests of other groups. However these repercussions should also be carefully assessed against future government health-related costs should no action be taken to remedy obesity risk for Pacific groups. Health prevention is a desirable economic-impact policy approach to take in order to limit increasing health care costs; and the long-lasting effect of children's health status tracking into adulthood should compel those in power towards immediate policy action. Governments also need to be more explicit and act upon its own health goals and values particularly where it values positive health standards as a right for all New Zealanders.

APPENDICES

Appendix A: Summary of studies on body image and Pacific or Polynesian people:

Year	Study	Sample Profile	Methodology	Results
1994	Wilkinson, J. Y., Ben-Tovim, D. I., & Walker, M. K. (1994). An insight into the personal and cultural significance of weight and shape in large Samoan women. <i>International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity</i> , 18(9), 602-606.	70 Samoa-based Samoan ♀, and 70 Australian-based European Australians ♀, ages 20-56	BAQ Questionnaire – The Ben-Tovim-Walker Body Attitude Questionnaire assessing body experiences feelings of overall fatness, self-disparagement, strength, salience of weight, attractiveness, comparing Samoan vs. Australian responses	No differences in feelings of overall fatness, but Samoan ♀ show no pre-occupation with fatness and felt more attractive, stronger and fitter at higher BMI than Australian ♀
1996	Jones, J. (1996). <i>Body image changes with modernisation in Western Samoa</i> . Unpublished MPhil, University of Auckland.	161 Samoa-based Samoan adults ages 29-59, 84 ♀ 77 ♂	20 minute Questionnaire, body satisfaction scale, line drawings for body size and shape scale, comparing urban versus rural responses	No differences in dieting practices, estimation of current body size, body satisfaction, and ideal body size between urban vs. rural respondents.
1996	Craig, P. L., Swinburn, B. A., Matanga-Smith, T., Matangi, H., & Vaughn, G. (1996). Do Polynesians still believe that big is beautiful? Comparison of body size perceptions and preferences of Cook Islands Maori and Australians. <i>New Zealand Medical Journal</i> , 109(1023), 200-203.	132 Island-based Cook Island Maori adults, split 83 ♀, 49 ♂, and 132 Australian-based European Australians, 83 ♀, 49 ♂ ages 20-75,	Questionnaire using graded photographs to assess current body size, ideal, healthy, attractive body sizes, comparing Cook Island Maori vs. Australian responses	Significant difference between ♀, with Cook-Island ♀ making accurate assessment of current body size, Australian ♀ overestimated. Cook Islanders preferred larger ideal body sizes.
1998	Brewis, A. A., McGarvey, S. T., Jones, J. & Swinburn, B. A. (1998). Perceptions of body size in Pacific Islanders. <i>International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity</i> , 22(2), 185-189.	161 Samoa-based Samoan adults and 65 NZ-based Samoans, ages 25-55, 125 ♀, 101 ♂	Questionnaire, line drawing body image tool to assess current size, ideal size, attractive, healthy and normal weight/size perceptions, comparing Samoa-based vs. NZ-based responses	No differences in ideal body size of 'slim' sizes, body satisfaction, and attempts to lose weight.

Year	Study	Sample Profile	Methodology	Results
1999	Craig, P., Halavatau, V., Comino, E., & Caterson, I. (1999). Perception of body size in the Tongan community: differences from and similarities to an Australian sample. <i>International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity</i> , 23(12), 1288-1294.	542 local-based Tongans, 299 ♀, 243 ♂ and 481 local-based European Australians 261 ♀, 220 ♂ mean age range 37-40 years	Photograph series used to assess current body size, ideal, healthy and attractive body sizes across genders.	Significant differences in current body estimations with Tongan ♀ underestimated body size (by 1.5kg) but Australian women overestimated (by 2.3kg). Tongan & Australian ♂ both overestimated by 1.5kg. Significant differences in perception of ideal body for Tongan ♀ BMI 26kg/m ² vs. 21-22kg/m ² for Australian ♀. Tongan ♂ ideal at 28kg/m ² vs. 24kg/m ² for Australian ♂. #Note below:
#Note: "Analyses of the body composition demonstrated consistently larger fat-free mass and lower % body fat in Tongans at the same BMI compared with Australians...the preferred sizes selected by ...Tongan subjects...were quite compatible with measured normal percentage body fat values." P. 1293				
2000	Metcalfe, P. A., Scragg, R. K., Willoughby, P., Finau, S., & Tipene-Leach, D. (2000). Ethnic differences in perceptions of body size in middle-aged European, Maori and Pacific people living in New Zealand. <i>International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity</i> , 24(5), 593-599.	657 NZ-based Pacific (incl. Samoan, Cook-Island, Tongan, Niuean & Other PI) adults, 255 ♀ 402 ♂, and 4464 European NZers and 433 Maori, Ages 40+	Questionnaire with 1-item that assessed weight perception across 5 categories 1. Underweight, 2. 'Right weight', 3. 'Slightly overweight', 4. 'Moderately overweight', 5. 'Very overweight'; and 1 item on weight control behaviour	Significant differences between ethnic groups, at each weight perception category, both Pacific and Maori ♂ and ♀ had greater mean BMI compared to European ♂ and ♀
2002	Becker, A. E., Burwell, R. A., Gilman, S. E., Herzog, D. B., & Hamburg, P. (2002). Eating behaviours and attitudes following prolonged exposure to television among ethnic Fijian adolescent girls. <i>British Journal of Psychiatry</i> , 180, 509-514.	158 Fiji-based Indigenous Fijian ♀, school forms 5-7, adolescent age.	128 completed eating-attitudes questionnaires that assessed dieting & TV behaviours: 30 semi-structured interviews with purposively sampled respondents who self-reported eating disordered behaviours, comparing 1995 vs. 1998 sample responses	Television exposure shows some effects on disordered eating patterns, with participants' interest in weight loss to role model Western television characters.
2002	Lipinski, J. P., & Pope, H. G. (2002). Body ideals in young Samoan men: A comparison with men in North America and Europe. <i>International Journal of Men's Health</i> , 1(2), 163-171.	28 Samoa-based Samoan ♂, age 18-33 81 white local-based Americans, French & Austrian ♂, College/University age	Questionnaire with carded- images assessed current body size, average body size of cultural group, ideal body size and ideal ♂ body size as assessed by women, comparing responses across ethnicity groupings	No differences across all items, correct individual and group body size assessment, and ideal body sizes exactly the same for Samoan ♂ as for American & European ♂
2002	Wang, C. Y., Abbot, L., Goodbody, A. K., & Hui, W. T. (2002). Ideal body image and health status in low-income Pacific Islanders. <i>Journal of Cultural Diversity</i> , 9(1), 12-22.	Hawaii-based 52 Samoan, 23 indigenous-Hawaiian, 2 Tongan adults, mean age 42	Modified Body Image Questionnaire (MBIQ), pictures assessed ideal body image related to cultural affiliation, compared responses across level of cultural affiliation i.e., Pacific vs. Western	Differences in ideal body image according to cultural affiliation, (measurements not provided) but no differences in concerns about these ideals.
2003	Becker, A. E., Burwell, R. A., Navara, K., & Gilman, S. E. (2003). Binge eating and binge eating disorder in a small-scale, indigenous society: the view from Fiji. <i>International Journal of Eating Disorders</i> , 34(4), 423-431.	50 local-based Fijian ♀, age range 18-69	Questionnaire on Body image assessed attitudes towards body shape, comparing responses of self-reported Binge Eaters vs. Non-Binge Eaters	5 women reported Binge Eating*. No difference in BMI levels between binge-eaters and non-binge-eaters. No difference in body satisfaction attitudes and across markers of acculturation to Western culture between the two groups.
* Note "Binge Eating" defined by researcher as "episodes of eating an unusually large amount of food within a discrete time period and an associated lack of control" p. 427 – Highly suspect application of a culturally-bound condition, this may be the normal way to eat in Fijian culture, i.e., feasting? No measures of nutritional intake was completed, in addition, the researcher notes, of the five that self-reported Binge eating "None of these 5 subjects endorsed purging symptoms or excessive exercise." p. 427				

Year	Study	Sample Profile	Methodology	Results
2004	Yates, A., Edman, J., & Aruguete, M. (2004). Ethnic differences in BMI and body/self-dissatisfaction among Whites, Asian subgroups, Pacific Islanders, and African-Americans. <i>Journal of Adolescent Health, 34</i> (4), 300-307.	70 Hawaiians based in Hawaii, College/University students 48 ♀ 22 ♂	Questionnaire, figure drawings assessed body dissatisfaction, across BMI levels	No differences in body dissatisfaction and BMI correlations of Hawaiians compared to other ethnic groups, White American, African-American, & Asian-American.
2005	Becker, A. E., Gilman, S. E., & Burwell, R. A. (2005). Changes in prevalence of overweight and in body image among Fijian women between 1989 and 1998. <i>Obesity Research, 13</i> (1), 110-117.	103 local-based Fijian ♀, split cohorts over two time periods, 52 ♀ in 1989 and 50 ♀ in 1998. age range 19-80	Questionnaire assessed body shape satisfaction and weight control behaviours, compared responses of women across cohort years i.e., 1989 vs. 1998	No differences over time, both groups have low body satisfaction with increased BMI but a difference noted with more ♀ in 1998 showing positive attitudes to weight control.
2006	Williams, L. K., Ricciardelli, L. A., McCabe, M. P., Waqa, G. G., & Bavadra, K. (2006). Body image attitudes and concerns among indigenous Fijian and European Australian adolescent girls. <i>Body Image, 3</i> (3), 275-287.	16 Fiji-based Indigenous-Fijian ♀ and 16 Australian-based European Australian ♀ ages 13-18	Semi-structured interview assessed beliefs, behaviours, future expectations on body weight, size, shape and muscles, comparing Fijian vs. Australian responses	No differences in ideal body size, both wanted body sizes that were 'average', but Austr. ♀ valued aesthetic while Fijian ♀ valued functional bodies. No differences in body ideals or shape according to weight status
2006	Williams, L. K., Ricciardelli, L. A., McCabe, M. P., Swinburn, B. A., Waqa, G. G., & Bavadra, K. (2006). A comparison of the sources and nature of body image messages perceived by indigenous Fijian and European Australian adolescent girls. <i>Sex Roles, 55</i> (7-8), 555-566.	16 Fiji-based Indigenous-Fijian ♀ and 16 Australian-based European Australian ♀, ages 13-18	Semi-structured interview assessed sources and nature of body image influences, comparing Fijian vs. Australian responses	No differences in sources and nature of messages with both groups encouraged to pursue thinness, but for Fijian ♀, extended family members also important, and media less so
2006	McDowell, A. J., & Bond, M. (2006). Body image differences among Malay, Samoan, and Australian women. <i>Asia Pacific Journal of Clinical Nutrition, 15</i> (2), 201-207	56 Samoa-based Samoan ♀, mean age 19.8 years, and Australian-based 56 Malays and 56 European Australian ♀	BAQ & Three-factor Eating Questionnaires, self-reported weight and height and weight perception, comparing responses by ethnicity	No differences in relationship between BMI and negative body attitudes, or BMI and weight perception. Body image of Samoan dieters and non-dieters were similar, significantly different to Australians, showing aesthetics motivates weight control for Australians but not for Samoan ♀
2007	Ricciardelli, L. A., McCabe, M. P., Mavoa, H., Fotu, K., Goundar, R., Schultz, J., et al. (2007). The pursuit of muscularity among adolescent boys in Fiji and Tonga. <i>Body Image, 4</i> (4), 361-371.	24 Tonga-based Tongan adolescent ♂, 24 Fiji-based Indigenous Fijian ♂ & 24 Indo-Fijian ♂, Ages 13-20	Semi-structured interview assessed attitudes, behaviours, future expectations on body weight, size, shape and muscles, comparing responses across ethnicity and with previous Western adolescent ♂ responses	No difference in ideal body size, similar with previous research on Western adolescent ♂; Indigenous Fijian & Tongan boys valued functionality for physical work & sport, Indo-Fijian did not. Aesthetic reasons unimportant for all.
2007	Swami, V., Knight, D., Tovee, M. J., Davies, P., & Furnham, A. (2007). Preferences for female body size in Britain and the South Pacific. <i>Body Image, 4</i> (2), 219-223.	76 Samoa-based Samoan adolescent ♂, split urban Apia vs. rural Savai'i & 36 local-based white British ♂, mean age = 16	Questionnaire rating female images on 9-point scale of physical attractiveness	No differences in ideal BMI of a female body across all groups, rural & urban Samoan ♂ and British ♂.

Appendix B: Participant Consent Form



THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND
HEALTH SCIENCES

The University of Auckland
Private Bag 92019
Auckland, New Zealand,

School of Population Health,
Morrin Rd, Tamaki, Auckland.
www.health.auckland.ac.nz

Telephone: 64 9 373 7599 extn 89356
Facsimile: 64 9 3737 624
Email: t.teevale@auckland.ac.nz

Consent Form for Students & Parents

Obesity prevention study of high school students SUB-STUDY *Obesity in Pacific adolescents*

Researcher: Ms Tasileta Teevale
School of Population Health, Tamaki Campus, University of Auckland

- I have been given, and have understood, an explanation of this research project. I have had an opportunity to ask questions and have them answered. Interviews will be completed individually and will take approximately 1 and a half hours to complete.
- I understand that I may withdraw myself, or any information traceable to me, without giving a reason at any time up to 30 April 2008.
- I agree to take part in this research.
- I agree for the formal research interview to be audio-taped.
- I agree for my son/ daughter to take part in this research

Signed by **student:** _____

Name: _____
(please print clearly)

Date:

Signed by **parent:** _____
(or guardian)

Name: _____
(please print clearly)

Date:

“APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE on 15 March 2006 to March 2009 for a period of 3 years, Reference Number 2006/021”

Appendix C: Participant Information Sheet (PIS)

Information Sheet for Parents & Students



The University of Auckland
Private Bag 92019
Auckland, New Zealand.

School of Population Health,
Morrin Rd, Tamaki, Auckland.
www.health.auckland.ac.nz

Telephone: 64 9 373 7599 extn 89356
Facsimile: 64 9 3737 624
Email: l.teevale@auckland.ac.nz

Obesity prevention study of high school students SUB-STUDY *Obesity in Pacific adolescents*

You and your son/daughter are invited to take part in this research project which is being carried out by researchers from the School of Population Health, Tamaki Campus, University of Auckland. Students attending several South Auckland high schools are being invited to take part in this study. The research project is funded by the Health Research Council of New Zealand.

Why are we doing this study?

Obesity levels are increasing rapidly among young people in New Zealand. The purpose of this research project is to see if obesity levels in high school students can be reduced by programs to prevent obesity in schools and the wider community. Several schools in the South Auckland region are currently participating in the schools obesity prevention program.

As part of this greater study, led by Associate Professor Robert Scragg, a smaller sub-study titled *Obesity in Pacific adolescents* is proposed to interview Pacific young people and their families about food, diet, physical activity and body image. We are interested to hear how Pacific young people and their families view food, physical activity and their physical bodies, so that other Pacific young people and families can learn from each other about how to manage their health and prevent obesity in Pacific families and communities living in New Zealand.

Who is being surveyed?

This study involves about 5000 students enrolled at several schools in South Auckland. Students in Year 9 and above will be approached by study researchers to take part, and if aged less than 16 years will require the written consent of their parent or guardian.

This smaller sub-study will interview a smaller sample of 80 Pacific families from the Mangere area.

Do you and your son/daughter have to take part in this survey?

Participation is entirely voluntary and you and your son/daughter may decline without giving any reasons. If you choose to participate you may withdraw from the interview, or withdraw any information that may identify you, at any time up to 30 June 2008. If you and your son/daughter do not want to participate in the research, the Principal has given an assurance it will not affect his/her assessment, grades or standing at school.

What is involved?

Only Pacific students who have completed the OPIC baseline interview in 2005 will be approached to be involved in the study. This sub-study interview focuses mainly on the home environment of students, and interviews with student parents (caregivers) is required. When both the student and parent (caregiver) has given consent, students and parents will be interviewed

individually. The interviews will take approximately an hour and a half each to complete and will be audio-taped. This involves answering questions on diet, physical activity and body image.

The interviews will take place either at school or home depending on the preference of the student. Parents will be interviewed in their homes. As a show of appreciation and respect a koha/gift is offered to Pacific families at the end of interviews.

What about privacy?

No information that could personally identify you or son/daughter will be used in any reports from this study. The answers you and your son/daughter give to the questions will be stored securely. Data will be stored for a period of 6 years on computer (as per University Guidelines), but will not contain your name or your son/daughter's name, address, family details or any other information that could identify you or your son/daughter.

The results of the survey will be given to participating families, participating school boards, local District Health Boards and relevant government ministries.

What are the benefits and risks of the study?

Students at the intervention schools may benefit from decreased weight gain if the obesity prevention is successful. This may lead to ways of preventing obesity in young people. Students at control schools will be offered the intervention in 2008.

Results of this sub-study will inform young people, schools, Pacific families and communities about the strategies Pacific families employ to prevent obesity within their homes and families.

The only risk involved with taking part is the possibility of embarrassment from talking about obesity. Our research interviewers are trained to respond to this. In the unlikely event of any injury from participating in this survey, you son/daughter will be covered by the Accident Rehabilitation and Compensation Act 1993.

Contact persons

If you have any questions about this research, please contact the Principal Researcher in the School of Population Health, University of Auckland;

Ms Tasileta Teevale – Principal Researcher (3737 599 ext 89356) or
Professor David Thomas – Principal Supervisor (3737 599, ext 85657) or
Associate-Professor Robert Scragg – Principal OPIC Investigator (3737 599, ext 86336)

The Acting Head of Section is: Professor David Thomas - Social & Community Health Section, School of Population Health, Tamaki Campus, University of Auckland, Morrin Road, Tamaki Tel: 3737 599 ext 85657.

If you have any queries or ethical concerns regarding the rights of your students as participants in this study, you may wish to contact: The Chair, **University of Auckland Human Participants Ethics Committee** Office of the Vice Chancellor, Research Office, Level 2, 76 Symonds St, Auckland, Tel: 373 7599 ext 87830.

“APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE on 15 March 2006 to March 2009 for a period of 3 years, Reference Number 2006/021”

Appendix D: Student invitation

If you are interested

in participating in this
PACIFIC FAMILIES STUDY, please
read the **Information Sheet**, and

sign the **Consent Form**.

Return the Consent Form to me by : at



Then I will ring you to arrange a **time and venue** for the **interview** to take place.

We can interview you at your home, at the school or at the University of Auckland campus.



In appreciation for your contribution to this study, a small *koha/mealofa/meaofa*, will be provided, as a sign of respect to Pacific young people, families & communities.

Double movies tickets for students

Supermarket vouchers for parents

Ia Manuia

You are Invited...



**TALOFA LAVA KIA ORANA
MALO E LELE!**

My name is Tasileta Teevale

I am part of the **Living for
Life** Health Programme
run by your school and the
University of Auckland

Do **YOU** want to be part of
a study on Pacific Island
youth & families?

Please come and meet me
for more information!

Meeting Details

Please meet me on:

Date:

Time:

Place:

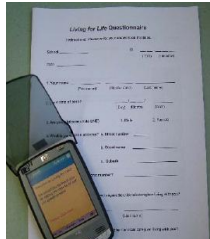


You are invited...

To be part of the Pacific OPIC study in New Zealand,

taking place in Mangere, Auckland

Last year (2005) you took part in the *Living for Life* health survey



Remember?...

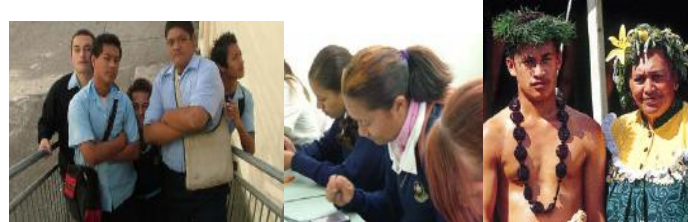
We took some of your physical measurements,



and you answered an electronic survey using little PDA machines



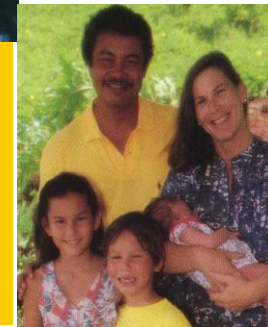
Now we want to follow up, on what's happening with you in 2006, and ask that you and your parent(s) or caregivers take part in a short personal interview with me



Interviewing you will help give us a greater understanding about the decisions Pacific young people (and their families) make with regards to daily living and keeping healthy



Our **vision** is to gather this information, so that other **Pacific youth & families** – who an important part of the school community – can learn from each other, about the best way to **live healthy lives**



Appendix E: Interview Participant Demographic form

STUDENTS DEMOGRAPHICS INFORMATION

We would appreciate you answering a few questions on this form.

This will help us understand the range of people who are participating in the research.

Please write your name here: _____



1. How many people usually live in your house? By house, I mean the dwelling you live in including caravans, garages and sheds.

Enter number

2. Were you born in New Zealand?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

3. If NOT in New Zealand, how long have you lived in New Zealand?

Write in below.

4. As well as being a full-time high school student, throughout the school term, do you work on a part-time or casual basis?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

5. How many people in your household, work full-time?

Enter number

6. How many people in your household, work part-time or casual basis?

Enter number

- 7a. Do you receive regular (weekly, monthly) pocket money from your parents/caregivers or other family members?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

- 7b. If yes, how much do you receive per week? _____

8. Please indicate below the age category you belong to.

Tick one box

Under 12 years	<input type="checkbox"/>
13 years	<input type="checkbox"/>
14 years	<input type="checkbox"/>
15 years	<input type="checkbox"/>
16 years	<input type="checkbox"/>
17 years	<input type="checkbox"/>
18+ years	<input type="checkbox"/>

9. What ethnic group or groups do you belong to?.

Tick one or more boxes if appropriate.

New Zealand Maori	<input type="checkbox"/>
Samoan	<input type="checkbox"/>
Cook Island Maori	<input type="checkbox"/>
Tongan	<input type="checkbox"/>
Niuean	<input type="checkbox"/>
European New Zealand	<input type="checkbox"/>
Other(s), please write here...	<input type="checkbox"/>

10. What language(s) are spoken daily in your home?

Tick one or more boxes if appropriate.

New Zealand Maori	<input type="checkbox"/>
Samoan	<input type="checkbox"/>
Cook Island Maori	<input type="checkbox"/>
Tongan	<input type="checkbox"/>
Niuean	<input type="checkbox"/>
English	<input type="checkbox"/>
Other(s), please write here...	<input type="checkbox"/>

Thank you!

PARENTS DEMOGRAPHICS INFORMATION

The University of Auckland
 Private Bag 5019
 Auckland, New Zealand.
 School of Population Health,
 Murrin Rd, Tamaki, Auckland.
 www.health.auckland.ac.nz
 Telephone: 64 9 373 7599 extn: 89356
 Facsimile: 64 9 3737 824
 Email: h.newell@auckland.ac.nz

We would appreciate you answering a few questions on this form.
This will help us understand the range of people who are participating in the research.

Please write your name here: _____

1. How many people usually live in your house? By house, I mean the dwelling you live in including caravans, garages and sheds.

--

Enter number

2a. How many dependent children aged under 18 do you look after that usually live in this household? (usually means for at least 5 days every fortnight)?
 (By dependent, we mean children who are financially dependent on you.)

--

Enter number

2b. How many children are...

Enter number

...Under 5 years?		
...5-13 years?		
...financially dependent children aged 14 to 17?		

3. Were you born in New Zealand?

Yes	
No	

4. If NOT in New Zealand, how long have you lived in New Zealand?

Write in below.

5. Do you live with a partner or spouse?

Tick one only

Yes	
No	

4

6. How many people in your household, are employed on a full-time basis?

--

Enter number

7. How many people in your household, are employed on a part-time or casual basis?

--

Enter number

8a. Which of the following categories does your personal income before tax fall into.

Please answer for the last 12 months and include all earnings, benefits, investments, assistance (e.g. Accommodation Supplement, Family Support and child support) and any other sources of income?

Tick one box

Up to \$10,000	
Over \$10,000 to \$15,000	
Over \$15,000 to \$20,000	
Over \$20,000 to \$30,000	
Over \$30,000 to \$40,000	
Over \$40,000 to \$50,000	
Over \$50,000 to \$70,000	
Over \$70,000 to \$80,000	
Over \$80,000	

8b. **If you live with a partner/spouse:**

And what is the combined income of both you and your partner for the last 12 months (before tax)? Again, please include all earnings, benefits, investments and other sources of income.

Tick one box

Up to \$10,000	
Over \$10,000 to \$15,000	
Over \$15,000 to \$20,000	
Over \$20,000 to \$30,000	
Over \$30,000 to \$40,000	
Over \$40,000 to \$50,000	
Over \$50,000 to \$70,000	
Over \$70,000 to \$80,000	
Over \$80,000 to \$90,000	
Over \$90,000 to \$100,000	
Over \$100,000	

9. Please indicate below the age category you belong to.

Tick one box

Under 18 years	
Over 18 – 35 years	
36 – 45 years	
46 – 55 years	
56 – 65 years	
66 – 75 years	
Over 76+ years	

10a. What ethnic group or groups do you belong to?.

Tick one or more boxes if appropriate.

New Zealand Maori	
Samoan	
Cook Island Maori	
Tongan	
Niuean	
European New Zealand	

If you live with a partner/spouse:

10b. What ethnic group or groups does your partner / spouse belong to?.

Tick one or more boxes if appropriate.

New Zealand Maori	
Samoan	
Cook Island Maori	
Tongan	
Niuean	
European New Zealand	
Other(s), please write here...	

11. What language(s) are spoken daily in your home?

Tick one or more boxes if appropriate.

New Zealand Maori	
Samoan	
Cook Island Maori	
Tongan	
Niuean	
English	
Other(s), please write here...	

Thank you!

Appendix F: Interview Guide

SUB-STUDY_OPIC with Pacific adolescents & families

Researcher: Ms Tasileta Teevale
School of Population Health, Tamaki Campus,
University of Auckland



The University of Auckland
Private Bag 92019
Auckland, New Zealand,

School of Population Health,
Morrin Rd, Tamaki, Auckland.
www.health.auckland.ac.nz

Telephone: 64 9 373 7599 extn 89356
Facsimile: 64 9 3737 624
Email: t.teevale@auckland.ac.nz

INTERVIEW SCHEDULE_PILOT MAY 2006

1. Briefly explain study and its benefits for participants
2. Participants to fill out Consent Forms
3. Participants to fill out Demographics Sheet
4. Set-up audio equipment, flip-charts
5. Participants to receive vouchers at end of interview

Draft Research Questions

The interview will explore our opinions about food, physical activity and our views about our bodies. You will be asked to comment about what you do and what your family, friends, school, workmates, communities are up to, with regards to every day living activities.

There are no right or wrong answers, only your own personal opinions and experiences.

This first set of questions, relate to our views and behaviours around food.

And we will begin first by documenting what happens in the typical daily life of Name of Participant.

1. Drawing a timeline for a typical working/school day, can you help me fill in what happens during your day, from the time you get up to the time you sleep at night. (Use: sleep, wake, clean, eat, travel, school or work, homework, active leisure activity e.g., sports, dance, kapahaka, inactive leisure activity e.g, TV, computer, Playstation, reading, homework, cooking, shopping, visiting others, hosting others, church events, other?)
 2. Referring to this timeline for a typical working/school day, what meals (including snack times) would you have during this day?
 3. Referring to this timeline for a typical Saturday, what meals (including snack times) would you have during this day?
 4. Referring to this timeline for a typical Sunday, what meals (including snack times) would you have during this day?
 5. What **typical** foods would you actually eat for each of these meals?
 - (a) → (And would these typical foods (including snacks) change between a typical working/school day and Saturday and Sundays? For e.g., is what you eat at lunchtimes during a school day (or work day) different from a weekend lunch? **Y?N**)
 - (b) If yes, why?
 6. Which meal event is the biggest meal of the day, if any?
 - (a) → And why?
 7. (Ask if appropriate) Why would you not have breakfast, lunch, dinner etc?
 8. For these meal events, when do you get to choose what you eat?
-

Ok, lets now talk about the foods we prefer to eat, or our favourite foods.

9. If there was no limitation, what foods would you like to eat?

(a) → And why?

(probe: taste, convenience, cost, familiarity, association with certain events? High/low value, readily available, ease of preparation etc.)

10. If there was no limitation, what drinks would you like to drink?

(a) → And why?

(probe: taste, convenience, cost, familiarity, association with certain events? High/low value, readily available, ease of preparation etc.)

11. Are there any foods that you really like to eat (favourite foods) but don't (or you limit your intake). If yes, what foods and why?

(a) → If Yes, Why would you choose not to eat the particular foods you prefer?

(b) → Are there certain foods you would only eat or prefer to eat on certain days? E.g., Sunday?

12. What foods and drinks would you prefer NOT to eat and drink? ↔ What foods can't you eat? Or forbidden to eat? Or allergic to?

(a) → And why?

13. Referring back to this timeline do some members of the family eat different foods and different amounts of food? **Y?N**

(a) → If so, why, explain?

Ok, lets now talk about where we get our food from.

14. Talking about the meals (and snacks) you have on a typical working/school day, **where** is this food coming from?

↔ Is it bought (from a shop/café/canteen)

↔ or from home

↔ or grown

↔ or gifted/shared by someone else?

↔ other?

15. If its' bought (from shop, dairy, canteen, café) where do you get the money from to buy food?

(a) → And how much would you get/budget to spend on a typical school/working day?

(b) → And how much would you get/budget to spend on a typical Saturday?

(c) → And how much would you get/budget to spend on a typical Sunday?

(d) → If its weekly pocket money, by who and how are the amounts of pocket money decided?

16. When you buy food, what is most important to you, the food or the size (bulk) of it? Explain.

17. Talking about what typically happens at home, **who buys** (or grows) the food in your family? (i.e., does the weekly groceries)

(a) → It its' you, Explain the decisions you make when doing the weekly groceries for the family?

18. For those meal events, when food is not chosen by you, **Who** prepares and cooks the food (type, menu) in your family?

(a) → If its' you, Do you think about what to cook or prepare or eat for an evening (all) meal(s)?

(b) → And when would you do this?

(c) → And why?

(d) → What foods does your family prefer to eat?

(e) → Do you prepare foods according to their tastes?

19. What types of occasions do you buy or prepare **different** (or special) foods from what you would normally buy or eat?

(b) → And how often would you do this (weekly? Monthly?)

(c) → Why is it important to provide these certain types and volume of food on these occasions?

(d) → And what types of people would normally be given this food?

(e) → If you did not provide it, what would happen?

20. On what occasions would you share or gift food and why?

(a) → And what types and volumes of food and why?

21. On what occasions would you receive food?

(a) → And what types and volumes of food and why?

22. How important is it to **eat** the food offered to you at these occasions?

(a) → If you did not eat it, what would happen to you?

23. Can you tell me about a time when you would eat **more** than you would normally eat, or a time, when you're not hungry and you eat anyway. What is happening at this time?

(a) How often would this occur to you? (weekly? Monthly?)

24. Can you tell me about a time when you would eat **less** than you would normally eat, or a time, when you are hungry but you don't eat. What is happening at this time?

(a) How often would this occur to you? (weekly? Monthly?)

Ok, lets now talk about what you know about food

25. What would you say (believe) are foods that are good for your health?

→ Are there some foods, you should eat **more** than others? What foods and Why?

(a) → where did you get the information, that these foods are healthy?

26. What would you say (believe) are foods that are bad for your health?

→ Are there some foods, you should eat **less** than others? What foods and Why?

(a) → where did you get the information, that these foods are unhealthy

27. (Ask if appropriate/ if relevant to Q:5) If you know these foods are healthy, why would you not eat them?

(a) → If you know these foods are unhealthy, why do you continue to eat them?

(probe: taste, convenience, cost, familiarity, association with certain events? High/low value, readily available, ease of preparation etc.)

Ok, this last set of questions about food is the influence of others on the food that you eat and buy.

28. Referring back to this timeline and meal events, **who** do you eat with?

29. What days of the week would you share meals together as a family?

(a) → and why?

30. (Referring back to the timeline and meal events) Does anyone influence the amount and type of food that you eat?

(prompt: mother, father, brothers/male cousins, sisters/male cousins, teachers, coaches, church leaders, media, role models, work colleagues, children)

34. In what way do these people influence you?

(Prompt: type of influence: sharing? Regular and persistent advertisement? role modelling? teasing? rules? encouragement? Sport sponsors, incentives)

(a) → How does this make you feel?

35. Who would you listen to more? Who has the most influence?

(parents, other family members, school, friends, media, church, particular role models, workmates).

(a) → and Why?

36. Is there anything else you would like to say about food?

This next set of questions, relate to our views and behaviours around physical activity.

37. Referring back to our daily timeline, at what periods during this typical week would you be physically active?

(Prompt definition: active enough to get a light sweat-up, puffed breathing etc.)

39. (a) Think of a person you know who is extra big, do you think that his/her size has anything to do with physical activity? **Y?N**
If yes, in what way?

(b) Think of a person you know who is skinny or too thin. Is there any link between his/her PA and him/her being skinny or too thin. **Y?N** If yes, in what way?

40. Do you think there is any value in doing daily physical activity/exercise?

(a) If yes, Why? What are the benefits? If no, why not?

(b) If you know, that there is a link between physical activity and being healthy, why do you not make time to do some daily physical activity?

(c) And How much physical activity/ exercise should people your age do each week?

(d) What value is your health (or physical activity) over and above all these other obligations (refer to timeline). Explain. (probe the cost/benefit decision making process)

41. How easy or how hard is it for you to be physically active every day?

42. How important is it for you to do daily physical activity (exercise)?

(a) ↔ (for parents) How important is it for your children to do daily physical activity (exercise?)

43. How do you get to school or work on a daily basis?
 (a) → Why? Who made this decision?
 (b) ↔ (if school/work nearby & gets dropped off, why do you not walk to school or work?)
 ↔ why would the school kids be picked up or dropped off instead of walking/biking?
44. Which members of the family are most active?
 (a) → Least active?
 (b) → And why?
45. What other physical activities would you like to do right now?
 (a) → What is stopping you from doing this/these?
 (probe the things that they value more than their own PA/ exercise.)
46. What would need to happen in order to increase/decrease you daily physical activity?
 (Ask if appropriate, low level of PA and high levels of inactive leisure time like TV watching)
 (a) → do you think shifting an hour of TV watching with an hour of walking around the neighbourhood would be an easy or hard thing to do?
 (b) → Why, explain?
47. Who influences the amount of daily PA that you do?
 (prompt: mother, father, brothers/male cousins, sisters/male cousins, teachers, coaches, church leaders, media, role models, work colleagues)
48. In what way do these people influence you?
 (Prompt: type of influence: sharing? Regular and persistent advertisement? role modelling? teasing? rules? encouragement? Sport sponsors, incentives)
 (a) → How does this make you feel?
49. Who would you listen to more? Who has the most influence?
 (parents, other family members, school, friends, media, church, particular role models, workmates).
 (a) → and Why?
50. Is there anything else you would like to say about physical activity?

This next set of questions, relate to our views and opinions about our physical bodies.

51. What do you believe is your ideal (acceptable) body weight, body size, body shape, body tone, muscularity?
 (a) → And why?
52. How important is it for you to be this ideal body weight, size, shape, tone? Do you think this weight, shape, size, tone, is healthy?
 (important to have for health reasons)
 (a) → Why?
53. Do you think this would be the best (ideal, acceptable) body weight, size, shape, tone, for all Samoan girls of your age? (exchange ethnicity, gender, age where appropriate). Or are there some differences in ideal body weight between different ethnic groups e.g., Palagi, Samoan, Tongan, Maori etc. **Y?N**
 (a) → If so, why?
 (b) What's a typical/usual weight (size) for Tongan girls your age? (exchange ethnicity, gender, age where appropriate).
 (c) → Do you think that weight is healthy? **Y?N**
 (d) and why?
54. Is there any problem with being overweight or extra big?
55. Is there any problem with being underweight or extra skinny?
56. How would you describe your weight right now?
 (prompt categories: Very underweight / Slightly underweight / About the right weight / Slightly overweight / Very overweight)
 (a) → Why do you think you are this weight, size, shape, muscle tone?
57. Are you doing anything right now to change your weight, shape, size? **Y?N**
 (a) → If so, what?
 (b) → And why?
 (c) → (For these particular body changing strategies) - Where did you get your ideas from?
 (prompt: family, friends, media, books etc.)
 (d) → What things do you willingly give up (sacrifice, pay, miss out on...) to gain this particular body weight, size, shape, tone, if any?
 (e) → And why do you feel its important to make this investment?
58. Given the chance, is there anyone you would like to look like? **Y?N**
 (a) → Who
-

(b) → **and Why?**

(c) → (ask if appropriate), **why Kevin Mealamu & Beatrice Faumuina and not Hamish Carter and Sarah Ulmar?**

59. Which of the following things about your body are most important to you?

Body weight? Body size? Body shape? Muscle bulk? Muscle tone? Height?

(a) → **Why?**

(b) → **Which of these (list above) are you most satisfied or dissatisfied with?**

(c) → **Why?**

60. Who or what has the most influence over anything to do with your body weight, size, shape or muscle tone?

(prompt: mother, father, brothers/male cousins, sisters/male cousins, teachers, coaches, church leaders, media, role models, work colleagues)

61. In what way do these people influence you?

(Prompt: type of influence: sharing? Regular and persistent advertisement? role modelling? teasing? rules? encouragement? Sport sponsors, incentives)

(a) → **How does this make you feel?**

62. Who would you listen to more? Who has the most influence?

(parents, other family members, school, friends, media, church, particular role models, workmates).

(a) → **and Why?**

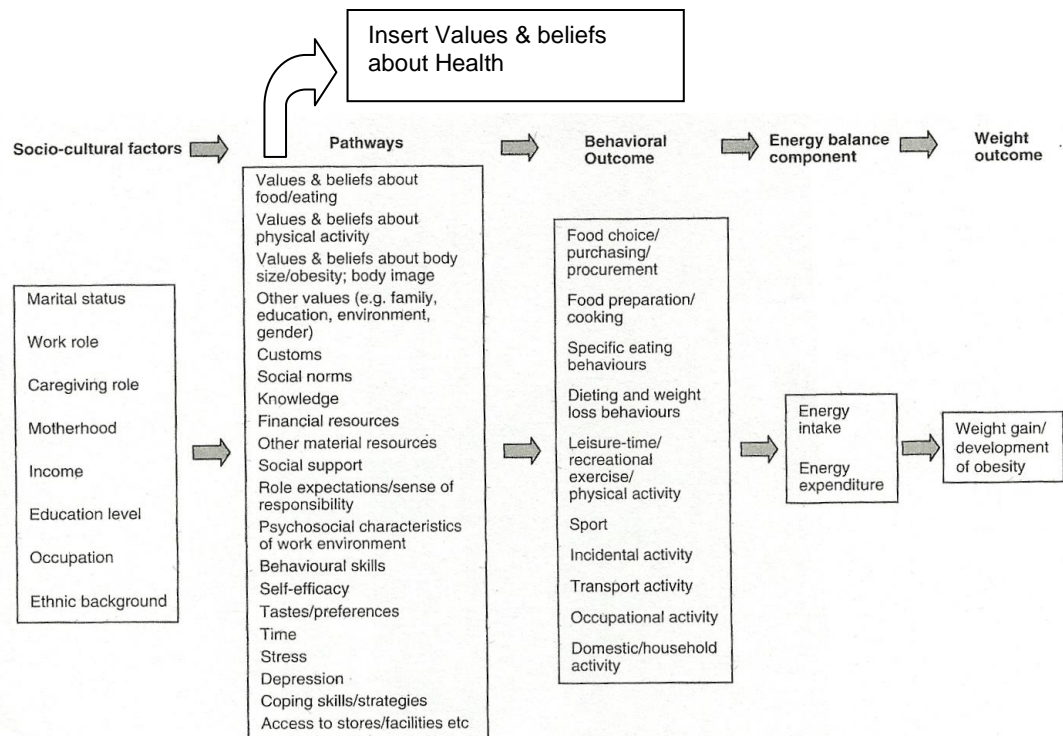
63. Is there anything else you would like to say about our bodies?

END OF INTERVIEW

THANK PARTICIPANT

GIVE THEM GIFT VOUCHER

Appendix G: Proposed conceptual model of pathways linking selected socio-cultural factors with obesity



Original Source: Ball & Crawford, 2005a, p45 ¹⁵

REFERENCES

1. World Health Organization. Obesity: preventing and managing the global epidemic: report of a WHO consultation. WHO technical report series 894. Geneva: World Health Organization, 2000.
2. Freedman DS, Khan LK, Serdula MK, Dietz WH, Srinivasan SR, Berenson GS. The Relation of Childhood BMI to Adult Adiposity: The Bogalusa Heart Study. *Pediatrics* 2005;115(1):22-27.
3. Serdula MK, Ivery D, Coates RJ, Freedman DS, Williamson DF, Byers T. Do Obese Children Become Obese Adults? A Review of the Literature. *Preventive Medicine* 1993;22(2):167-77.
4. Ministry of Health. The New Zealand Health Strategy. Wellington: Ministry of Health www.moh.govt.nz/nzhs.html, 2000.
5. Reilly JJ, Methven E, McDowell ZC, Hacking B, Alexander D, Stewart L, et al. Health consequences of obesity. *Archives of Disease in Childhood* 2003;88(9):748-52.
6. Curtis M. The obesity epidemic in the Pacific Islands. *Journal of Development and Social Transformation* 2004;1:37-42.
7. Hodge AM, Dowse GK, Zimmet PZ. Obesity in Pacific populations. *Pacific Health Dialog* 1996;3(1):77-86.
8. Hughes R. *Diet, food supply and obesity in the Pacific*. Manila, Phillipines: World Health Organization, Regional Office for the Western Pacific., 2003.
9. Ministry of Health. NZ Food NZ Children: Key Results of the 2002 National Children's Nutrition Survey. Wellington: Ministry of Health, 2003.
10. Ministry of Health. A portrait of health: Key results of the 2006/07 New Zealand health survey. Wellington: Ministry of Health, 2008.
11. Fukuyama S, Inaoka T, Matsumura Y, Yamauchi T, Natsuhara K, Kimura R, et al. Anthropometry of 5-19-year-old Tongan children with special interest in the high prevalence of obesity among adolescent girls. *Annals of Human Biology* 2005;32(6):714-23.
12. Utter J, Faeamani GL, Malakellis M, Vanualailai N, Kremer P, Scragg R, et al. Lifestyle and Obesity in South Pacific Youth: Baseline Results from the Pacific Obesity Prevention In Communities (OPIC) Project in New Zealand, Fiji, Tonga and Australia. Auckland: University of Auckland, 2008.
13. Kumanyika S, Jeffery RW, Morabia A, Ritenbaugh C, Antipatis VJ, Working Group of the International Obesity Task Force. Obesity prevention: the case for action. *International Journal of Obesity & Related Metabolic Disorders* 2002;26(3):425-36.
14. Swinburn BA, Egger G, Raza F. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventive Medicine* 1999;29:563-70.

15. Ball K, Crawford D. The role of socio-cultural factors in the obesity epidemic. In: Crawford D, Jeffery RW, editors. *Obesity Prevention and Public Health*. New York: Oxford University Press, 2005:37-53.
16. Ball K, Crawford D. Socio-economic factors in obesity: a case of slim chance in a fat world? *Asia Pacific Journal of Clinical Nutrition* 2006;15(Supplement 1):15-20.
17. Booth ML, Wake M, Armstrong T, Chey T, Hesketh K, Mathur S. The epidemiology of overweight and obesity among Australian children and adolescents, 1995-97. *Australian & New Zealand Journal of Public Health* 2001;25(2):162-9.
18. Rennie KL, Jebb SA. Prevalence of obesity in Great Britain. *Obesity Reviews* 2005;6(1):11-2.
19. Wang Y, Beydoun MA. The obesity epidemic in the United States--gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and meta-regression analysis. *Epidemiologic Reviews* 2007;29:6-28.
20. Norton K, Dollman J, Martin M, Harten N. Descriptive epidemiology of childhood overweight and obesity in Australia: 1901-2003. *International Journal of Pediatric Obesity* 2006;1(4):232-8.
21. Hancox R, Milne B, Poulton R. Association between child and adolescent television viewing and adult health: a longitudinal birth cohort study. *Lancet* 2004;364:257-62.
22. Baranowski T, Mendlein J, Resnicow K, Frank E, Cullen KW, Baranowski J. Introduction Physical Activity and Nutrition in Children and Youth: An Overview of Obesity Prevention. *Preventive Medicine* 2000;31:S1-S10.
23. Swinburn BA, Bell AC. A comprehensive approach to obesity prevention. In: Kopelman PG, Caterson I, Dietz WH, editors. *Clinical Obesity in Adults and Children*. Massachusetts: Blackwell Publishing Ltd, 2005:456-71.
24. Brown R, Scragg R, Quigley R. Does the family environment contribute to food habits or behaviours and physical activity in children? Wellington: Agencies for Nutrition Action (ANA), 2008.
25. Lindsay AC, Sussner KM, Kim J, Gortmaker S. The role of parents in preventing childhood obesity. *Future of Children* 2006;16(1):169-86.
26. Patrick H, Nicklas TA. A review of family and social determinants of children's eating patterns and diet quality. *Journal of the American College of Nutrition* 2005;24(2):83-92.
27. Ministry of Health. Tracking the Obesity Epidemic: New Zealand 1977-2003. Wellington: Ministry of Health, 2004.
28. Ministry of Health, University of Auckland. Nutrition and the Burden of Disease: New Zealand 1997-2011. Wellington: Ministry of Health., 2003.
29. OECD. OECD Health Data 2009: Statistics and indicators for 30 countries: www.oecd.org/health/healthdata, 2009.
30. Ni Mhurchu C, Turley M, Stefanogiannis N, Lawes CMM, Rodgers A, Vander Hoorn S, et al. Mortality attributable to higher-than-optimal body mass index in New Zealand. *Public Health Nutrition* 2005;8(4):402-8.

31. World Health Organization. Global Strategy on diet, physical activity and health. Geneva: World Health Organization, 2004.
32. Ministry of Health. Healthy Eating - Healthy Action. Oranga Kai – Oranga Pumau: A strategic framework. Wellington, New Zealand: Ministry of Health, 2003.
33. Ministry of Health. Healthy Eating – Healthy Action: Oranga Kai – Oranga Pumau Implementation Plan: 2004–2010. Wellington: Ministry of Health, 2004.
34. Ministry of Health. Reducing inequalities in health. Wellington: Ministry of Health, 2002.
35. Utter J, Neumark-Sztainer D, Jeffery R, Story M. Couch potatoes or french fries: are sedentary behaviors associated with body mass index, physical activity, and dietary behaviors among adolescents? *Journal of the American Dietetic Association* 2003;103(10):1298-305.
36. World Health Organization. Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation. Geneva: WHO, 2003.
37. World Health Organization. Population-based approaches to increasing levels of physical activity. Geneva: World Health Organization, 2007.
38. Nelson M. Childhood nutrition and poverty. *Proceedings of the Nutrition Society* 2000;59(2):307-15.
39. James WP, Nelson M, Ralph A, Leather S. Socioeconomic determinants of health. The contribution of nutrition to inequalities in health. *British Medical Journal* 1997;314(7093):1545-9.
40. Robinson TN, Sirard JR. Preventing childhood obesity; a solution oriented research paradigm. *American Journal of Preventive Medicine* 2005;28(2S2):194-201.
41. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *British Medical Journal* 2000;320(7244):1240-3.
42. Chinn S. Definitions of childhood obesity: current practice. *European Journal of Clinical Nutrition* 2006;60(10):1189-94.
43. Guillaume M. Defining obesity in childhood: current practice. *American Journal of Clinical Nutrition* 1999;70(1):126S-30S.
44. Neovius MG, Linne YM, Barkeling BS, Rossner SO. Discrepancies between classification systems of childhood obesity. *Obesity Reviews* 2004;5(2):105-14.
45. Crawford D, Jeffery RW. *Obesity prevention and public health*. Oxford: Oxford University Press, 2005.
46. Abrantes MM, Lamounier JA, Colosimo EA. Comparison of body mass index values proposed by Cole et al. (2000) and Must et al. (1991) for identifying obese children with weight-for-height index recommended by the World Health Organization. *Public Health Nutrition* 2003;6(3):307-11.
47. Mei Z, Grummer-Strawn LM, Pietrobelli A, Goulding A, Goran MI, Dietz WH. Validity of body mass index compared with other body-composition screening indexes for the assessment of body fatness in children and adolescents. *American Journal of Clinical Nutrition* 2002;75(6):978-85.

48. Neovius MG, Linne YM, Barkeling BS, Rossner SO. Sensitivity and specificity of classification systems for fatness in adolescents. *American Journal of Clinical Nutrition* 2004;80(3):597-603.
49. Duncan E, Schofield G, Duncan S, Kolt G, Rush E. Ethnicity and body fatness in New Zealanders. *New Zealand Medical Journal* 2004;117(1195):U913.
50. Ministry of Health. An Analysis of the Usefulness and Feasibility of a Population Indicator of Childhood Obesity. Wellington: Ministry of Health, 2006.
51. Swinburn BA. Using the body mass index: weigh then weigh up. *New Zealand Medical Journal* 1998;111(1075):377-9.
52. Statistics New Zealand. 2006 New Zealand Census of population and dwellings. Wellington: Statistics New Zealand, 2006.
53. Craig P, Halavatau V, Comino E, Caterson I. Differences in body composition between Tongans and Australians: time to rethink the healthy weight ranges? *International Journal of Obesity & Related Metabolic Disorders* 2001;25(12):1806-14.
54. Deurenberg P, Yap M, van Staveren WA. Body mass index and percent body fat: a meta analysis among different ethnic groups. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity* 1998;22(12):1164-71.
55. Norgan NG. Population differences in body composition in relation to the body mass index. *European Journal of Clinical Nutrition* 1994;48 Suppl 3:S10-25; discussion S26-7.
56. Malina RM, Katzmarzyk PT. Validity of the body mass index as an indicator of the risk and presence of overweight in adolescents. *American Journal of Clinical Nutrition* 1999;70(1):131S-6S.
57. Daniels SR, Houry PR, Morrison JA. The utility of body mass index as a measure of body fatness in children and adolescents: differences by race and gender. *Pediatrics* 1997;99(6):804-7.
58. Rush E, Plank L, Chandu V, Laulu M, Simmons D, Swinburn B, et al. Body size, body composition, and fat distribution: a comparison of young New Zealand men of European, Pacific Island, and Asian Indian ethnicities. *New Zealand Medical Journal* 2004;117(1207):U1203.
59. Swinburn BA, Craig PL, Daniel R, Dent DP, Strauss BJ. Body composition differences between Polynesians and Caucasians assessed by bioelectrical impedance. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity* 1996;20(10):889-94.
60. Swinburn BA, Ley S, Carmichael H, Plank L. Body size and composition in Polynesians. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity* 1999;23(11):1178-83.
61. Salesa JS, Bell AC, Swinburn BA. Body size of New Zealand Pacific Islands children and teenagers. *New Zealand Medical Journal* 1997;110(1046):227-9.
62. Rush EC, Puniani K, Valencia ME, Davies PSW, Plank LD. Estimation of body fatness from body mass index and bioelectrical impedance: comparison of New Zealand European, Maori and Pacific Island children. *European Journal of Clinical Nutrition* 2003;57(11):1394-401.

63. Tyrrell VJ, Richards GE, Hofman P, Gillies GF, Robinson E, Cutfield WS. Obesity in Auckland school children: a comparison of the body mass index and percentage body fat as the diagnostic criterion. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity* 2001;25(2):164-9.
64. Ministry of Health. *A portrait of health : key results of the 2002/03 New Zealand health survey*. Wellington, N.Z.: Ministry of Health, 2004.
65. Ministry of Health. *The health of Pacific peoples*. Wellington: Ministry of Health, 2005:36.
66. Ebbeling CB, Pawlak DB, Ludwig DS. Childhood obesity: public-health crisis, common sense cure. *Lancet* 2002;360(9331):473-82.
67. Ege MJ, von Kries R. Epidemiology of obesity in childhood and adolescence. In: Kiess W, Marcus C, Wabitsch M, editors. *Obesity in Childhood and Adolescence*. Farmington, CT, USA: Karger Publishers, 2004:41-62.
68. Chinn S, Rona RJ. Prevalence and trends in overweight and obesity in three cross sectional studies of British Children, 1974-94. *British Medical Journal* 2001;322(7277):24-6.
69. Flegal KM, Ogden CL, Wei R, Kuczmarski RL, Johnson CL. Prevalence of overweight in US children: comparison of US growth charts from the Centers for Disease Control and Prevention with other reference values for body mass index. *American Journal of Clinical Nutrition* 2001;73(6):1086-93.
70. Magarey AM, Daniels LA, Boulton TJ. Prevalence of overweight and obesity in Australian children and adolescents: reassessment of 1985 and 1995 data against new standard international definitions. *Medical Journal of Australia* 2001;174(11):561-4.
71. Kohn M, Booth M. The worldwide epidemic of obesity in adolescents. *Adolescent Medicine State of the Art Reviews* 2003;14(1):1-9.
72. Saxena S, Ambler G, Cole TJ, Majeed A. Ethnic group differences in overweight and obese children and young people in England: cross sectional survey. *Archives of Disease in Childhood* 2004;89(1):30-6.
73. Wang Y, Lobstein T. Worldwide trends in childhood overweight and obesity. *International Journal of Pediatric Obesity* 2006;1(1):11-25.
74. Chinn S, Hughes JM, Rona RJ. Trends in growth and obesity in ethnic groups in Britain. *Archives of Disease in Childhood* 1998;78(6):513-7.
75. Strauss RS, Pollack HA. Epidemic increase in childhood overweight, 1986-1998. *The Journal of the American Medical Association* 2001;286(22):2845-8.
76. Hanley AJ, Harris SB, Gittelsohn J, Wolever TM, Saksvig B, Zinman B. Overweight among children and adolescents in a Native Canadian community: prevalence and associated factors. *American Journal of Clinical Nutrition* 2000;71(3):693-700.
77. McLellan F. Obesity rising to alarming levels around the world. *Lancet* 2002;359(9315):1412.
78. Bindon JR, Baker PT. Modernization, migration and obesity among Samoan adults. *Annals of Human Biology* 1985;12(1):67-76.

79. Hodge AM, Dowse GK, Toelupe P, Collins VR, Imo T, Zimmet PZ. Dramatic increase in the prevalence of obesity in western Samoa over the 13 year period 1978-1991. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity* 1994;18(6):419-28.
80. Ulijaszek SJ. Increasing body size among adult Cook Islanders between 1966 and 1996. *Annals of Human Biology* 2001;28(4):363-73.
81. Turnbull A, Barry D, Wickens K, Crane J. Changes in body mass index in 11-12-year-old children in Hawkes Bay, New Zealand (1989-2000). *Journal of Paediatrics & Child Health* 2004;40(1-2):33-7.
82. Utter J, Scragg R, Denny S, Schaaf D. Trends in body mass index and waist circumference among New Zealand adolescents, 1997/1998-2005. *Obesity Reviews* 2009;10(4):378-82.
83. Freedman DS, Srinivasan SR, Valdez RA, Williamson DF, Berenson GS. Secular increases in relative weight and adiposity among children over two decades: the Bogalusa Heart Study. *Pediatrics* 1997;99(3):420-6.
84. Olds TS, Harten NR. One hundred years of growth: the evolution of height, mass, and body composition in Australian children, 1899-1999. *Human Biology* 2001;73(5):727-38.
85. Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. Predicting obesity in young adulthood from childhood and parental obesity. *New England Journal of Medicine* 1997;337(13):869-73.
86. Williams S. Overweight at age 21: the association with body mass index in childhood and adolescence and parents' body mass index. A cohort study of New Zealanders born in 1972-1973. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity* 2001;25(2):158-63.
87. Dietz WH. Health consequences of obesity in youth: childhood predictors of adult disease. *Pediatrics* 1998;101(3 Pt 2):518-25.
88. Must A, Strauss RS. Risks and consequences of childhood and adolescent obesity. *International Journal of Obesity & Related Metabolic Disorders* 1999;23(Suppl 2):S2-11.
89. Turley M, Tobias M, Paul S. Non-fatal disease burden associated with excess body mass index and waist circumference in New Zealand adults. *Australian & New Zealand Journal of Public Health* 2006;30(3):231-7.
90. Bell AC, Swinburn BA, Simmons D, Wang W, Amosa H, Gatland B. Heart disease and diabetes risk factors in Pacific Islands communities and associations with measures of body fat. *New Zealand Medical Journal* 2001;114(1131):208-13.
91. Simmons D. Diabetes and its complications among Pacific people in New Zealand. *Pacific Health Dialog* 1997;4(2):75-79.
92. Ministry of Health. Modelling diabetes: forecasts to 2011. *Public Health Intelligence Occasional Bulletin No. 10*. Wellington: Ministry of Health, 2002.
93. Hotu S. Increasing prevalence of Type 2 Diabetes in Adolescents. *Journal of Paediatrics & Child Health* 2004;40:201-04.
94. Young S. Type 2 diabetes in youth : an emerging epidemic? *New Ethicals Journal*, 2004;7(1):9-13.

95. Jeffs K. Diabeating ourselves to death. *Spasifik*, 2006(15):24-26.
96. Asia Pacific Cohort Studies C, Ni Mhurchu C, Parag V, Nakamura M, Patel A, Rodgers A, et al. Body mass index and risk of diabetes mellitus in the Asia-Pacific region. *Asia Pacific Journal of Clinical Nutrition* 2006;15(2):127-33.
97. Haines J, Neumark-Sztainer D, Wall M, Story M. Personal, behavioral, and environmental risk and protective factors for adolescent overweight. *Obesity* 2007;15(11):2748-60.
98. Hill AJ, Lissau I. Psychosocial factors. In: Burniat W, editor. *Child and Adolescent Obesity: causes and consequences, prevention and management*. West Nyack, NY, USA: Cambridge University Press, 2002:109-28.
99. Gortmaker SL, Must A, Perrin JM, Sobol AM, Dietz WH. Social and economic consequences of overweight in adolescence and young adulthood. *New England Journal of Medicine* 1993;329:1008-12.
100. Ministry of Health. Healthy Eating - Healthy Action: Oranga kai - Oranga pumau: A background paper. Wellington: Ministry of Health, 2003.
101. Dalton A, Crowley S. Economic impact of NCD in the Pacific Islands. Is obesity in the Pacific too big to ignore.: Secretariat of the Pacific Community, 2002.
102. Banwell C, Hinde S, Dixon J, Sibthorpe B. Reflections on expert consensus: a case study of the social trends contributing to obesity. *European Journal of Public Health* 2005;15(6):564-68.
103. Crawford D, Ball K. Behavioural determinants of the obesity epidemic. *Asia Pacific Journal of Clinical Nutrition* 2002;11(Suppl):S718-S21.
104. Egger G, Swinburn B. An "ecological" approach to the obesity pandemic. *British Medical Journal* 1997;315(7106):477-80.
105. Harnack LJ, Schmitz KH. The role of nutrition and physical activity in the obesity epidemic. In: Crawford D, Jeffery RW, editors. *Obesity Prevention and Public Health*. New York: Oxford University Press, 2005.
106. Prentice AM, Jebb SA. Obesity in Britain: gluttony or sloth? *British Medical Journal* 1995;v311(n7002):p437(3).
107. Russell DG, Parnell W, Wilson NC. NZ food NZ People: Key results of the 1997 National Nutrition Survey. Dunedin: University of Otago, 1999.
108. Janssen I, Katzmarzyk PT, Boyce WF, Vereecken C, Mulvihill C, Roberts C, et al. Comparison of overweight and obesity prevalence in school-aged youth from 34 countries and their relationships with physical activity and dietary patterns. *Obesity Reviews* 2005;6(2):123-32.
109. Rolland-Cachera MF, Bellisle F. Nutrition. In: Burniat W, Cole TJ, Lissau I, Poskitt E, editors. *Child and adolescent obesity: Causes and consequences, Prevention and Management*. Cambridge: Cambridge University Press, 2002:69-92.
110. Neumark-Sztainer D, Story M, Resnick MD, Blum RW. Lessons learned about adolescent nutrition from the Minnesota Adolescent Health Survey. *Journal of the American Dietetic Association* 1998;98(12):1449-56.

111. Story M, Neumark-Sztainer D, French S. Individual and environmental influences on adolescent eating behaviors. *Journal of the American Dietetic Association* 2002;102(3 Suppl):S40-51.
112. Rolland-Cachera MF, Bellisle F. No correlation between adiposity and food intake: why are working class children fatter? *American Journal of Clinical Nutrition* 1986;44(6):779-87.
113. Craig E, Jackson C. The Determinants of Child and Youth Health in Counties-Manukau. Manukau city: Counties Manukau District Health Board, 2006.
114. Bandini LG, Must A, Cyr H, Anderson SE, Spadano JL, Dietz WH. Longitudinal changes in the accuracy of reported energy intake in girls 10-15 y of age. *American Journal of Clinical Nutrition* 2003;78(3):480-4.
115. Bandini LG, Schoeller DA, Cyr HN, Dietz WH. Validity of reported energy intake in obese and nonobese adolescents. *American Journal of Clinical Nutrition* 1990;52(3):421-5.
116. Hill RJ, Davies PS. The validity of self-reported energy intake as determined using the doubly labelled water technique. *British Journal of Nutrition* 2001;85(4):415-30.
117. Rennie KL, Jebb SA, Wright A, Coward WA. Secular trends in under-reporting in young people. *British Journal of Nutrition* 2005;93(2):241-7.
118. Weber JL, Reid PM, Greaves KA, DeLany JP, Stanford VA, Going SB, et al. Validity of self-reported energy intake in lean and obese young women, using two nutrient databases, compared with total energy expenditure assessed by doubly labeled water. *European Journal of Clinical Nutrition* 2001;55(11):940-50.
119. Utter J, Scragg R, Ni Mhurchu C, Schaaf D. What effect do attempts to lose weight have on the observed relationship between nutrition behaviors and body mass index among adolescents? *International Journal of Behavioral Nutrition and Physical Activity* 2007;4:40.
120. Duncan JS, Schofield G, Duncan EK, Rush EC. Risk factors for excess body fatness in New Zealand children. *Asia Pacific Journal of Clinical Nutrition* 2008;17(1):138-47.
121. French SA, Story M, Jeffery RW. Environmental influences on eating and physical activity. *Annual Review of Public Health* 2001;22:309-35.
122. Utter J, Schaaf D, Ni Mhurchu C, Scragg R. Food choices among students using the school food service in New Zealand. *New Zealand Medical Journal* 2007;120(1248):U2389.
123. Utter J, Scragg R, Schaaf D, Fitzgerald E, Wilson N. Correlates of body mass index among a nationally representative sample of New Zealand children. *International Journal of Pediatric Obesity* 2007;2(2):104-13.
124. Utter J, Scragg R, Schaaf D, Ni Mhurchu C. Relationships between frequency of family meals, BMI and nutritional aspects of the home food environment among New Zealand adolescents. *International Journal of Behavioral Nutrition and Physical Activity* 2008;5(1):50.
125. Adolescent Health Research Group. Youth '07: The Health and Wellbeing of Secondary School Students in New Zealand. Initial Findings. Auckland.: University of Auckland, 2008.
126. Metcalf PA, Scragg RK, Tukuitonga CF, Dryson EW. Dietary intakes of middle-aged European, Maori and Pacific Islands people living in New Zealand. *New Zealand Medical Journal* 1998;111(1072):310-3.

127. Metcalf PA, Scragg RR, Schaaf D, Dyal L, Black PN, Jackson R. Dietary intakes of European, Maori, Pacific and Asian adults living in Auckland: the Diabetes, Heart and Health Study. *Australian & New Zealand Journal of Public Health* 2008;32(5):454-60.
128. Utter J, Scragg R, Schaaf D, Fitzgerald E. Nutrition and physical activity behaviours among Maori, Pacific and NZ European children: identifying opportunities for population-based interventions. *Australian & New Zealand Journal of Public Health* 2006;30(1):50-56.
129. Berkey CS, Rockett HR, Field AE, Gillman MW, Colditz GA. Sugar-added beverages and adolescent weight change. *Obesity Research* 2004;12(5):778-88.
130. Taylor R, Scragg R, Quigley R. Do sugary drinks contribute to obesity in children? A report prepared by the Scientific Committee of the Agencies for Nutrition Action. Wellington: Agencies for Nutrition Action, 2005.
131. Vartanian LR, Schwartz MB, Brownell KD. Effects of Soft Drink Consumption on Nutrition and Health: A Systematic Review and Meta-Analysis. *American Journal of Public Health* 2007;97(4):667-75.
132. Grant AM, Ferguson EL, Toafa V, Henry TE, Guthrie BE. Dietary factors are not associated with high levels of obesity in New Zealand Pacific preschool children. *Journal of Nutrition* 2004;134(10):2561-5.
133. Regan A, Parnell W, Gray A, Wilson N. New Zealand children's dietary intakes during school hours. *Nutrition & Dietetics* 2008;35(3):205-10.
134. Rush E, Paterson J, Obolonkin V. Food frequency information--relationships to body composition and apparent growth in 4-year-old children in the Pacific Island Family Study. *New Zealand Medical Journal* 2008;121(1281):63-71.
135. Sullivan C, Oakden J, young J, Lau M, Lawson R. Pulp Fiction, the facts harvested: A study of New Zealanders' physical activity and nutrition. Wellington: AC Neilsen report prepared for Cancer Society of New Zealand Incorporated, 2004.
136. Gonelevu S, Rush E, Lauulu MS. Fruit, vegetable and cereal intake of Polynesian and European women in Auckland. *Pacific Health Dialog* 1997;4(2):11-19.
137. Aмоса T, Rush E, Plank L. Frequency of eating occasions reported by young New Zealand Polynesian and European women. *Pacific Health Dialog* 2001;8(1):59-65.
138. Vainikolo F, Vivili P, Guthrie BE. Food consumption patterns and beliefs of Tongans living in Dunedin. *Journal of the New Zealand Dietetic Association* 1993;47(1):6-9.
139. Utter J, Scragg R, Ni Mhurchu C, Schaaf D. At-Home Breakfast Consumption among New Zealand Children: Associations with Body Mass Index and Related Nutrition Behaviors. *Journal of the American Dietetic Association* 2007;107(4):570-76.
140. Berg F, M. *Underage & Overweight: America's childhood obesity crisis - what every family needs to know*. New York: Hatherleigh Press, 2004.
141. Rennie KL, Johnson L, Jebb SA. Behavioural determinants of obesity. *Best Practice & Research Clinical Endocrinology & Metabolism* 2005;19(3):343-58.

142. Wetter AC, Goldberg JP, King AC, Sigman-Grant M, Baer R, Crayton E, et al. How and why do individuals make food and physical activity choices? *Nutrition Reviews* 2001;59(3 Pt 2):S11-20; discussion S57-65.
143. Atlantis E, Barnes EH, Singh MA. Efficacy of exercise for treating overweight in children and adolescents: a systematic review. *International Journal of Obesity* 2006;30(7):1027-40.
144. Bouchard C. *Physical activity and obesity*. Champaign, IL: Human Kinetics, 2000.
145. Butte NF, Christiansen E, Sorensen TI. Energy imbalance underlying the development of childhood obesity. *Obesity* 2007;15(12):3056-66.
146. DiPietro L. Physical activity, body weight, and adiposity: an epidemiologic perspective. *Exercise & Sport Sciences Reviews* 1995;23:275-303.
147. Caspersen CJ, Pereira MA, Curran KM. Changes in physical activity patterns in the United States, by sex and cross-sectional age. *Medicine & Science in Sports & Exercise* 2000;32(9):1601-9.
148. Adams J. Trends in physical activity and inactivity amongst US 14-18 year olds by gender, school grade and race, 1993-2003: evidence from the youth risk behavior survey. *BMC Public Health* 2006;6:57.
149. Aeberli I, Kaspar M, Zimmermann MB. Dietary intake and physical activity of normal weight and overweight 6 to 14 year old Swiss children. *Swiss Medical Weekly* 2007;137(29-30):424-30.
150. Brodersen NH, Steptoe A, Boniface DR, Wardle J. Trends in physical activity and sedentary behaviour in adolescence: ethnic and socioeconomic differences. *British Journal of Sports Medicine* 2007;41(3):140-4.
151. Lippe J, Brener N, Kann L, Kinchen S, Harris WA, McManus T, et al. Youth risk behavior surveillance--Pacific Island United States Territories, 2007. *Morbidity & Mortality Weekly Report* 2008;Surveillance Summaries. 57(12):28-56.
152. Riddoch CJ, Bo Andersen L, Wedderkopp N, Harro M, Klasson-Heggebo L, Sardinha LB, et al. Physical activity levels and patterns of 9- and 15-yr-old European children. *Medicine & Science in Sports & Exercise* 2004;36(1):86-92.
153. Hohepa M, Scragg R, Schofield G, Kolt GS, Schaaf D. Self-reported physical activity levels during a segmented school day in a large multiethnic sample of high school students. *Journal of Science & Medicine in Sport* 2009;12(2):284-92.
154. Mila-Schaaf K, Robinson E, Schaaf D, Denny S, Watson PD. A Health profile of Pacific Youth: Findings of Youth2000. A National Secondary School Youth Health Survey. Auckland, New Zealand.: University of Auckland 2008.
155. SPARC. SPARC facts : results from the New Zealand Sport and Physical Activity Survey (1997-2001). [Wellington, N.Z.]: SPARC, 2003:63 p.
156. Sallis JF, Saelens BE. Assessment of physical activity by self-report: status, limitations, and future directions. *Research Quarterly for Exercise & Sport*. 2000;71(2):1-14.
157. Corder K, Ekelund U, Steele RM, Wareham NJ, Brage S. Assessment of physical activity in youth. *Journal of Applied Physiology* 2008;105(3):977-87.

158. Duncan JS, Schofield G, Duncan EK, Rush EC. Measuring physical activity in New Zealand children: A population health perspective. *New Zealand Journal of Sports Medicine* 2004;32(4):100-05.
159. Fox KR, Riddoch C. Charting the physical activity patterns of contemporary children and adolescents. *Proceedings of the Nutrition Society* 2000;59(4):497-504.
160. Goran MI. Measurement issues related to studies of childhood obesity: assessment of body composition, body fat distribution, physical activity, and food intake. *Pediatrics* 1998;101(3 Pt 2):505-18.
161. Muller MJ, Bosy-Westphal A. Assessment of energy expenditure in children and adolescents. *Current Opinion in Clinical Nutrition & Metabolic Care* 2003;6(5):519-30.
162. Welk GJ, Corbin CB, Dale D. Measurement issues in the assessment of physical activity in children. *Research Quarterly for Exercise & Sport* 2000;71(2 Suppl):S59-73.
163. Duncan JS, Schofield G, Duncan EK. Step count recommendations for children based on body fat. *Preventive Medicine* 2007;44(1):42-4.
164. Doak CM, Visscher TL, Renders CM, Seidell JC. The prevention of overweight and obesity in children and adolescents: a review of interventions and programmes. *Obesity Reviews* 2006;7(1):111-36.
165. Gordon-Larsen P, McMurray RG, Popkin BM. Determinants of adolescent physical activity and inactivity patterns. *Pediatrics* 2000;105(6):E83.
166. Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. *Medicine & Science in Sports & Exercise* 2000;32(5):963-75.
167. Van Der Horst K, Chin A, Paw MJ, Twisk JWR, Van Mechelen W. A Brief Review on Correlates of Physical Activity and Sedentariness in Youth. *Medicine & Science in Sports & Exercise* 2007;39(8):1241-50.
168. Sallis JF. Epidemiology of physical activity and fitness in children and adolescents. *Critical Reviews in Food Science & Nutrition* 1993;33(4-5):403-8.
169. Sallis JF, Zakarian JM, Hovell MF, Hofstetter CR. Ethnic, socioeconomic, and sex differences in physical activity among adolescents. *Journal of Clinical Epidemiology* 1996;49(2):125-34.
170. Trost SG, Pate RR, Dowda M, Saunders R, Ward DS, Felton G. Gender differences in physical activity and determinants of physical activity in rural fifth grade children. *Journal of School Health* 1996;66(4):145-50.
171. Vilhjalmsón R, Kristjansdóttir G. Gender differences in physical activity in older children and adolescents: the central role of organized sport. *Social Science & Medicine* 2003;56(2):363-74.
172. Duncan MJ, Woodfield L, Al-Nakeeb Y, Nevill AM. Differences in Physical Activity Levels Between White and South Asian Children in the United Kingdom. *Pediatric Exercise Science* 2008;20(3):285-91.
173. Telama R, Yang X. Decline of physical activity from youth to young adulthood in Finland. *Med Sci Sports Exerc* 2000;32(9):1617 - 22.

174. Wareham NJ, Corder K, van Sluijs EM. Decrease in activity from childhood to adolescence: potential causes and consequences. *American Journal of Preventive Medicine* 2008;35(6):604-5.
175. Buckworth J, Dishman RK. Determinants of exercise and physical activity. In *Buckworth, J. (ed.), Exercise psychology, Champaign, Ill., Human Kinetics, c2002, p.191-209*. United States, 2002.
176. Carroll B, Loumidis J. Children's perceived competence and enjoyment in physical education and physical activity outside school. *European Physical Education Review* 2001;7(1):24-43.
177. Reynolds KD, Killen JD, Bryson SW, Maron DJ, Taylor CB, Maccoby N, et al. Psychosocial predictors of physical activity in adolescents. *Preventive Medicine* 1990;19(5):541-51.
178. Hohepa M, Scragg R, Schofield G, Kolt G, Schaaf D. Social support for youth physical activity: Importance of siblings, parents, friends and school support across a segmented school day. *International Journal of Behavioral Nutrition and Physical Activity* 2007;4(1):54.
179. Kay T. Sporting excellence: a family affair? *European Physical Education Review* 2000;6(2):151-69.
180. Duncan JS, Hopkins WG, Schofield G, Duncan EK. Effects of weather on pedometer-determined physical activity in children. *Medicine & Science in Sports & Exercise* 2008;40(8):1432-8.
181. Tucker P, Gilliland J. The effect of season and weather on physical activity: a systematic review. *Public Health* 2007;121(12):909-22.
182. Armstrong N, Welsman JR. The Physical Activity Patterns of European Youth with Reference to Methods of Assessment. *Sports Medicine* 2006;36(12):1067-86.
183. Armstrong N, Welsman JR, Kirby BJ. Longitudinal changes in 11-13-year-olds' physical activity. *Acta Paediatrica* 2000;89(7):775-80.
184. Bagley S, Salmon J, Crawford D. Family structure and children's television viewing and physical activity. *Medicine & Science in Sports & Exercise* 2006;38(5):910-8.
185. Gutin B, Barbeau P. Physical activity and body composition in children and adolescents. In: Bouchard C, editor. *Physical Activity and Obesity*. Champaign, IL: Human Kinetics, 2000:213-45.
186. Salmon J, Bauman A, Crawford D, Timperio A, Owen N. The association between television viewing and overweight among Australian adults participating in varying levels of leisure-time physical activity. *International Journal of Obesity & Related Metabolic Disorders* 2000;24(5):600-6.
187. Utter J, Scragg R, Schaaf D. Associations between television viewing and consumption of commonly advertised foods among New Zealand children and young adolescents. *Public Health Nutrition* 2006;9(5):606-12.
188. Cooper AR, Page A, Fox KR, Misson J. Physical activity patterns in normal, overweight and obese individuals using minute-by-minute accelerometry. *European Journal of Clinical Nutrition* 2000;54(12):887-94.
189. Kruger HS, Venter CS, Vorster HH, Margetts BM. Physical inactivity is the major determinant of obesity in black women in the North West province, South Africa: the THUSA study. *Nutrition* 2002;18(5):422-27.

190. Purath J. Comparison of the traits of physically active and inactive women. *Journal of the American Academy of Nurse Practitioners* 2006;18(5):234-40.
191. Jebb SA, Moore MS. Contribution of a sedentary lifestyle and inactivity to the etiology of overweight and obesity: current evidence and research issues. *Medicine & Science in Sports & Exercise* 1999;31(11):S534-S41.
192. Leino-Arjas P, Solovieva S, Riihimaki H, Kirjonen J, Telama R. Leisure time physical activity and strenuousness of work as predictors of physical functioning: a 28 year follow up of a cohort of industrial employees. *Occupational & Environmental Medicine* 2004;61(12):1032-38.
193. Wareham NJ, van Sluijs EM, Ekelund U. Physical activity and obesity prevention: a review of the current evidence. *Proceedings of the Nutrition Society* 2005;64(2):229-47.
194. Wing RR, Phelan S. Long-term weight loss maintenance. *American Journal of Clinical Nutrition* 2005;82(1 Suppl):222S-25S.
195. Prentice AM, Jebb SA. Physical Activity level and weight control in adults. In: Bouchard C, editor. *Physical Activity and Obesity*. Champaign, IL: Human Kinetics, 2000:247-61.
196. Sport and Recreation New Zealand. Sport, Recreation and Physical Activity Participation Among New Zealand Adults: Key Results of the 2007/08 Active NZ Survey. Wellington: SPARC, 2008.
197. Critser G. *How Americans became the fattest people in the world*. London: The Penguin Press, 2003.
198. Dixon JM, Broom DH. *The seven deadly sins of obesity : how the modern world is making us fat*. Sydney: UNSW Press, 2007.
199. Jeffery RW, Linde JA. Evolving environmental factors in the obesity epidemic. In: Crawford D, Jeffery RW, editors. *Obesity Prevention and Public Health*. New York: Oxford University Press, 2005:55-73.
200. Banwell C, Shipley M, Strazdins L. The pressured parenting environment. In: Dixon JM, Broom DH, editors. *The seven deadly sins of obesity: how the modern world is making us fat*. Sydney: UNSW Press, 2007:46-63.
201. Hirschmann J, Zaphiropoulos L. *Are you hungry? A completely new approach to raising children free of food and weight problems*. New York: Warner Books, 1985.
202. Zizza C, Maria-Riz A, Popkin B. Significant increase in young adults snacking between 1977-78 and 1994-96 represents a cause for concern. *Preventive Medicine*. 2001;32:303-10.
203. Frum D. *How we got here: the seventies*. New York: Basic Books, 2000.
204. Schulman B. *The seventies*. New York: Free Press, 2001.
205. Nakamura D. Schools hooked on junk food. *Washington Post* 2001 February 27;A1.
206. Howard J, Kinnaird E. Soft drink pouring rights. *North Carolina Medical Journal* 2002;63(6):312-13.
207. Schlosser E. *Fast food nation*. Boston: Houghton Mifflin, 2001.

208. Department of Education. Healthy bodies, healthy minds: a study of the decline of physical education in California schools. Sacramento: Assembly Office of Research, 1984:49-51.
209. Fletcher GF, Froelicher VF, Hartley LH, Haskell WL, Pollock ML. Exercise standards. A statement for health professionals from the American Heart Association. *Circulation*. 1990;82(6):2286-322.
210. Ball K, Crawford D. Socioeconomic status and weight change in adults: a review. *Social Science & Medicine* 2005;60(9):1987-2010.
211. Milligan S, Statistics New Zealand, University of Auckland, University of Otago. Family wellbeing indicators from the 1981-2001 New Zealand censuses. Wellington, NZ: Statistics New Zealand, 2006.
212. Ministry of Social Development. The 2008 Social report te purongo oranga tangata: Indicators of social well-being in New Zealand. Wellington, NZ: Ministry of Social Development, 2007.
213. Statistics New Zealand. QuickStats about Incomes. Wellington: Statistics New Zealand, 2006.
214. Kumanyika SK. Environmental influences on childhood obesity: ethnic and cultural influences in context. *Physiology & Behavior* 2008;94(1):61-70.
215. Giammattei J, Blix G, Marshak H, Wollitzer A, Pettitt DJ. Television watching and soft drink consumption: associations with obesity in 11-to-13 year old school children. *Archives of Pediatrics & Adolescent Medicine* 2003;157(9):882-86.
216. Ludwig DS, Peterson KE, Gortmaker SL. Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. *Lancet* 2001;357:505-08.
217. Jeffery R, French S, Forster J, Spry V. Socioeconomic status differences in health behaviours related to obesity. *International Journal of Obesity* 1991;15(10):689-96.
218. Poulton R, Caspi A, Milne BJ, Thomson WM, Taylor A, Sears MR, et al. Association between children's experience of socioeconomic disadvantage and adult health: a life-course study. *Lancet* 2002;360(9346):1640.
219. Sherwood NE, Wall M, Neumark-Sztainer D, Story M. Effect of socioeconomic status on weight change patterns in adolescents. *Preventing Chronic Disease* 2009;6(1):A19.
220. Ministry of Health. Embodying social rank: How body fat varies with social status, gender and ethnicity in New Zealand. *Public Health Intelligence Occasional Bulletin No.34*. Wellington: Ministry of Health, 2006:31.
221. Statistics New Zealand, Ministry of Pacific Island Affairs. Pacific progress: A report on the economic status of Pacific peoples in New Zealand. Wellington, New Zealand: Statistics New Zealand, 2002.
222. Booth SL, Sallis JF, Ritenbaugh C, Hill JO, Birch LL, Frank LD, et al. Environmental and societal factors affect food choice and physical activity: rationale, influences, and leverage points. *Nutrition Reviews* 2001;59(3 Pt 2):S21-39; discussion S57-65.
223. Sallis JF, Owen N. Ecological models. In: Glanz K, Lewis FM, BK R, editors. *Health Behaviour and Health Education: Theory, Research and Practice*. San Francisco: Jossey-Bass, 1997:403-.

224. Crampton P, Salmond C, Kirkpatrick R, Scarborough R, Skelly C. *Degrees of Deprivation in New Zealand. An Atlas of Socioeconomic Difference*. Auckland: David Bateman., 2000.
225. Irala-Estevez JD, Groth M, Johansson L, Oltersdorf U, Prattala R, Martinez-Gonzalez MA. A systematic review of socio-economic differences in food habits in Europe: consumption of fruit and vegetables. *European Journal of Clinical Nutrition* 2000;54(9):706-14.
226. Hupkens CLH, Ronald A, Knibbe MJD. Social class differences in food consumption. *European Journal of Public Health* 2000;10(2):108-13.
227. Inglis V, Ball K, Crawford D. Why do women of low socioeconomic status have poorer dietary behaviours than women of higher socioeconomic status? A qualitative exploration. *Appetite* 2005;45(3):334-43.
228. Ball K, Salmon J, Giles-Corti B, Crawford D. How can socio-economic differences in physical activity among women be explained? A qualitative study. *Women & Health* 2006;43(1):93-113.
229. Ball K, Crawford D, Mishra G. Socio-economic inequalities in women's fruit and vegetable intakes: a multilevel study of individual, social and environmental mediators. *Public Health Nutrition* 2006;9(5):623-30.
230. Pill R, Peters TJ, Robling MR. Factors associated with health behaviour among mothers of lower socio-economic status: a British example. *Social Science & Medicine* 1993;36(9):1137-44.
231. Cassady D, Jetter KM, Culp J. Is price a barrier to eating more fruits and vegetables for low-income families? *Journal of the American Dietetic Association* 2007;107(11):1909-15.
232. Darmon N, Briand A, Drewnowski A. Energy-dense diets are associated with lower diet costs: a community study of French adults. *Public Health Nutrition* 2004;7(1):21-7.
233. Kirkpatrick S, Tarasuk V. The relationship between low income and household food expenditure patterns in Canada. *Public Health Nutrition* 2003;6(6):589-97.
234. Rush E, Puniani N, Snowling N, Paterson J. Food security, selection, and healthy eating in a Pacific Community in Auckland New Zealand. *Asia Pacific Journal of Clinical Nutrition* 2007;16(3):448-54.
235. French SA. Pricing Effects on Food Choices. *Journal of Nutrition* 2003;133(3):841S-43.
236. Pearce J, Blakely T, Witten K, Bartie P. Neighbourhood deprivation and access to fast-food retailing. *American Journal of Preventive Medicine* 2007;32(5):375-82.
237. Pearce J, Hiscock R, Blakely T, Witten K. The contextual effects of neighbourhood access to supermarkets and convenience stores on individual fruit and vegetable consumption. *Journal of Epidemiology & Community Health* 2008;62(3):198-201.
238. Lanumata T, Heta C, Signal L, Haretuku R, Corrigan C. Enhancing food security and physical activity: the views of Maori, Pacific and low-income peoples. Wellington: Health Promotion and Policy Research Unit, University of Otago., 2008.
239. Rozin P, Fischler C, Imada S, Sarubin A, Wrzesniewski. Attitudes to food and the role of food in life in the USA, Japan, Flemish Belgium and France: Possible implications for the Diet-Health Debate. *Appetite* 1999;33:163-80.

240. Ajwani S, Blakely T, Robson B, Tobias M, Bonne M. *Decades of disparity: Ethnic mortality trends in New Zealand 1980-1999*. Wellington: Ministry of Health and University of Otago., 2003.
241. Health Sponsorship Council. *Healthy Eating in New Zealand Families and Whanau*. Auckland, New Zealand: Health Sponsorship Council, 2007.
242. Health Sponsorship Council. *Health and Well-Being and Family/Whanau Functioning: An Interim Report*. Auckland, New Zealand: Health Sponsorship Council, 2007.
243. Ministry of Health, Health Sponsorship Council. *Healthy Eating Healthy Action Focus group research: Commissioned by the Health Sponsorship Council on behalf of the Ministry of Health*, 2004.
244. SPARC. *Obstacles to Action: A Study of New Zealanders' Physical Activity and Nutrition*. Wellington, 2003.
245. Faumatu N. The food choices of Samoan teenagers in Auckland: Big Mac combo or pisupo and taro? *Pacific Health Dialog* 1997;4(2):6-10.
246. Counties-Manukau District health Board. *Lotu Moui: mind, body, spirit - Pacific Health Symposium*. Auckland, New Zealand: Counties-Manukau District health Board, 2005:1-54.
247. Tavila A. *Your health is in your hands: Factors that influence Samoan womens' food choices within a church context*. MA Thesis: Victoria University of Wellington, 2006.
248. Pollock NJ. *These roots remain: food habits in Islands of the Central and Eastern Pacific since Western contact*. Laie, Hawai'i: The Institute for Polynesian Studies, 1992.
249. Moata'ane LM, Muimui-Heata S, Guthrie BE. Tongan perceptions of diet and diabetes mellitus. *Journal of the New Zealand Dietetic Association* 1996;50(2):52-56.
250. Mavoa H, McCabe M. Sociocultural factors relating to Tongans' and Indigenous Fijians' patterns of eating, physical activity and body size. *Asia Pacific Journal of Clinical Nutrition* 2008;17(3):375-84.
251. Hayes LS. *Food for thought: The health of Pacific Islands young people in New Zealand: An analysis of the dietary and lifestyle behaviours of Pacific Islands adolescents, and the potential long-term effects of these behaviours upon health*. [Master of Arts thesis]. University of Canterbury, 2001.
252. Gracey D, Stanley N, Burke V, Corti B, Beilin LJ. Nutritional knowledge, beliefs and behaviours in teenage school students. *Health Education Research* 1996;11(2):187-204.
253. Neumark-Sztainer D, Story M, Perry C, Casey MA. Factors Influencing Food Choices of Adolescents: Findings from Focus-Group Discussions with Adolescents. *Journal of the American Dietetic Association* 1999;99(8):929-37.
254. O'Dea JA. Why do kids eat healthful food? Perceived benefits of and barriers to healthful eating and physical activity among children and adolescents. *Journal of the American Dietetic Association* 2003;103(4):497-501.
255. Eyles H, Mhurchu CN, Wharemate L, Funaki-Tahifote M, Lanumata T, Rodgers A. Developing nutrition education resources for a multi-ethnic population in New Zealand. *Health Educ. Res.* 2008:cyn057.

256. Laing P. *Talking health but doing sickness : studies in Samoan health*. Wellington [N.Z.]: Victoria University Press, 1985.
257. Pollock NJ. Social constraints of diet and nutrition - an example from a Pacific society. *Australian Journal of Nutrition and Dietetics* 1995;52(4):184-86.
258. University of Auckland Pacific Health Research Centre. *The Pacific Island primary health care utilisation study*. Auckland, N.Z.: Pacific Health Research Centre, 2003.
259. Bell AC, Amosa H, Swinburn B. Nutrition knowledge and practices of Samoans in Auckland. *Pacific Health Dialog* 1997;4(2):26-32.
260. Teevale T. We are what we play: Pacific peoples, sport and identity in Aotearoa. In: Macpherson C, Spoonley P, Anae M, editors. *Tangata o te Moana Nui: The evolving identities of Pacific Peoples in Aotearoa/New Zealand*. Palmerston North: Dunmore Press, 2001:212-27.
261. Teevale T. Pacific women's netball: A Question of Style? In: Obel C, Bruce T, Thompson S, editors. *Outstanding: Research about women and sport in New Zealand*. Hamilton, New Zealand: Wilf Malcolm Institute of Educational Research, 2008:167-89.
262. Neumark-Sztainer D, Croll J, Story M, Hannan PJ, French SA, Perry C. Ethnic/racial differences in weight-related concerns and behaviors among adolescent girls and boys: findings from Project EAT. *Journal of Psychosomatic Research* 2002;53(5):963-74.
263. Flynn KJ, Fitzgibbon M. Body images and obesity risk among black females: a review of the literature. *Annals of Behavioral Medicine* 1998;20(1):13-24.
264. Kumanyika S, Wilson JF, Guilford-Davenport M. Weight-related attitudes and behaviors of black women. *Journal of the American Dietetic Association* 1993;93(4):416-22.
265. Padgett J, Biro FM. Different shapes in different cultures: body dissatisfaction, overweight, and obesity in African-American and caucasian females. *Journal of Pediatric & Adolescent Gynecology* 2003;16(6):349-54.
266. Sarwer DB, Thompson JK, Cash TF. Body image and obesity in adulthood. *Psychiatric Clinics of North America* 2005;28(1):69-87.
267. White M, Kohlmaier J, Varnado-Sullivan P, Williamson DA. Racial/ethnic differences in weight concerns: Protective and risk factors for the development of eating disorders and obesity among adolescent females. *Eating and Weight Disorders* 2003;8(1):20-25.
268. Worsley A, Worsley AJ, McConnon S, Silva P. The weight control practices of 15 year old New Zealanders. *Journal of Paediatrics & Child Health* 1990;26(1):41-5.
269. Anton SD, Perri MG, Riley JR. Discrepancy between actual and ideal body images: Impact on eating and exercise behaviors. *Eating Behaviors* 2000;1(2):153-60.
270. Neumark-Sztainer D, van den Berg P, Hannan PJ, Story M. Self-weighing in adolescents: helpful or harmful? Longitudinal associations with body weight changes and disordered eating. *Journal of Adolescent Health* 2006;39(6):811-8.
271. van den Berg P, Neumark-Sztainer D. Fat 'n happy 5 years later: Is it bad for overweight girls to like their bodies? *Journal of Adolescent Health* 2007;41(4):415-17.

272. Kelly AM, Wall M, Eisenberg ME, Story M, Neumark-Sztainer D. Adolescent girls with high body satisfaction: who are they and what can they teach us? *Journal of Adolescent Health* 2005;37(5):391-6.
273. Heinberg LJ, Thompson JK, Matzon JL. Body image dissatisfaction as a motivator for healthy lifestyle change: Is some distress beneficial? In: Striegel-Moore R, Smolak L, editors. *Eating disorders: Innovative directions in research and practice*. Washington DC: American Psychological Association, 2001:215-32.
274. Kruger J, Lee CD, Ainsworth BE, Macera CA. Body size satisfaction and physical activity levels among men and women. *Obesity* 2008;16(8):1976-9.
275. Crow S, Eisenberg ME, Story M, Neumark-Sztainer D. Psychosocial and behavioral correlates of dieting among overweight and non-overweight adolescents. *Journal of Adolescent Health* 2006;38(5):569-74.
276. de Sousa SM. Body-image and obesity in adolescence: a comparative study of social-demographic, psychological, and behavioral aspects. *Spanish Journal of Psychology* 2008;11(2):551-63.
277. Neumark-Sztainer D, Story M, Hannan PJ, Perry CL, Irving LM. Weight-related concerns and behaviors among overweight and nonoverweight adolescents: implications for preventing weight-related disorders. *Archives of Pediatrics & Adolescent Medicine* 2002;156(2):171-8.
278. Ricciardelli LA, McCabe MP. Children's body image concerns and eating disturbance: a review of the literature. *Clinical Psychology Review* 2001;21(3):325-44.
279. McDowell AJ, Bond M. Body image differences among Malay, Samoan, and Australian women. *Asia Pacific Journal of Clinical Nutrition* 2006;15(2):201-7.
280. Wang CY, Abbot L, Goodbody AK, Hui WT. Ideal body image and health status in low-income Pacific Islanders. *Journal of Cultural Diversity* 2002;9(1):12-22.
281. Craig PL, Swinburn BA, Matenga-Smith T, Matangi H, Vaughn G. Do Polynesians still believe that big is beautiful? Comparison of body size perceptions and preferences of Cook Islands, Maori and Australians. *New Zealand Medical Journal* 1996;109(1023):200-3.
282. Lipinski JP, Pope HG. Body ideals in young Samoan men: A comparison with men in North America and Europe. *International Journal of Men's Health* 2002;1(2):163-71.
283. Jones J. Body image changes with modernisation in Western Samoa [MPhil]. University of Auckland, 1996.
284. Brewis AA, McGarvey ST, Jones J, Swinburn BA. Perceptions of body size in Pacific Islanders. *International Journal of Obesity & Related Metabolic Disorders* 1998;22(2):185-9.
285. Ricciardelli LA, McCabe MP, Mavoia H, Fotu K, Goundar R, Schultz J, et al. The pursuit of muscularity among adolescent boys in Fiji and Tonga. *Body Image* 2007;4(4):361-71.
286. Swami V, Knight D, Tovee MJ, Davies P, Furnham A. Preferences for female body size in Britain and the South Pacific. *Body Image* 2007;4(2):219-23.
287. Williams LK, Ricciardelli LA, McCabe MP, Waqa GG, Bavadra K. Body image attitudes and concerns among indigenous Fijian and European Australian adolescent girls. *Body Image* 2006;3(3):275-87.

288. Yates A, Edman J, Aruguete M. Ethnic differences in BMI and body/self-dissatisfaction among Whites, Asian subgroups, Pacific Islanders, and African-Americans. *Journal of Adolescent Health* 2004;34(4):300-7.
289. Wilkinson JY, Ben-Tovim DI, Walker MK. An insight into the personal and cultural significance of weight and shape in large Samoan women. *International Journal of Obesity & Related Metabolic Disorders* 1994;18(9):602-6.
290. de Garine I, Pollock NJ, editors. *Social aspects of obesity*. South Australia: Gordon and Breach Publishers, 1995.
291. Pollock NJ. Obesity or large body size? A study in Wallis and Futuna. *Pacific Health Dialog* 2001;8(1):119-23.
292. Pollock NJ. Social fattening patterns in the Pacific - the positive side of obesity: A Nauru case study. In: de Garine IP, N.J., editor. *Social aspects of obesity*. Luxembourg, Amsterdam: OPA (Overseas Publishers Association), 1995:87-109.
293. Craig P. Obesity and culture. In: Kopelman PG, Caterson I, Dietz WH, editors. *Clinical Obesity in Adults and children*. Massachusetts: Blackwell Publishing, 2005:46-64.
294. Ricciardelli LA, McCabe MP, Williams RJ, Thompson JK. The role of ethnicity and culture in body image and disordered eating among males. *Clinical Psychology Review* 2007;27(5):582-606.
295. Meleisea M, Meleisea PS, editors. *Lagaga : a short history of Western Samoa*. Suva, Fiji Suva, Fiji: University of the South Pacific, 1987.
296. St John P. Working to improve tino lelei of Pacificans. *New Zealand Doctor* 2005(26 Jan 2005):18.
297. Ritenbaugh C. Obesity as a culture-bound syndrome. *Culture, Medicine & Psychiatry* 1982;6(4):347-64.
298. Gould PM. Polynesian body image and body size : transformations and implications [MA]. Anthropology--University of Auckland, 1994.
299. Ferdon EN. *Early Tonga : as the explorers saw it 1616-1810*. Tucson: University of Arizona Press, 1987.
300. Forster G. *A voyage round the world in His Britannic Majesty's sloop, Resolution, commanded by Capt. James Cook, during the years 1772, 3, 4 and 5*. London: Printed for B. White, Fleet-Street J. Robson, Bond Street; P. Elmsly, Strand; and G. Robinson, Peter-noster Row, 1777.
301. Hale H. *Ethnography and philology*. Ridgewood, N.J.: Gregg Press, 1968.
302. Sullivan LR, Gifford EW, McKern WC. *A contribution to Tongan somatology*. Honolulu, Hawaii: Bishop Museum Press, 1922.
303. Sullivan LR. *A contribution to Samoan somatology, based on the field studies of E. W. Gifford and W. C. McKern*. Honolulu: Bishop museum press, 1921.
304. Turner G. *Samoa, a hundred years ago and long before : together with notes on the cults and customs of twenty-three other islands in the Pacific*. London: Macmillan, 1884.

305. Wilkes C. *Narrative of the United States Exploring Expedition, during the years 1838, 1840, 1841, 1842*. Condensed and abridged [ed.] ed. London: Whittaker, 1845.
306. Beechey FW. *Narrative of a voyage to the Pacific and Beering's Strait, to co-operate with the Polar expeditions : performed in His Majesty's Ship Blossom in the years 1825, 26, 27, 28*. New ed. London: H. Colburn and R. Bentley, 1831.
307. Shapiro HL, Beaglehole E, Beaglehole P. *The anthropometry of Pukapuka*. New York: The American Museum of Natural History, 1942.
308. Shapiro HL, Buck PH. *The physical characters of the Cook Islanders*. Honolulu, Hawaii: The Museum, 1936.
309. Prichard JC. *Researches into the physical history of man*. Chicago,: University of Chicago Press, 1973.
310. Pollock NJ. An overview of obesity issues across several cultures. Wellington: Victoria University, 1992.
311. Cook J. *Captain Cook's voyages round the world : The first performed in the years 1768, 1769, 1770, 1771; the second in 1772, 1773, 1774, 1775; the third and last in 1776, 1777, 1778, 1779, and 1780, for making discoveries in the northern and southern hemispheres*. Newcastle: H. Brown, 1790.
312. Brown PJ, Konner M. An anthropological perspective on obesity. *Annals of the New York Academy of Sciences* 1987;499:29-46.
313. Cassidy CM. The good body: when big is better. *Medical Anthropology* 1991;13(3):181-213.
314. Cook J, Syngé MB. *Captain Cook's voyages around the world : with an introductory life by M.B. Syngé*. London: Nelson, 1903.
315. Birkbeck JA. New Zealanders and their Diet: A Report to the National Heart Foundation of New Zealand on the National Dietary Survey 1977. Auckland, 1979.
316. Health Sponsorship Council. 2007 New Zealand Children's Food and Drinks Survey. Auckland: National Research Bureau Ltd, 2008.
317. Horwarth C, Parnell W, Birkbeck JA, Wilson N, Russell DG, Herbison P. Life in New Zealand Commission Report Volume VI: Nutrition. Dunedin: University of Otago, 1991.
318. Parnell W, Ministry of Health. *NZ food NZ children : key results of the 2002 national children's nutrition survey*. Wellington, N.Z.: Ministry of Health, 2003.
319. Finau SA, Tukuitonga C. Pacific peoples in New Zealand. In: Davis P, Dew K, editors. *Health & society in Aotearoa/New Zealand*. Oxford: Oxford University Press, 1999:129-43.
320. Health Research Council of New Zealand. Guidelines on Pacific Health Research. Auckland, NZ: Health Research Council of New Zealand, 2005.
321. Howden-Chapman P. Unequal socio-economic determinants, unequal health. In: Dew K, Davis P, editors. *Health and society in Aotearoa New Zealand*. Oxford: Oxford University Press, 2005:51-68.

322. Popkin BM, Siega-Riz AM, Haines PS. A comparison of dietary trends among racial and socioeconomic groups in the United States.[see comment]. *New England Journal of Medicine* 1996;335(10):716-20.
323. Goodman E, Adler NE, Daniels SR, Morrison JA, Slap GB, Dolan LM. Impact of objective and subjective social status on obesity in a biracial cohort of adolescents. *Obesity Research* 2003;11(8):1018-26.
324. Gordon-Larsen P, Adair LS, Popkin BM. The relationship of ethnicity, socioeconomic factors, and overweight in US adolescents. *Obesity Research* 2003;11(1):121-9.
325. Kumanyika S, Grier S. Targeting interventions for ethnic minority and low-income populations. *Future of Children* 2006;16(1):187-207.
326. Ministry of Pacific Island Affairs. Current trends & economic status of Pacific Peoples. Wellington, New Zealand: Ministry of Pacific Island Affairs, 2002.
327. Statistics New Zealand. QuickStats About Pacific Peoples. Wellington: Statistics New Zealand, 2008.
328. Rush EC, Plank LD, Coward WA. Energy expenditure of young Polynesian and European women in New Zealand and relations to body composition. *American Journal of Clinical Nutrition* 1999;69(1):43-8.
329. Rush EC, Plank LD, Robinson SM. Resting metabolic rate in young Polynesian and Caucasian women. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity* 1997;21(11):1071-5.
330. Public Health Intelligence. Mana Whakamarama - equal explanatory power: Maori and non-Maori sample size in national health surveys. Wellington, New Zealand: Ministry of Health, 2002:1-23.
331. Ball K, Brown W, Crawford D. Who does not gain weight? Prevalence and predictors of weight maintenance in young women. *International Journal of Obesity* 2002;26:1570-78.
332. Jeffery RW, Linde JA. Population approaches to obesity prevention. In: Crawford D, Jeffery RW, editors. *Obesity Prevention and Public Health*. Oxford: Oxford University Press, 2005:153-64.
333. Gard MW, Jan. *The obesity epidemic: science, morality and ideology*. London: Routledge, 2005.
334. Young DR, Gittelsohn J, Charleston J, Felix-Aaron K, Appel LJ. Motivations for exercise and weight loss among African-American women: focus group results and their contribution towards program development. *Ethnicity & Health* 2001;6(3-4):227-45.
335. Budd GM, Volpe SL. School-based obesity prevention: Research, challenges, and recommendations. *Journal of School Health* 2006;76(10):485-95.
336. Hardeman W, Griffin S, Johnston M, Kinmonth AL, Wareham NJ. Interventions to prevent weight gain: a systematic review of psychological models and behaviour change methods. *International Journal of Obesity & Related Metabolic Disorders* 2000;24(2):131-43.
337. Thomas H. Obesity prevention programs for children and youth: why are their results so modest? *Health Education Research* 2006;21(6):783-95.

338. Barnfather D. Childhood Obesity Prevention Programmes in Auckland. Auckland: Auckland Regional Public Health Service, 2004.
339. Clemmens D, Hayman LL. Increasing activity to reduce obesity in adolescent girls: a research review. *Journal of Obstetric, Gynecologic, & Neonatal Nursing* 2004;33(6):801-8.
340. Connelly JB, Duaso MJ, Butler G. A systematic review of controlled trials of interventions to prevent childhood obesity and overweight: a realistic synthesis of the evidence. *Public Health* 2007;121(7):510-7.
341. Henderson M, Daneman D, Hux J, Hanley A. Exercise interventions in obese youth: are they effective? *Journal of Pediatric Endocrinology* 2008;21(9):823-6.
342. Kolt GS, Schofield GM, Schofield L, McLachlan C, Svendsen CA, Mackay LM. Best Practice Review of Sport and Physical Activity Interventions for Young People Aged 13-18 Years - Report to Sport and Recreation New Zealand. (Vol 1 & 2). Auckland, New Zealand: Auckland University of Technology., 2006.
343. Flodmark CE, Marcus C, Britton M. Interventions to prevent obesity in children and adolescents: a systematic literature review. *International Journal of Obesity* 2006;30(4):579-89.
344. Sharma M. International school-based interventions for preventing obesity in children. *Obesity Reviews* 2007;8(2):155-67.
345. Robinson TN. Obesity prevention. In: Chen C, Dietz WH, editors. *Obesity in Childhood and Adolescence*. Philadelphia: Lippincott Williams & Wilkins, 2002:245-56.
346. Kumanyika SK. The obesity epidemic: looking in the mirror. *American Journal of Epidemiology* 2007;166(3):243-5.
347. Yancey AK, Kumanyika SK. Bridging the Gap: understanding the structure of social inequities in childhood obesity. *American Journal of Preventive Medicine* 2007;33(4 Suppl):S172-4.
348. Cali AM, Caprio S. Obesity in children and adolescents. *Journal of Clinical Endocrinology & Metabolism* 2008;93(11 Suppl 1):S31-6.
349. Daniels SR. The consequences of childhood overweight and obesity. *Future of Children* 2006;16(1):47-67.
350. Patton MQ. *Qualitative evaluation and research methods*. 2nd ed. Newbury Park, Calif.: Sage Publications, 1990.
351. Guba EG, Lincoln YS. Competing paradigms in qualitative research. In: Denzin NK, Lincoln YS, editors. *Handbook of qualitative research*. California: Sage Publications, 1994.
352. Cresswell JW. *Research Design: Qualitative and Quantitative Approaches*. California: Sage Publications, 1994.
353. Neuman WL. *Social research methods : qualitative and quantitative approaches*. Boston: Allyn and Bacon, 1997.
354. Maxim PS. *Quantitative research methods in the social sciences*. New York: Oxford University Press, 1999.

355. Black TR. *Doing quantitative research in the social sciences : an integrated approach to research design, measurement and statistics*. London SAGE, 1999.
356. Denzin NK, Lincoln YS. *Handbook of qualitative research*. California: Sage Publications, 1994.
357. Sanga KF. Making philosophical sense of indigenous Pacific research. In: Baba T, Mahina O, Williams N, Nabobo-Baba U, editors. *Researching the Pacific and Indigenous Peoples: Issues and perspectives*. Auckland: Centre for Pacific Studies, University of Auckland, 2004:41-52.
358. Baba T, Mahina O, Williams N, Nabobo-Baba U, editors. *Researching Pacific and indigenous peoples : issues and perspectives*. Auckland, N.Z.: Centre for Pacific Studies, The University of Auckland, 2004.
359. Creswell JW, Plano Clark VL. *Designing and conducting mixed methods research*. Thousand Oaks: Sage Publications, 2007.
360. Thomas DR. A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation* 2006;27(2):237-46.
361. Davison KK, Campbell K. Opportunities to prevent obesity in children within families: an ecological approach. In: Crawford D, Jeffery RW, editors. *Obesity Prevention and Public Health*. Oxford: Oxford University Press, 2005:207-30.
362. Miles MB, Huberman AM. *Qualitative data analysis : an expanded sourcebook*. 2nd ed. Thousand Oaks: Sage Publications, 1994.
363. Health Research Council of New Zealand. Guidelines on Pacific Health Research: Health Research Council of New Zealand *Te Kaunihera Rangahau Hauora o Aotearoa*, 2004:65.
364. Vaioleti TM. Talanoa research methodology : a developing position on Pacific research. *Waikato Journal of Education* 2006;12:21-34.
365. Filipo SL. In search of a culturally appropriate approach to research: A Samoan case. In: Baba T, Mahina O, Williams N, Nabobo-Baba U, editors. *Researching the Pacific and Indigenous Peoples: Issues and perspectives*. Auckland: Centre for Pacific Studies, University of Auckland, 2004:179-85.
366. Tamasese K, Peteru C, Waldegrave C. O le Taeao Afua - The New Morning: A qualitative investigation into Samoan perspectives on Mental health and culturally appropriate services. Wellington: The Family Centre, Lower Hutt, 1997.
367. Smith LT. *Decolonising methodologies: Research and indigenous peoples*. Dunedin: University of Otago Press, 1998.
368. Australian Bureau of Statistics. National Nutrition Survey: Nutrient intakes and physical measurements Australia. (Survey No. 4805.0 1995). Canberra: Australian Bureau of Statistics, 1998.
369. Strauss AL, Corbin JM. *Basics of qualitative research: grounded theory procedures and techniques*. California: Sage Publications, 1990.
370. Babbie E. *The practice of social research*. 11th ed. California: Thomson & Wadsworth Publishing, 2007.
371. De Vaus DA. *Surveys in social research*. 5th ed. London: Routledge, 2001.

372. Kerry SM, Bland JM. Statistics notes: The intraclass correlation coefficient in cluster randomisation. *BMJ* 1998;316(7142):1455-60.
373. Fletcher M, Dwyer M. A Fair Go for all Children: Actions to address child poverty in New Zealand. Wellington: Office of the Children's Commissioner & Barnados, 2008.
374. Kowalski KC, Crocker PRE, Faulkner RA. Validation of the Physical Activity Questionnaire for Older Children. *Pediatric Exercise Science* 1997;9:174 - 86.
375. Moore JB, Hanes Jr JC, Barbeau P, Gutin B, Treviao RP, Zenong Y. Validation of the Physical Activity Questionnaire for Older Children in Children of Different Races. *Pediatric Exercise Science* 2007;19(1):6-19.
376. Mayer SE. The influence of parental income on children's outcomes. Wellington: Ministry of Social Development, 2002.
377. Perry B. Household incomes in New Zealand: Trends in indicators of inequalities and hardship 1982-2007. Wellington: Ministry of Social Development, 2008.
378. Butler S, Williams M, Tukuitonga C, Paterson J. Problems with damp and cold housing among Pacific families in New Zealand. *New Zealand Medical Journal* 2003;116(1177):U494.
379. Olson CM. Nutrition and health outcomes associated with food insecurity and hunger. *Journal of Nutrition* 1999;129(2S Suppl):521S-24S.
380. Pena M, Bacallao J. Malnutrition and poverty. *Annual Review of Nutrition* 2002;22:241-53.
381. Waldegrave C, King P, Stuart S. The monetary constraints and consumer behaviour in New Zealand low-income households. Wellington: The Family Centre Social Policy Research Unit, 1999.
382. Wood C. Barely or borrow - a report: research into the faces and figures of those living on a low income in Lower Hutt. Lower Hutt: Salvation Army Crossroads Community Church, 2001.
383. Drake B, Pandey S. Understanding the relationship between neighborhood poverty and specific types of child maltreatment. *Child Abuse & Neglect* 1996;20(11):1003-18.
384. Lievore D, Mayhew P. The scale and nature of family violence in New Zealand: A review and evaluation of knowledge. Wellington: Ministry of Social Development, 2007.
385. Wilson D, Horner W. Chronic Child Neglect: Needed Developments in Theory and Practice. *Families in Society* 2005;86(4):471-81.
386. Parnell WR, Reid J, Wilson NC, McKenzie J, Russell DG. Food security: is New Zealand a land of plenty? *New Zealand Medical Journal* 2001;114(1128):141-5.
387. Rush E. Food security for Pacific Peoples in New Zealand. A report for the Obesity Action Coalition. Wellington: Obesity Action Coalition, 2009.
388. Diabetes New Zealand Incorporated, Fight the Obesity Epidemic Incorporated. The POD Report: Prevention of Obesity and Type 2 Diabetes in New Zealand Children. The Facts. Wellington: Diabetes New Zealand Incorporated, 2003.
389. Evans M, Sinclair R, Fusimalohi C, Liava'a V. Globalization, diet and health: an example from Tonga. *Bulletin of the World Health Organisation* 2001;79(9):856-62.

390. Drewnowski A, Specter SE. Poverty and obesity: the role of energy density and energy costs. *American Journal of Clinical Nutrition* 2004;79(1):6-16.
391. Tarasuk VS. Household food insecurity with hunger is associated with women's food intakes, health and household circumstances. *Journal of Nutrition* 2001;131(10):2670-6.
392. Ni Mhurchu C, Ogra S. The price of healthy eating: cost and nutrient value of selected regular and healthier supermarket foods in New Zealand.[see comment]. *New Zealand Medical Journal* 2007;120(1248):U2388.
393. Tarasuk V, McIntyre L, Li J. Low-income women's dietary intakes are sensitive to the depletion of household resources in one month. *Journal of Nutrition* 2007;137(8):1980-7.
394. Bronte-Tinkew J, Zaslow M, Capps R, Horowitz A, McNamara M. Food insecurity works through depression, parenting, and infant feeding to influence overweight and health in toddlers. *Journal of Nutrition* 2007;137(9):2160-5.
395. Gundersen C, Lohman BJ, Garasky S, Stewart S, Eisenmann J. Food security, maternal stressors, and overweight among low-income US children: results from the National Health and Nutrition Examination Survey (1999-2002). *Pediatrics* 2008;122(3):e529-40.
396. Jain A, Sherman SN, Chamberlin LA, Carter Y, Powers SW, Whitaker RC. Why don't low-income mothers worry about their preschoolers being overweight? *Pediatrics* 2001;107(5):1138-46.
397. Adam TC, Epel ES. Stress, eating and the reward system. *Physiology & Behavior* 2007;91(4):449-58.
398. Dallman MF, Pecoraro N, Akana SF, La Fleur SE, Gomez F, Houshyar H, et al. Chronic stress and obesity: a new view of "comfort food". *Proceedings of the National Academy of Sciences of the United States of America* 2003;100(20):11696-701.
399. Buttriss JL. Food and nutrition: attitudes, beliefs, and knowledge in the United Kingdom. *American Journal of Clinical Nutrition* 1997;65(6 Suppl):1985S-95S.
400. Crawford D, Baghurst KI. Diet and health: a national survey of beliefs, behaviours and barriers to change in the community. *Australian Journal of Nutrition and Dietetics* 1990;47(4):97-104.
401. OECD. Health Working Paper No. 46: Education and Obesity in Four OECD Countries 2009.
402. van der Horst K, Oenema A, Ferreira I, Wendel-Vos W, Giskes K, van Lenthe F, et al. A systematic review of environmental correlates of obesity-related dietary behaviors in youth. *Health Education Research* 2007;22(2):203-26.
403. Shaw C, Blakely T, Crampton P, Atkinson J. The contribution of causes of death to socioeconomic inequalities in child mortality: New Zealand 1981-1999. *New Zealand Medical Journal* 2005;118(1227):1779.
404. Anderson PM, Butcher KF, Levine PB. Maternal employment and overweight children. *Journal of Health Economics* 2003;22(3):477-504.
405. Phipps SA, Lethbridge L, Burton P. Long-run consequences of parental paid work hours for child overweight status in Canada. *Social Science & Medicine* 2006;62(4):977-86.

406. Broom DH, Strazdins L. The harried environment: Is time making us fat? In: Dixon JM, Broom DH, editors. *The seven deadly sins of obesity : how the modern world is making us fat*. Sydney: UNSW Press, 2007:35-45.
407. Devine CM, Connors MM, Sobal J, Bisogni CA. Sandwiching it in: spillover of work onto food choices and family roles in low- and moderate-income urban households. *Social Science & Medicine* 2003;56(3):617-30.
408. Zehle K, Wen LM, Orr N, Rissel C. "It's not an issue at the moment": a qualitative study of mothers about childhood obesity. *MCN, American Journal of Maternal Child Nursing* 2007;32(1):36-41.
409. Sacks G, Swinburn B, Lawrence M. A systematic policy approach to changing the food system and physical activity environments to prevent obesity. *Australia and New Zealand Health Policy* 2008;5(1):13.
410. Freeman D, Hampenstall P. *The social structure of a Samoan village community*. Canberra, ACT: Target Oceania, 2006.
411. Krämer A. *The Samoan Islands : an outline giving special consideration to German Samoa*. [S.I.]: [s.n.], 1942.
412. Parmenter K, Waller J, Wardle J. Demographic variation in nutrition knowledge in England. *Health Education Research* 2000;15(2):163-74.
413. Gibson EL, Wardle J, Watts CJ. Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite* 1998;31(2):205-28.
414. Ricciuto L, Tarasuk V, Yatchew A. Socio-demographic influences on food purchasing among Canadian households. *European Journal of Clinical Nutrition* 2006;60(6):778-90.
415. Vieweg VR, Johnston CH, Lanier JO, Fernandez A, Pandurangi AK. Correlation between high risk obesity groups and low socioeconomic status in school children. *Southern Medical Journal* 2007;100(1):8-13.
416. Kristensen PL, Wedderkopp N, Moller NC, Andersen LB, Bai CN, Froberg K. Tracking and prevalence of cardiovascular disease risk factors across socio-economic classes: a longitudinal substudy of the European Youth Heart Study. *BMC Public Health* 2006;6:20.
417. Duncan JS, Schofield G, Duncan EK. Pedometer-determined physical activity and body composition in New Zealand children. *Medicine & Science in Sports & Exercise* 2006;38(8):1402-9.
418. Hohepa M. Prevalence, perceptions, and correlates of physical activity among youth in New Zealand [PhD]. Auckland University of Technology, 2008.
419. Hohepa M, Schofield G, Kolt GS, Scragg R, Garrett N. Pedometer-Determined Physical Activity Levels of Adolescents: Differences by Age, Sex, Time of Week, and Transportation Mode to School. *Journal of Physical Activity & Health* 2008;5:S140-S52.
420. Maddison R, Roberts V, Magnusson J, Prapavessis H. The utility of a revised social cognitive model to predict objective physical activity in adolescents. *Journal of Sport & Exercise Psychology* 2007;29:S185-S85.

421. Kirk D. Physical education, youth sport and lifelong participation: the importance of early learning experiences. *European Physical Education Review* 2005;11(3):239-55.
422. Hohepa M, Schofield G, Kolt GS. Physical activity: what do high school students think? *Journal of Adolescent Health* 2006;39(3):328-36.
423. Rees R, Kavanagh J, Harden A, Shepherd J, Brunton G, Oliver S, et al. Young people and physical activity: a systematic review matching their views to effective interventions. *Health Education Research* 2006;21(6):806-25.
424. Taylor WC, Yancey AK, Leslie J, Murray NG, Cummings SS, Sharkey SA, et al. Physical activity among African American and Latino middle school girls: consistent beliefs, expectations, and experiences across two sites. *Women & Health* 1999;30(2):67-82.
425. Ikhioya OSA. Utilizing adolescent interest patterns for effective participation in sports. *Journal of the International Council for Health, Physical Education, Recreation, Sport & Dance* 2003;39(4):52-54.
426. Bocarro J, Kanters MA, Casper J, Forrester S. School Physical Education, Extracurricular Sports, and Lifelong Active Living. *Journal of Teaching in Physical Education* 2008;27(2):155-66.
427. Quality of Life Project. Quality of life '07: In twelve of New Zealand's cities. Christchurch, NZ: Quality of Life Project, 2007.
428. Bennett GG, McNeill LH, Wolin KY, Duncan DT, Puleo E, Emmons KM. Safe to walk? Neighborhood safety and physical activity among public housing residents. *PLoS Medicine / Public Library of Science* 2007;4(10):1599-606; discussion 607.
429. Giles-Corti B, Donovan RJ. Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical environment. *Preventive Medicine* 2002;35(6):601-11.
430. Gomez JE, Johnson BA, Selva M, Sallis JF. Violent crime and outdoor physical activity among inner-city youth. *Preventive Medicine* 2004;39(5):876-81.
431. Romero AJ. Low-income neighborhood barriers and resources for adolescents' physical activity. *Journal of Adolescent Health* 2005;36(3):253-59.
432. Utter J, Denny S, Robinson EM, Ameratunga S, Watson P. Perceived access to community facilities, social motivation, and physical activity among New Zealand youth. *Journal of Adolescent Health* 2006;39(5):770-3.
433. Wilson DK, Kirtland KA, Ainsworth BE, Addy CL. Socioeconomic status and perceptions of access and safety for physical activity. *Annals of Behavioral Medicine* 2004;28(1):20-8.
434. Burton NW, Turrell G, Oldenburg B. Participation in recreational physical activity: why do socioeconomic groups differ? *Health Education & Behavior* 2003;30(2):225-44.
435. Fletcher GM, Behrens TK, Domina L. Barriers and enabling factors for work-site physical activity programs: a qualitative examination. *Journal of Physical Activity & Health* 2008;5(3):418-29.
436. Jewson E, Spittle M, Casey M. A preliminary analysis of barriers, intentions, and attitudes towards moderate physical activity in women who are overweight. *Journal of Science and Medicine in Sport* 2008;11(6):558-61.

437. Salmon J, Owen N, Crawford D, Bauman A, Sallis JF. Physical activity and sedentary behavior: a population-based study of barriers, enjoyment, and preference. *Health Psychology* 2003;22(2):178-88.
438. Wolin KY, Bennett GG, McNeill LH, Sorensen G, Emmons KM. Low discretionary time as a barrier to physical activity and intervention uptake. *American Journal of Health Behavior* 2008;32(6):563-9.
439. Sua'alii TM. Samoans and gender: Some reflections on male, female and fa'afafine gender identities. In: Macpherson C, Spoonley P, Anae M, editors. *Tangata o te moana nui: The evolving identities of Pacific people in Aotearoa/New Zealand*. Palmerston North: Dunmore Press, 2001:160-80.
440. Sallis JF, Cervero RB, Ascher W, Henderson KA, Kraft MK, Kerr J. An ecological approach to creating active living communities. *Annual Review of Public Health* 2006;27:297-322.
441. Sallis JF, Owen N. *Physical Activity and Behavioral Medicine*. Sage: Thousand Oaks, 1999.
442. Grogan S, Richards H. Body image: Focus groups with boys and men. *Men and Masculinities* 2002;4(3):219-32.
443. Ricciardelli LA, McCabe MP, Ridge D. The construction of the adolescent male body through sport. *Journal of Health Psychology* 2006;11(4):577-87.
444. Smolak L, Stein JA. The relationship of drive for muscularity to sociocultural factors, self-esteem, physical attributes gender role, and social comparison in middle school boys. *Body Image* 2006;3(2):121-29.
445. Pope HG, Jr., Gruber AJ, Mangweth B, Bureau B, deCol C, Jouvent R, et al. Body Image Perception Among Men in Three Countries. *Am J Psychiatry* 2000;157(8):1297-301.
446. Johnston O, Reilly J, Kremer J. Women's experiences of appearance concern and body control across the lifespan: challenging accepted wisdom. *Journal of Health Psychology* 2004;9(3):397-410.
447. McCabe MP, Ricciardelli LA. Body image dissatisfaction among males across the lifespan: a review of past literature. *Journal of Psychosomatic Research* 2004;56(6):675-85.
448. Rand CS, Wright BA. Continuity and change in the evaluation of ideal and acceptable body sizes across a wide age span. *International Journal of Eating Disorders* 2000;28(1):90-100.
449. Johnson PB, Malow-Iroff MS. *Adolescents and risk : making sense of adolescent psychology*. Westport, Conn.: Praeger, 2008.
450. Nowak M, Crawford D. Getting the message across: Adolescents' health concerns and views about the importance of food. *Australian Journal of Nutrition and Dietetics* 1998;55(1):3-8.
451. Lui D, New Zealand Mental Health Commission. *Family - a Samoan perspective*. Wellington, [N.Z.]: Mental Health Commission, 2003.
452. MacGregor J, McMaster ABJ. *Tongan families*. Wellington: JAM Publications, 1998.
453. Meleisea M, Schoeffel P. Samoan families in New Zealand: the cultural context of change. In: Adair V, Dixon R, editors. *The family in Aotearoa New Zealand*. Auckland: Longman NZ Ltd, 1998:158-78.

454. Vini N. Ora'anga Tamariki: Growing up in Tonga Reva. In: Crocombe RG, Crocombe MTi, editors. *Akono'anga Maori: Cook Islands Culture*. Suva, Fiji: Institute of Pacific Studies and Cook Islands Extension Centre, University of South Pacific, 2003:277-87.
455. Davidson M, Knafelz KA. Dimensional analysis of the concept of obesity. *Journal of Advanced Nursing* 2006;54(3):342-50.
456. Powell AD, Kahn AS. Racial differences in women's desires to be thin. *International Journal of Eating Disorders* 1995;17(2):191-5.
457. Dawson DA. Ethnic differences in female overweight: data from the 1985 National Health Interview Survey. *American Journal of Public Health* 1988;78(10):1326-9.
458. Franko DL, Herrera I. Body image differences in Guatemalan-American and White college women. *Eating Disorders: The Journal of Treatment & Prevention* 1997;5(2):119-27.
459. Miller KJ, Gleaves DH, Hirsch TG, Green BA, Snow AC, Corbett CC. Comparisons of body image dimensions by race/ethnicity and gender in a university population. *International Journal of Eating Disorders* 2000;27(3):310-6.
460. Altabe M. Ethnicity and body image: quantitative and qualitative analysis. *International Journal of Eating Disorders* 1998;23(2):153-9.
461. Cachelin FM, Rebeck RM, Chung GH, Pelayo E. Does ethnicity influence body-size preference? A comparison of body image and body size. *Obesity Research* 2002;10(3):158-66.
462. Crago M, Shisslak CM, Estes LS. Eating disturbances among American minority groups: a review. *International Journal of Eating Disorders* 1996;19(3):239-48.
463. Furnham A, Alibhai N. Cross-cultural differences in the perception of female body shapes. *Psychological Medicine* 1983;13(4):829-37.
464. Gittelsohn J, Harris SB, Thorne-Lyman AL, Hanley AJ, Barnie A, Zinman B. Body image concepts differ by age and sex in an Ojibway-Cree community in Canada. *Journal of Nutrition* 1996;126(12):2990-3000.
465. Lee AC. Differences in leadership perception : Pacific Islanders and Europeans in New Zealand organisations [MPhil]. University of Auckland, 1996.
466. Maliko TT. The hierarchy of voice : the context of the Congregational Christian Church of Samoa (C.C.C.S) in New Zealand [Thesis (MTheol (Moral and Practical))]. University of Auckland, 2000., 2000.
467. Meleisea M, Meleisea PS, Leatio'o K, Fitisemanu, T., Sio G, Tavale T, et al. Christianity. In: Meleisea M, editor. *Lagaga: A short history of Western Samoa*. Suva, Fiji: University of the South Pacific, 1987:52-70.
468. Watters RF. The Transition to Christianity in Samoa. *Historical Studies, Australia & New Zealand* 1959;8(32):392-99.
469. Ama AT, Crocombe RG, Crocombe MT, University of the South Pacific Institute of Pacific Studies, University of the South Pacific Cook Islands Extension Centre, Cook Islands Cultural and Historical Places Trust, et al. *Akono'anga Maori = Cook Islands culture*. Suva, Fiji: Institute of Pacific Studies ; in association with the Cook Islands Extension Centre, University of the South Pacific, 2003.

470. Ewins R, Macmillan Brown Centre for Pacific S. *Changing their minds : tradition and politics in contemporary Fiji and Tonga* Christchurch: Macmillan Brown Centre for Pacific Studies, 1998.
471. Hecht JA, Orans M, Janes CR. Social settings in Contemporary Samoans. In: Baker PT, Hanna JM, Baker TS, editors. *The Changing Samoans: Behaviour and Health in Transition*. Oxford: Oxford University Press, 1986:39-62.
472. Mead M. *Coming of age in Samoa : a study of adolescence and sex in primitive societies*. Harmondsworth,Eng.: Penguin, 1943.
473. Setefano I. O le faifeau: Redefining the paradigm of the faifeau of the Congregational Christian Church of Samoa in Aotearoa New Zealand [Masters of Theology]. University of Auckland, 2009.
474. Becker AE. Body image in Fiji: The self in the body and the community [PhD]. Harvard University, 1990.
475. Gregg E. The cultural ideology of body image among Fijian women [Honors Thesis]. Union College, 2000.
476. Williams LK, Ricciardelli LA, McCabe MP, Swinburn BA, Waqa GG, Bavadra K. A comparison of the sources and nature of body image messages perceived by indigenous Fijian and European Australian adolescent girls. *Sex Roles* 2006;55(7-8):555-66.
477. Daly M. *Tonga : a new bibliography* Honolulu: University of Hawaii Press, 2009.
478. see <http://www.state.gov/r/pa/ei/bgn/1842.htm> for Samoa.
479. see <http://www.state.gov/r/pa/ei/bgn/16092.htm> for Tonga.
480. Agnew F, Pulotu-Endemann FK, Robinson G, Sua'ali'i-Sauni T, Warren H, Wheeler A, et al. Pacific Models of Mental Health Service Delivery in New Zealand ("PMMHSD") Project. Auckland: Health Research Council in New Zealand, 2004.
481. Finau S, A. Health, environment and development: towards a Pacific paradigm. *Pacific Health Dialog* 1996;3(2):266-78.
482. Tukuitonga CF. Pasifika Healthcare: a model for delivering primary healthcare to Pacific people in New Zealand. *First Pacific Health Conference*. Auckland, New Zealand, 1997.
483. Laing P, Mitaera J. Samoan and Cook Islanders' perspectives on health. In: Spicer J, Trlin A, Walton J, editors. *Social Dimensions of Health and Disease*. Palmerston North: Dunmore Press Ltd, 1994:204-18.
484. Allardice RW. *A simplified dictionary of modern Samoan*. Auckland: Polynesian Press, 1985.
485. Schaaf MR. Pacific Island women, body image and sport. *World Indigenous Peoples' Conference on Education 'New Horizons of Knowledge'*. Hamilton, Aotearoa/New Zealand, 2005.
486. WHO. <http://www.who.int/about/definition/en/print.html>, Accessed 16 March 2009.
487. Macpherson C, Macpherson L. *Samoan medical belief and practice*. Auckland: Auckland University Press, 1990.

488. Fallon A. Culture in the mirror: Sociocultural determinants of body image. In: Cash TF, Pruzinsky T, editors. *Body Images: Development, deviance and change*. New York: The Guildford Press, 1990:80-109.
489. Nichter M. Hype and weight. *Medical Anthropology* 1991;13(3):249-84.
490. Turner BS. The Government of the Body: Medical Regimens and the Rationalization of Diet. *The British Journal of Sociology* 1982;33(2):254-69.
491. Turner B. *The Body in Society*. Oxford: Basil Blackwell, 1984.
492. Massara EB. Obesity and cultural weight evaluations. *Appetite* 1980;1:291-98.
493. Ritenbaugh C. Body size and shape: a dialogue of culture and biology. *Medical Anthropology* 1991;13(3):173-80.
494. Chang VW, Christakis NA. Medical modelling of obesity: a transition from action to experience in a 20th century American medical textbook. *Sociology of Health & Illness* 2002;24(2):151-77.
495. Brodie DA, Slade PD, Riley VJ. Sex differences in body-image perceptions. *Perceptual and Motor Skills* 1991;72(1):73-74.
496. Fallon AE, Rozin P. Sex differences in perceptions of desirable body shape. *Journal of Abnormal Psychology* 1985;94(1):102-05.
497. Gross SM, Gary TL, Browne DC, LaVeist TA. Gender Differences in Body Image and Health Perceptions among Graduating Seniors from a Historically Black College. *Journal of the National Medical Association* 2005;97(12):1608-19.
498. Rozin P, Fallon A. Body image, attitudes to weight, and misperceptions of figure preferences of the opposite sex: A comparison of men and women in two generations. *Journal of Abnormal Psychology* 1988;97(3):342-45.
499. Allan JD, Mayo K, Michel Y. Body size values of white and black women. *Research in Nursing & Health* 1993;16(5):323-33.
500. Dohnt H, Tiggemann M. The contribution of peer and media influences to the development of body satisfaction and self-esteem in young girls: A prospective study. *Developmental Psychology* 2006;42(5):929-36.
501. Grabe S, Ward LM, Hyde JS. The role of the media in body image concerns among women: A meta-analysis of experimental and correlational studies. *Psychological Bulletin* 2008;134(3):460-76.
502. Wertheim EH, Paxton SJ, Schutz HK, Muir SL. Why do adolescent girls watch their weight? An interview study examining sociocultural pressures to be thin. *Journal of Psychosomatic Research* 1997;42(4):345-55.
503. Strauss RS. Self-reported weight status and dieting in a cross-sectional sample of young adolescents: National Health and Nutrition Examination Survey III. *Archives of Pediatrics & Adolescent Medicine* 1999;153(7):741-7.
504. Stunkard AJ. Factors in Obesity: Current views. In: Pena M, Bacallao J, editors. *Obesity and Poverty: A new public health challenge*. Washington: Pan American Health Organization, 2000:23-28.

505. Baker PT, Hanna JM, Baker PT, editors. *The Changing Samoans: Behavior and health in Transition*. Oxford: Oxford University Press, 1986.
506. Miller MN, Pumariega AJ. Culture and eating disorders: a historical and cross-cultural review. *Psychiatry* 2001;64(2):93-110.
507. Pike KM, Borovoy A. The rise of eating disorders in Japan: issues of culture and limitations of the model of "westernization". *Culture, Medicine & Psychiatry* 2004;28(4):493-531.
508. Craig P, Halavatau V, Comino E, Caterson I. Perception of body size in the Tongan community: differences from and similarities to an Australian sample. *International Journal of Obesity & Related Metabolic Disorders* 1999;23(12):1288-94.
509. Duke L. Get real!: Cultural relevance and resistance to the mediated feminine ideal. *Psychology & Marketing* 2002;19(2):211-33.
510. Baker PT, Hanna JM. Perspectives on Health and Behavior of Samoans. In: Baker PT, Hanna JM, Baker TS, editors. *The Changing Samoans: Behavior and Health in Transition*. New York: Oxford University Press, 1986:419-34.
511. Bindon J, Dressler WW, Gilliland MJ, Crews DE. A cross-cultural perspective on obesity and health in three groups of women: the Mississippi Choctaw, American Samoans, and African Americans. *Collegium Antropologicum* 2007;31(1):47-54.
512. Crews DE. Body weight, blood pressure and the risk of total and cardiovascular mortality in an obese population. *Human Biology* 1988;60(3):417-33.
513. Crews DE. Multivariate prediction of total and cardiovascular mortality in an obese Polynesian population. *American Journal of Public Health* 1989;79(8):982-6.
514. Defay R, Jaussent I, Lacroux A, Fontbonne A. Relationships between glycaemic abnormalities, obesity and insulin resistance in nondiabetic Polynesians of New Caledonia. *International Journal of Obesity* 2007;31(1):109-13.
515. Okihiro M, Harrigan R. An overview of obesity and diabetes in the diverse populations of the Pacific. *Ethnicity & Disease* 2005;15:S5-71-80.
516. Pawson IG, Janes C. Massive obesity in a migrant Samoan population. *American Journal of Public Health* 1981;71(5):508-13.
517. Rush EC, Plank LD, Davies PS, Watson P, Wall CR. Body composition and physical activity in New Zealand Maori, Pacific and European children aged 5-14 years. *British Journal of Nutrition* 2003;90(6):1133-9.
518. Rush EC, Plank LD, Mitchelson E, Lалу MS. Central obesity and risk for type 2 diabetes in Maori, Pacific, and European young men in New Zealand. *Food & Nutrition Bulletin* 2002;23(3 Suppl):82-6.
519. Sluyter JD. Validation of bio-impedance analyser in Auckland youth [Masterate thesis]. University of Auckland, 2007.
520. Duncan E. Obesity and its determinants in girls from five ethnic groups [Doctor of Philosophy]. Auckland University of Techonology, 2008.

521. Brodney S, Blair SN, Lee C. Is it possible to be overweight or obese and fit and healthy? In: Bouchard C, editor. *Physical Activity and Obesity*. Champaign, IL: Human Kinetics, 2000:355-71.
522. Eisenmann JC. Physical activity and cardiovascular disease risk factors in children and adolescents: an overview.[see comment]. *Canadian Journal of Cardiology* 2004;20(3):295-301.
523. Poland M, Paterson J, Carter S, Gao W, Perese L, Stillman S. Pacific Islands Families Study: factors associated with living in extended families one year on from the birth of a child. *Kotuitui: New Zealand Journal of Social Sciences Online* 2007;2:17-28.
524. Koloto A, Sharma S. Pasifika Women's Economic Well-being Study. Wellington: Report prepared for Ministry of Women's Affairs, 2005.
525. Miech RA, Kumanyika SK, Stettler N, Link BG, Phelan JC, Chang VW. Trends in the association of poverty with overweight among US adolescents, 1971-2004. *JAMA: Journal of the American Medical Association* 2006;295(20):2385-93.
526. Wilson NC, Parnell WR, Wohlers M, Shirley PM. Eating breakfast and its impact on children's daily diet. *Nutrition & Dietetics* 2006;63(1):15-20.
527. Wilson N, Thomson G, Jenkin G. More evidence for action on New Zealand's obesogenic school environment and food pricing. *New Zealand Medical Journal* 2007;120(1248):U2397.
528. Ebbeling CB, Sinclair KB, Pereira MA, Garcia-Lago E, Feldman HA, Ludwig DS. Compensation for energy intake from fast food among overweight and lean adolescents. *JAMA: Journal of the American Medical Association* 2004;291(23):2828-33.
529. Jackson M, Ball K, Crawford D. Beliefs about the causes of weight change in the Australian population. *International Journal of Obesity* 2001;25:1512-16.
530. Harrington JM. Health effects of shift work and extended hours of work. *Occupational & Environmental Medicine* 2001;58(1):68-72.
531. New Zealand Council of Trade Unions. Interim report of the thirty families project: The impact of work hours on New Zealand workers and their families. Wellington, NZ: New Zealand Council of Trade Unions, 2002.
532. Sparks K, Cooper C, Fried Y, Shirom A. The effects of hours of work on health: A meta-analytic review. *Journal of Occupational and Organizational Psychology* 1997;70(4):391-408.
533. Rogers AE, Hwang WT, Scott LD, Aiken LH, Dinges DF. The working hours of hospital staff nurses and patient safety. *Health Affairs* 2004;23(4):202-12.
534. Weber M, Kalberg S. *The Protestant ethic and the spirit of capitalism / Max Weber ; new introduction and translation by Stephen Kalberg*. Los Angeles, Calif.: Roxbury Pub. Co, 2002.
535. Schor J. *The overworked American : the unexpected decline of leisure*. New York, N.Y: BasicBooks, 1993.
536. Fursman L, Department of Labour. Work-life balance in New Zealand: A snapshot of employee and employer attitudes and experiences. Wellington, NZ: Department of Labour, 2006.

537. Centers for Disease Control & Prevention. Prevalence of Self-Reported Physically Active Adults - United States, 2007. *Morbidity & Mortality Weekly Report* 2008;December 5, 2008 / 57(48).
538. Ferreira I, van der Horst K, Wendel-Vos W, Kremers S, van Lenthe FJ, Brug J. Environmental correlates of physical activity in youth - a review and update. *Obesity Reviews* 2007;8(2):129-54.
539. Swinburn BA, Egger G. Preventive strategies against weight gain and obesity. *Obesity Reviews* 2002;3(4):289-301.
540. French SA. Population approaches to promote healthful eating behaviors. In: Crawford D, Jeffery RW, editors. *Obesity Prevention and Public health*. Oxford: Oxford University Press, 2005:101-27.
541. Wrigley N, Warm D, Margetts B, Whelan A. Assessing the Impact of Improved Retail Access on Diet in a 'Food Desert': A Preliminary Report. *Urban Studies* 2002;39(11):2061-82.
542. Carter M, Swinburn BA. Measuring the 'obesogenic' food environment in New Zealand primary schools. *Health Promotion International* 2004;19(1):15-20.
543. Mackay LM, Schofield GM, Schluter PJ. Validation of Self-Report Measures of Physical Activity: A Case Study Using the New Zealand Physical Activity Questionnaire. *Research Quarterly for Exercise & Sport* 2007;78(3):189-96.
544. Riffenburgh RH. *Statistics in medicine*. Amsterdam: Elsevier Academic, 2006.
545. Schaaf D. Cardiovascular disease risk factors in Pacific adolescents : the Auckland high school heart survey University of Auckland, 2005.
546. Finau S. Health research: A tool for social justice and the poor. *Asia Pacific Journal of Public Health* 1998;10(2):106-10.
547. Tupuola AM. Raising research consciousness the FaaSamoa Way. *New Zealand Annual Review of Education* 1993;3:175-89.
548. Anae M. Inside Out: Methodological issues on being a 'Native' researcher. *Pacific Health Dialog* 1998;5(2):273-79.
549. Utter J, Scragg R, Percival T, Beaglehole R. School is back in New Zealand--and so is the junk food. *New Zealand Medical Journal* 2009;122(1290):5-8.
550. Centers for Disease Control & Prevention. Prevalence of self-reported physically active adults-- United States, 2007. *MMWR - Morbidity & Mortality Weekly Report* 2008;57(48):1297-300.
551. Wilson DK, Williams J, Evans A, Mixon G, Rheaume C. Brief report: a qualitative study of gender preferences and motivational factors for physical activity in underserved adolescents. *Journal of Pediatric Psychology* 2005;30(3):293-7.
552. Kumanyika S. Bringing evidence and practice closer together: Models for obesity prevention in African Americans. *Community-based Obesity prevention: A satellite conference to the International Congress on Obesity*. Deakin University, Victoria Australia, 1-2 September 2006. Deakin University, Victoria Australia, 2006.

553. Lichtman SW, Pisarska K, Berman ER, Pestone M, Dowling H, Offenbacher E, et al. Discrepancy between self-reported and actual caloric intake and exercise in obese subjects. *New England Journal of Medicine* 1992;327(27):1893-8.
554. Tukuitonga C. You want fries with that? The challenges of diabetes prevention and treatment among Pacific Peoples in New Zealand. *Diabetes Research & Clinical Practice* 2008;79:S12.